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Barry G. Atticks
Millersville University, batticks@millersville.edu

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Speed-Testing in Audio Engineering Education: An Imperative Assessment Tool

Barry Atticks, Ph.D.
Associate Professor
Millersville University
(Millersville, PA)

ABSTRACT

Multiple choice tests, fill-in the blanks, and essay question assessments do have their place in academia, but for students preparing for careers as studio engineers, live engineers, and producers, other assessments that test readiness for troubleshooting “real-world” problems in audio technology are needed. Being able to quickly solve signal flow issues is crucial whether it is for a high paying client in the studio or a rock band during a live show for 10,000 fans. It is well-documented that experiential learning is key in audio education, but I argue that it is not just the ability to complete hands-on tasks correctly but being able to do it as efficiently and at the fastest speed possible. Because learning how to handle pressure in the fast paced live and studio audio worlds is crucial for success, this paper focuses on the “need for speed” in audio education training. I will present selective interviews from new employees in the live audio field, employers in the live audio field, and studio owners who support speed-testing as an invaluable and necessary—if often neglected—assessment tool for career preparation. This paper will also address speed-testing online and future studies that may utilize virtual reality testing.

BACKGROUND

I recently took one of my classes to a local club to have a clinic with the live audio engineer before a show. Sebastian Bach, former lead singer of the rock band Skid Row, and his band were the headliners for the night. His dedicated fans arrived at 7PM, stood waiting for an hour prior to the two opening bands, that they tolerated, who played for two hours. Three hours

after the doors opened, Sebastian Bach finally took the stage. During his third song the audio from his mic went silent! He threw the mic to the floor and the band walked off stage. The fans who have been standing for 3 hours to see Bach's act started an uproar. The club owner was panicking, and the tour manager was angry. The engineer calmly traced the problem and restored audio 6 long minutes later under severe time pressure from multiple constituencies. My students looked at me and said, "Now we know why speed-tests that you use are critical for our futures!"

SPEED-TESTING DEFINED

From my professional experience, I knew when I started teaching that traditional assessments in undergraduate education were inadequate to truly measure preparedness for the industry. I started giving "speed-tests" designed to simulate real-world applications. For example, as part of the midterm of the Recording 1 course, students come into the studio individually and are told that a client is coming in seven minutes and they must have a working session up and ready to go. Necessary tasks include setting up I/Os (inputs/outputs) on the DAW, assigning busses, setting up headphone and talkback tracks, adjusting mic pre-amps, activating phantom power, and setting up the patch-bay. As the students' progress through the first course, these speed-tests become increasingly more challenging. For example, they may be assigned a session that utilizes both the vocal booth and live room, and made more difficult because the session is already set up, and they must find the items that were patched or set incorrectly in only a few minutes. Basically, they quickly figure out why they are not hearing audio, for example, or why the vocalist can't hear the music, or why the drummer in the live room can't hear the talkback but the vocalist in the booth can. This situation is more challenging than setting up a session from scratch but is a more realistic troubleshooting scenario similar to what students will inevitably encounter on the job.

DISCUSSION

The assertion that my students perceive speed-testing as a crucial part of their training is supported by the quotes below. However, perception and reality can be quite different. Therefore, following the current students' testimonials, I present interviews from practitioners in

the field supporting the perceptions of the current students that speed-testing is crucial for preparing them to be successful.

Student Perception of Speed-Testing

- “Speed-tests are more effective than multiple choice because it requires us to use our practical knowledge in a hands-on way. It simulates the real-world application and pressure better.” Jake C
- “For multiple-choice you are memorizing facts which is fine, but when you work in a recording studio you need to be able to understand the ins and outs of the space in a tangible sense and be able to quickly troubleshoot issues as they arise. For me personally, speed-tests were much more informative on my understanding of the recording studio and whether I could operate and troubleshoot in a timely manner.” Annelise L
- “I think speed-tests are important, not only because they can give you a feel of how working a real job in the field feels, but they are also a great tool to gauge your own progress and knowledge. Paper tests and multiple-choice answers are no substitute for working knowledge and ability in a real studio.” Jordan H
- “Speed-tests mandate quick critical thinking to solve technical challenges and require the participant to be well versed in all aspects of studio technology in order to provide quick solutions to sometimes complex issues.” Owen M

Selective Interviews from New Employees in the Live Audio Industry

What value do employees in the live audio industry, who had speed-testing as part of their education, place on speed-testing as an assessment tool for career preparation? To find out the answer to this question, I interviewed recent graduates of the Millersville University Music Industry program who are working full-time in the live audio industry. They unanimously

support the integration of speed-testing as an applicable and necessary assessment tool that assists with career preparation.

Interview #1

Andrew Black is a Systems Engineer & Crew Chief with Clair Global who has toured in the last few years with acts such as Ariana Grande and the Doobie Brothers. He relayed that time is always a major factor in his job as no matter how much time you think you might have, there is always less time available. He listed experiential learning as the most applicable learning method to his job which was no surprise considering the nature of his work, but he said the speed-testing assessment component is the most valuable way to test this knowledge for someone working in touring audio. He says,

Many times, you have much less time than expected, something breaks that will slow work down, or an unchangeable element, like venue logistics/design will put the halt to what is normally efficient. Being able to work at speeds is very important in these moments when you must play catch up. This is a perfect example of speed-testing in the real world. Can you remember all the steps to this long tedious process, go faster than you might like, and do it safely? This type of speed-test happens almost daily in my job, and quickly proves who is proficient at their respective positions. (A. Black, Personal Communication, March, 2023)

When asked about the proverbial “real-world” example, he relayed a story that recently occurred. A tractor trailer carrying audio gear broke down so the normal load-in time for gear that usually commenced at 8 a.m. and would be completed by 3 p.m., changed to a load-in time at 3 p.m. Pressure was on everyone to work quickly to get the PA system up and running in record time which allowed the show to begin at the scheduled time. The subject said that speed-testing experience was certainly helpful in this scenario since one needed to understand a sequence of tasks and be able to execute procedure quickly and correctly. He said it is important for someone to feel comfortable and calm under pressure and speed-testing can help build that confidence in their skillset. (A. Black, Personal Communication, March, 2023)

Interview #2

According to Front of House lead audio engineer in Denver, Nikol Grandinetti, speed-testing is the best way to assess knowledge, just as experiential learning is the most applicable form of training for audio engineering. She says that she works in a very fast-paced environment that requires quick and confident decision making. She continues by saying that someone who can quickly setup and troubleshoot a problem is an asset to have on your team. Those professionals who can maneuver around a console and complete setups or sound checks quickly AND correctly are the people who make great shows happen. She argues that audio education needs to include this type of assessment as time is the biggest factor in live sound, and if you can't meet every single deadline when you arrive on site, you will struggle. She says time is something she fights with every single day, and gives an example of a recent experience where extra musicians were added to one of the bands at the last minute. She had to quickly repatch and reorganize the setups on the console, in only 10-15 minutes, and complete the new setup before soundcheck. Speed-testing experience prepared her for that situation. (N. Grandinetti, Personal Communication, March, 2023)

Interview #3

Recent graduate Emily Cogle works on the road staff for Clair Global and has recently worked with Greta Van Fleet and Mötley Crüe. She notes that speed-testing was a valuable aspect of her education. In her job, she must quickly identify frequencies in seconds to control/EQ them to make a great mix quickly and prevent feedback loops. She says that when it comes to load in and set-up there is sometimes less time than one would like so you must act quickly and efficiently. She cites a recent example of having to set up monitor mixes for an opening band on a national tour quickly when the setup got delayed. She said she efficiently completed her tasks due to her important training, which she said included frequency identification, ear training, and speed-testing. (E. Cogle, Personal Communication, March, 2023)

Interview #4

Grant Patrick is a console technician at Clair Global and FOH engineer for a local theater. Although he is not currently “on the road” like the interviewees above, speed-testing is

nevertheless crucial to prepare for professional success. He says the job is very fast paced and a lot of events happen with minimal notice at best. If you are not effective AND fast, you will fall behind and end up slowing down someone else farther down the line. In his work as a FOH engineer, if something fails before a show and you're on the call to fix it, an entire performance is on the line. Thousands of people could be left unnecessarily idle if you are not fast enough. In his day job, he constantly has gigs added to his list that must get done in a day or two, and he is constantly judged on efficiency, not just the ability to complete a task. He concludes that speed-testing helped with this because it provided him a way to experience and handle stress under pressure. In truth, he says, stress is often because of limited time, not necessarily the difficulty or complexity of the issue at hand. Several people may have the know-how to get the job done, but if they crack under pressure, then that knowledge is pointless. (G. Patrick, Personal Communication, March, 2023)

New Employees Interview Summary

The interviews with recent graduates from the Millersville University Music Industry program who are working full-time in the live audio industry suggest that speed-testing is highly valued as an assessment tool for career preparation in the live audio field. These graduates, who are working in touring live audio, unanimously agreed that time is a critical factor in their work and that the ability to work quickly and efficiently is essential for success in their industry. According to the interviewees, speed-testing is considered the most valuable way to assess their knowledge and skills in the context of live audio. By testing their ability to work swiftly and make quick decisions, speed-testing simulates the high-pressure environment they often encounter in their line of work. This type of assessment helps them build confidence in their skillset and prepares them for the fast-paced nature of their industry.

Selective Interviews from Employers in the Live Audio Industry

Interview #5

Dave Lester, the Director of Education and Safety at Clair Global, works in the program that trains new hires before they go out on the road. He says that it is very beneficial for

educational institutions in this field to create scenarios for students that replicate the pressures of the job. Many students do not have this understanding when they first enter the workforce and he further states that if a school can help develop the sense of urgency and responsibility, it will be very beneficial for that student. He argues that speed is important and a much needed and required skill, but handling the urgency that usually goes with it is also a critical element.

While having demonstrated ability to troubleshoot quickly can be useful as an assessment, I think there is a more important underpinning. I think what may be more important than developing “quickness” or “speed” is developing a student’s understanding of the need for urgency in general and servicing the client in promptness as is expected. In other words, developing a student’s psychological framework for their career objective and what that consists of and how they understand and place value on certain skills such as meeting client expectations. Being able to troubleshoot quickly to service the client is always a needed skill and a requirement. (D. Lester, Personal Communication, March 2023)

He also maintains that critical thinking is a key element in audio education to build efficiency. One example of how this is addressed in our classroom is that students are not learning by rote or merely demonstrating a variety of routine tasks for speed on specific equipment. Rather, they are being trained to think critically about why something is not working, which can be applicable in many situations. He supports my philosophy by saying:

Troubleshooting is a deep skill that takes time to develop for many. It starts out as understanding and troubleshooting specific equipment that has specific steps for that piece of gear. Knowing the specifics of gear allows better trouble shooting on that gear but many times may not transfer to other less known equipment. What is important to help students develop from an early age is the over-used concept and term “critical” thinking. I think where the term critical thinking gets used incorrectly is many associate that trouble shooting develops critical thinking, while indirectly it can but not always as mentioned above. If a student truly understands and applies critical thinking, (the objective analysis and evaluation to form judgement) they should be able to solve

problems at deeper levels with topics and gear that are new to a student. (D. Lester, Personal Communication, March 2023)

Interview #6

Chris Strayer is CEO of his own light and sound company headquartered in Rock Lititz in Pennsylvania. He says speed-testing would be very valuable for training future employees especially in live audio since time is very crucial. Often, we only have minutes to make the setup transition from band A to band B. When doing events with multiple bands, it's all about time management. He says the fans don't want to wait 15 minutes, yet alone an hour, to get one band off the stage and another on the stage. Naturally the band coming on the stage wants to sound its best, so speed becomes very crucial in getting bands on and off the stage and ensuring they sound phenomenal when they hit their first note! (C. Strayer, Personal Communication, March, 2023)

Employers Interview Summary

According to the employers, speed-testing plays a crucial role in preparing individuals for the demands of the live audio industry. By assessing how quickly and effectively individuals can handle various tasks, speed-testing helps identify their ability to work efficiently under pressure. The employers stress that developing a sense of urgency is vital, as live audio situations often require quick decision-making and problem-solving.

Audio Faculty Interview

Interview #7

I interviewed Professor Jeffrey Snyder who teaches music technology at a liberal arts school. Although his institution does not speed-test as an assessment, they have simulated what it is like in high pressure studio situations with anxious producers and engineers. The inclusion of his interview is to show that speed is the key in the industry, and one needs to be able to troubleshoot quickly to keep the client satisfied. It is interesting to note that students at that institution reported that they were "shocked" about this type of simulation, even though it is a

crucial form of training. They even complained to administration to assign a new professor to the course since they weren't accustomed to this kind of "unusual" pressure that simulated a real-world experience.

The professor brought in engineer Shelley Yakus who was the chief engineer and vice president of A&M Records and was nominated for induction into the Rock and Roll Hall of Fame in 1999. He has worked with the likes of John Lennon, Tom Petty, Stevie Nicks, Madonna, and U2. As told by professor Snyder who brought Shelley to his class:

Shelley had students come in to record musicians they didn't personally know in a limited time. He'd pull a headphone out (of the output) just enough that it was in place, but not working. Then the musician would point to the headphones signaling that no audio was coming out, and the student would be pressed to quickly find a solution. Most students began pushing buttons on the board, blaming the technology, and adding to the stress of finding what was wrong, Shelly would begin acting the same way producers treated him in such situations, reminding the students that they were costing money, and the musicians were getting angry having to wait. Most students buckled but some stayed calm and began looking for the easiest solution (go out and make sure headphone was plugged in). There often were tears from those who couldn't stand the pressure, but even now they refer to that (event) preparing them what to expect and how to react under pressure. Note that the class/teacher evaluations were low as students (reported that they) weren't used to a teacher being 'mean.' So, administration asked for someone else to teach the class. Students though still brag about learning from Shelly. (J. Snyder, Personal Communication, March 2023)

Interviews with Grammy Nominated Studio Owners and Engineers/Producers

Interview #8

Grammy nominated engineer Grant McFarland from Atrium Audio agrees that speed and creative problem solving are crucial in the studio world. He says having enough of those unexpected challenges thrown at someone will give them the experience to grow and learn, which should happen at the training level. He says there have been many moments in his career

where accuracy and quickness were essential as time is money and high-profile clients don't like to wait around. For recording studio engineers, an invaluable skill is to not only complete a project quickly but make it sound great. He continues that this can set apart a good engineer from a great one and that his clients really appreciate speed and efficiency. For students to learn about music engineering in a university setting, it's important they understand that real world deadlines may not always match up with what they have been faced with in education settings. Unlike academic assignments, commercial projects often need to be completed within 1-2 days instead of several weeks. He concludes that mastering speed as a learning skillset goal is vital for those students looking to become an audio engineer. (G. McFarland, Personal Communication, March, 2023)

Interview #9

Grammy nominated engineer/producer David Ivory says that training needs to include a speed-testing element. He agrees that in many educational settings too much emphasis is placed on just completing projects without assessing how long it takes the student to accomplish tasks in recording. The analogy Ivory uses to describe the difference between an amateur recording session and a professional one is apt. Just as college football and the NFL have vastly different levels of skill, speed, and intensity, so do amateur and professional recording sessions. Professionals have the experience and training necessary to work quickly and efficiently, ensuring their clients are satisfied and that the studio is profitable. He relayed an example of a studio employee who worked fast to get a session up and running, but the cables were not run cleanly, and the inputs were wrong. The band ended up waiting needlessly, not only costing money but highly embarrassing the studio. (D. Ivory, Personal Communication, March, 2023)

Studio Owners Interview Summary

The studio engineers suggest that students in audio education should be exposed to real-world deadlines that align with the fast-paced nature of the industry. They believe that the timelines of academic assignments may not always reflect the time constraints faced in the professional settings. By experiencing and practicing working under tight deadlines, students can develop the necessary skill to thrive in the recording studio environment.

SPEED-TESTING RESEARCH DURING COVID

During the pandemic when we were required to conduct classes online, I implemented speed-testing using a 2D computer program which would test speed in setting up virtual patch cables and working an analog mixer. I wondered how this would compare to testing in a real physical studio. When we returned in the fall, each student was involved in both a 2D version of speed-testing as well as the traditional testing in person in the studio. (See Appendix A for pictures of setup.)

Note that the study did not test the exact same outcomes, which would have been optimal. Both tested the ability to work quickly but the task was not exactly similar. It was limited to what the online software could do compared to a full-fledge studio that included ProTools as the DAW and a digital mixing board. A future study will test a new VR software version of a mixing studio which will more closely align the in-person and alternate methods of testing. See paragraph below to understand what was tested.

Traditional Hands-on Speed Testing used in the Study

For the hands-on speed test, second-semester students majoring in music industry come into the recording studio and are told that that a vocalist will be arriving to the studio in 5 minutes to record over a pre-recorded background track. The test requires them to complete several tasks within a limited timeframe:

- Patching cables on the patch bay: Students need to correctly connect the appropriate cables to establish audio signal flow between devices.
- Accessing pre-amps: Students must be able to correctly access and set appropriate levels.
- Students must setup a ProTools session: They must setup necessary tracks, I/O's, and busses for the session.

- **Monitoring:** The end goal is for the vocalist to hear themselves, the track, and the engineer at appropriate levels. The engineer also must be able to hear the vocalist and background track.

Online Speed Testing used in the Study

The online speed test focuses on working with a 4-channel analog simulated mixer (Maggie Mixer from Soundcheck 2D software program) that has pre-loaded tracks. The students need to demonstrate their proficiency in the following tasks:

- **Hearing audio from 4 channels:** They should quickly configure the mixer to route and adjust the levels of the channels so audio can be heard.
- **Applying Compression to track one:** Students need to correctly use the patch bay to route signal to a compressor and return it to the track. They also must activate the compressor, configure the settings correctly, and ensure the insert in the channel strip is active.
- **Apply reverb to tracks 2 and 3.** Using sends and stereo busses, students must route the audio from these tracks to a digital reverb until via the master section of the mixer and the patch bay. They also need to adjust setting on the reverb to make it audible.

There were two different methods used to test students' (n=25) speed in the studio; an online speed-test and a hands-on speed-test. The grades for both tests varied widely, with the online speed-test ranging from 0%-100% and the hands-on speed-test ranging from 43%-100%. The data shows that more students scored better than 80% on the online speed-test compared to the hands-on speed-test. Specifically, 85% of students scored better than 80% on the online speed-test, while only 62% of students scored better than 80% on the hands-on speed-test. It is interesting to note that students who did well on one method of testing did not necessarily do well on the other method. For example, some students who did poorly on the hands-on speed-test did well on the online speed-test, and vice versa. This lack of correlation between the two data sets is reflected in the low correlation coefficient of .24.

One possible explanation for the difference in performance between the two tests is the availability of resources. Specifically, the 2D virtual studio used in the online speed-test may have been more accessible to students than the physical studio used in the hands-on speed-test. While the 2D virtual studio was available to students 24 hours a day, the physical studio was only available for two hours per week. This may have given students who performed much better on the online speed-test an advantage, as they had more opportunities to practice using the virtual studio. For those students who scored much higher on the hands-on method, it is possible that some students simply did not focus on or spend enough time with the new method of learning presented in the 2D virtual studio. This could explain why some students who did well in the physical studio did not perform as well on the online speed-test. Overall, the data suggests that there are multiple factors that can influence student performance on speed tests including resource availability and student engagement with different learning methods, specifically those whose scores varied drastically between testing methods.

There were three expected outcomes of this study. First, that there would be a high correlation between the two testing methods. As explained in the previous paragraph, the correlation was low due to some students doing significantly better on one method but not the other testing method, although there was a high correlation on those doing well on both tests. Second, it was predicted that students would feel that the online speed-test was a fair assessment of their studio knowledge. They were asked to respond to the following questions after one of the online speed-tests. “Do you feel that the online studio effectively measured your knowledge of a real studio?” The consensus was that, although the online environment is suitable when a “real” studio is not available, the online environment is not a substitute for experiential learning at this point. It is possible that using a VR studio simulation in a future research study could lead to interesting speed-test results, as it would closely replicate the experience of being in a traditional studio. If students can have access to these studio environments 24/7, they would be able to increase the time to practice speed and accuracy. Lastly, it was also predicted that the online studio environment for testing was a better measure of knowledge than written exams. Unlike the second question above, the students were unanimous in the fact that this online speed-test of studio knowledge far outweighs the traditional written exams in assessing their preparedness for working in a studio.

CONCLUSION

Based on the interviews with recent graduates from the Millersville University Music Industry program who are working full-time in the live audio industry, it can be fairly concluded that speed-testing is highly valued as an assessment tool for career preparation in the live audio field. All interviewees agreed that time is a critical factor in their work and that being able to work quickly and efficiently is essential to their success. They stated that speed-testing is the most valuable way to test their knowledge and skills for someone working in touring live audio and that it helps build confidence in their skillset in a high-pressure environment.

Both interviews of employers in the live audio industry highlighted the importance of speed and efficiency in the audio industry. They emphasized the importance of speed-testing in training employees and the importance of developing a student's understanding of urgency, responsibility, and critical thinking in audio education to build efficiency. Both respondents emphasized the importance of speed in the recording studio environment. They indicated a belief that mastering speed and efficiency is crucial for success in this field: time is money and clients expect quick turnarounds. They suggested that students be exposed to real world deadlines in their training, which may not always match up with the timelines of academic assignments. They agreed that accurate and quickness must come together to set apart a good engineer from a great one. Ultimately, their comments confirm that speed is a key factor in ensuring that the recording process runs smoothly and efficiently, minimizing downtime and maximizing productivity in the studio.

Speed-testing can indeed be a valuable tool for assessing a student's preparedness for live audio and music production careers. In these fields, professionals often work under high pressure and time-sensitive situations, and being able to work quickly and efficiently is crucial. Speed-testing can help students develop their skills in working quickly and accurately under pressure and can also help them identify areas where they need to improve. It is worth noting that speed-testing should not be the only assessment tool used in audio engineering education. Students also need to develop their critical thinking skills, problem-solving abilities, and creativity, among other things. A well-rounded education that includes both theoretical and practical components is essential for preparing students for successful careers in the audio and music production industries, but speed-testing is a necessary part of that education.

APPENDIX A

Photo 1

A student begins a speed test by inserting patch cables in the correct inserts.



Photo 2

A student is evaluating the recording studio setup on the DAW for the Speed Test



Photo 3

A simple setup for beginning students learning signal flow.

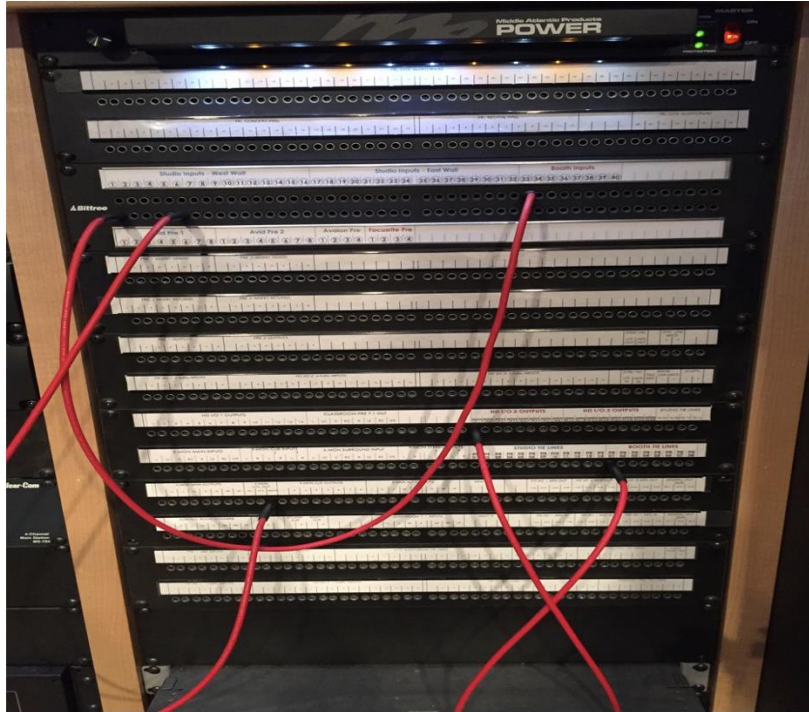


Photo 4
Digital Mixer in SoundCheck 2D



Photo 5

Virtual simulation of patching cables to practice signal flow

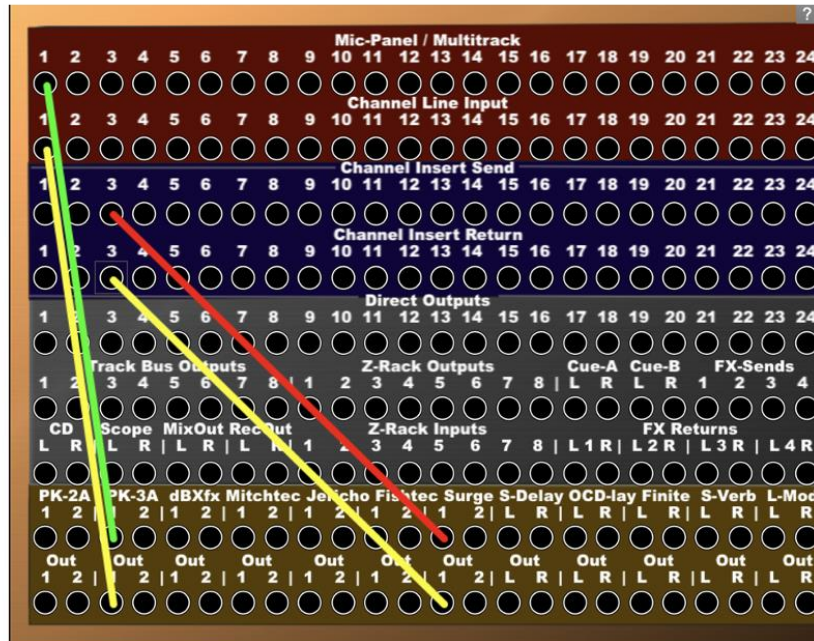


Photo 6

The patchbay and outboard gear of the “real” studio (partial view)



Photo 7

The patchbay and outboard gear of the “virtual” studio (partial view)



ABOUT THE AUTHOR

Dr. Barry Atticks teaches music technology courses at Millersville University. Dr. Atticks holds degrees in Business Management/Piano (B.S.), Commercial Music Composition (M.M), Intelligence/Terrorism (M.S.) and Music Education (Ph.D) from Elizabethtown College, California State University-Los Angeles, American Public University, and Penn State University, respectively. Additionally, he has studied music technology at Berklee College of Music and the University of Oslo. He has worked as a sound designer and a music engineer in New York and a

sound effects and music editor in Los Angeles. He has also appeared in television shows such as "Power Rangers" and "Beetle Borgs," and in Showtime movies.

Dr. Atticks received the Educator of Note award (Educator of the Year) in 2022 from the Central Pennsylvania Music Hall of Fame and received a national technology award from the College Music Society for his work during Covid in teaching technology online. He is a published author in the area of Speed Testing in Audio Education and has presented his work internationally at the European Audio Engineering Society conference in 2023.

Since 2015, over 200 students have experienced the music industry and world cultures by traveling with him to places such as Morocco, Spain, Norway, Germany, Dominican Republic, Italy, Portugal, Switzerland, Austria, Los Angeles, and Nashville. He is the current president of ATMI (Association for Technology in Music Instruction) and a member of AES (Audio Engineering Society). He is also a NCAA college football official.