Date:	December 9, 2019
To:	Jennifer deWinter, IMGD Department Director
Cc:	Keith Zizza, IMGD Professor
From:	Allison Steeves
	Hannah Goodsell
	Matthew Selva
Subject:	Recommendation Report on Improving Campus Audio Quality

Attached is our completed recommendation report, which summarizes our research and suggestions for improving audio quality on campus, assembled by Allison Steeves, Hannah Goodsell, and Matthew Selva for review by Jennifer deWinter, the director of WPI's IMGD department. Our team's proposal for this project was approved by Kevin Lewis on November 8.

For our research, we conducted in-person interviews with WPI faculty, surveyed WPI students, and pursued various methods of secondary research. Our team first interviewed Professor Keith Zizza, who teaches two game audio courses, to establish a direction for our project and a plan to distribute surveys to his Game Audio I class. We then interviewed both Ellen Lincourt, the Senior AV Support Specialist at WPI's Academic Technology Center (ATC), and Professor Farley James Chery, an IMGD professor who has experience teaching game development at competing universities. Concurrently, we performed secondary research to determine what current industry standards are for audio production and what resources other universities have available to their students to see how WPI compares.

Our research revealed that many IMGD students aren't familiar with the audio development process and that WPI isn't in a state to offer an immediate solution. The equipment supplied by the ATC isn't up to industry standards, and budget limitations prevent the IMGD department from investing in upgrades. As a result, we conclude that IMGD students need to be responsible for providing their own equipment to create the necessary quality of work to ensure the continued success of WPI's IMGD program, which is in danger of falling behind other universities without continued student and faculty initiative.

Our team has prepared three recommendations for improving the quality of student recordings on campus. The first is for IMGD faculty to require students to purchase industry standard audio tools for their classes as a substitute for textbook requirements. The second is to encourage students to use sound libraries for their projects and eliminate the need to record entirely, which is more representative of the industry. Finally, we recommend that faculty assist students in starting an audio training initiative to give sound designers the proper training needed to use and maintain high-quality equipment purchased by WPI.

Our team is grateful to have had the opportunity to research ways of improving audio quality on campus. We hope our recommendations will be of help going forward, and if you have any further questions or concerns regarding this project, you may contact Allison Steeves at aesteeves@wpi.edu, Hannah Goodsell at hlgoodsell@wpi.edu, and Matthew Selva at mhselva@wpi.edu. We look forward to working with you on future endeavors.

Improving Campus Audio Quality: A Recommendation Report

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Abstract

"Improving Campus Audio Quality: A Recommendation Report"

Proposed by: Allison Steeves
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Matthew Selva

Kevin Lewis, Professor of Practice for Professional Writing in the Humanities Department at Worcester Polytechnic Institute (WPI), approved a proposal by Allison Steeves, Hannah Goodsell, and Matthew Selva on November 8. This gave the project team authorization to begin looking into the audio resources on campus, in association with the Interactive Media and Game Design (IMGD) department. To begin, the authors interviewed Professor Keith Zizza, the primary audio instructor on campus, to gather his thoughts on the problem. Survey questions were then distributed to Zizza's Game Audio I course at WPI. Of the 24 responses, only two students had previously used WPI's audio recording equipment, and nearly two-thirds identified a high-quality audio as one with no background noise. This data shows that, while students are unfamiliar with WPI's current audio resources, they are aware of what makes a quality recording—the lack of background noise, which is a current issue with WPI's resources. The authors also conducted research into WPI's Academic Technology Center (ATC), similar schools' audio departments, and the industry standard of tools and quality. Overall, it is clear that WPI's current resources will lead to its audio department falling behind compared to competing universities. The most prominent recommendation is to make audio equipment and access to soundproof rooms required costs for students taking audio classes, akin to textbooks in a typical course. This would allow audio courses to go more in depth in preparation for the upcoming IMGD audio concentration. Professors would no longer have to worry about increasing tuition for new resources, and students would have access to equipment early, before using it in their careers. Another possible solution is to promote student use of professional sound libraries, giving students access to a wide assortment of professional quality audio. This would allow students to focus more on implementation and editing of sounds, rather than the recording process. The final recommendation is to reframe the IMGD teaching process as a whole, frontloading freshmen with classes to teach essential skills in game production and give them the skills needed to form a student-run audio initiative. This allows students to gain essential information about the industry. Students would also be encouraged to work with Lens and Lights (LNL), an organization providing professional lighting, sound, and projection services, to gain valuable knowledge about audio tools.

Keywords: WPI, IMGD, ATC, LNL, Audio

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Executive Summary

WPI students majoring in IMGD often struggle to create professional-quality sounds for their projects. This is especially worrisome in an industry where a student's success is determined by the quality of their portfolio. In this report, we will recommend potential steps toward improving audio quality on campus.

Our project consisted of interviewing faculty, surveying students, and performing secondary research on competing universities and industry audio standards. We first sat down with Professor Keith Zizza for a preliminary interview to establish a direction for our project prior to its proposal. He confirmed our suspicions that WPI's IMGD audio department is indeed at risk of falling behind to other universities if we cannot keep up with advancing industry standards.

The following phase of our research lead us to survey game audio students to see what their perceptions were; conduct interviews with Ellen Lincourt, the Senior AV Support Specialist at the ATC, and Professor Farley James Chery; and research what current industry standards are for game audio and how WPI compares to its competitors.

In our research, we discovered that many students lack experience with audio production and that it's not feasible for WPI to provide a direct solution. The audio equipment available through the ATC isn't sufficient for professional-quality recordings, and it will never be due to budget and policy constraints, as well as the ATC's overarching purpose to cater to all WPI students, not just IMGD majors. Instead, audio students need to be held accountable for acquiring their own equipment and taking the initiative to produce quality portfolio pieces needed to succeed in such a competitive industry.

Based on these revelations, we recommend three potential courses of action to improve the quality of student recordings on campus. One solution is for IMGD professors to treat all industry-standard audio equipment and software like textbooks and require students to purchase the necessary tools to succeed both in class as well as prepare students for the real world. Another, which can be used in conjunction with the previous recommendation, is to promote the usage of sound libraries for student projects. By eliminating the need to record, students can instead focus on the practical applications of implementing sound in games, which is more representative of the game industry as a whole. Finally, faculty assistance in organizing a student-run audio training initiative would help to establish a legacy for future sound designers at WPI and open up the possibility of investing in high-quality equipment for the campus.

Introduction

The IMGD department lacks necessary audio resources to truly prepare their students for the game industry. As a group of IMGD majors, we proposed to research the issue and were approved by Professor Lewis. We used both primary and secondary sources to understand the extent of the situation.

WPI prides itself as one of the first universities to offer game development as a major. The major offers seven concentrations that students can choose from, and starting next year—the 2020–2021 school year—the department will add an audio concentration. The professors in the department have built their reputations based on their quality work and bring their experience to teach future game developers. They teach the fundamentals of the development process and allow students to explore their own ideas and styles. WPI's location also allows students to take part in game jams and competitions against other schools. Last year, an on-campus student game development studio, Sunburst Studios, won the MassDiGI Game Challenge, which gave WPI a new competitive edge. However, the professors and competitions can only do so much to prepare students for what the industry is truly like.

WPI currently does not match the industry's standards in software and resources for audio students and theater sound designers. On campus, there is a limited amount of audio equipment in the ATC and only one room in the basement of Fuller Laboratories that is somewhat soundproofed. At other universities with either communications or game development majors, they have designated sound recording facilities and state of the art equipment. The lack of industry grade resources at WPI decreases the quality in students' work.

To fully understand the situation, we completed the following six tasks:

1. Interview Professor Zizza
2. Survey Game Audio I Students
3. Research Audio Industry Standards
4. Interview Ellen Lincourt of the ATC
5. Research Available Resources at Competing Universities
6. Interview Professor Chery

As seen above, we predominantly focused on student and faculty knowledge of the issue. The faculty spoke about what is necessary to ensure good audio quality and why WPI currently does not meet the standard. Both Professor Zizza and Professor Chery agree that WPI will fall behind if action is not taken to improve the quality of resources accessible to students. Lincourt explained how the ATC cannot offer state of the art technology because students will not take care of it without the proper training. Students were a valuable source of information as well. Our survey revealed that they are aware of what affects audio quality, yet they have little experience or knowledge when it comes to the audio resources offered on campus.

We then researched what tools are used in the industry in order to have a baseline when comparing WPI to other universities. We found that the software used at WPI is not most commonly used in the industry. Rather than using Reaper, a digital audio workstation used in WPI courses, professionals in the industry use a similar—but more advanced—program called ProTools. The quality of the final audio file is only as good as the original recording, so companies in the industry have completely soundproofed rooms and designated recording facilities, as well as access to sound libraries. WPI has one designated recording room, but it is not fully soundproofed, which allows background noise into the recording. This makes it difficult for students to book the room and ensure that their recordings will be of the quality needed in order to be used. WPI also does not have access to top tier sound libraries due to how expensive the licensing can be. Other universities do not face these problems due to three main factors: they have multiple spaces to schedule out to students, the spaces are completely soundproofed, and they use current software and equipment.

To help improve the quality of audio resources, we have three recommendations based on our research:

1. **Replace textbooks with equipment and software for classes:** Faculty could require students to purchase audio equipment, like recording add-ons for smartphones, and industry-standard software for use in their courses, rather than requiring students purchase textbooks.
2. **Eliminate the need to record by requiring students buy sound libraries for personal computers:** This is more representative of the industry and would ensure the quality of the original recording rather than risking the chance of needing to re-record sounds and waste time.
3. **Spread the word about available resources on campus and assist students in future training**: To motivate WPI and the IMGD department to invest in higher quality audio equipment, faculty should assist various student-run groups in training students how to properly use complex equipment. Those groups would include IMGD audio students, LNL, Masque, Vox, and Student Comedy Productions (SCP).

We recommend that the IMGD department look into one or more of these options to improve the quality of audio resources on campus. Recommendation one asks for the students to buy software and pieces of equipment rather than a textbook. They will be able to keep these for future use and learn how to use industry-standard tools. Recommendation two focuses on how WPI can ensure quality recordings without significant investment, like building designated recording spaces. By having ensured, quality audio recordings from sound libraries to work off of, students will no longer have to record their own audio. Finally, recommendation three allows certain groups of students to be trained on how to properly work with and take care of quality equipment. Students who are truly passionate or need to learn these skills should be able to work with quality equipment which includes how to take care of it.

The following sections discuss what research methods we used, the results from our research, the conclusions we made, and what we present as our final recommendations.

Research Methods

Our research focuses on understanding the present state of audio development at WPI—including teaching practices, software, and available equipment—relative to both similar universities and the industry as a whole. Additionally, we had to understand how the current program is being perceived by students and faculty.

To carry out this research, our team divided the project into six tasks:

1. Interview Professor Zizza
2. Survey Game Audio Students
3. Research Audio Industry Standards
4. Interview Ellen Lincourt of the ATC
5. Research Available Resources at Competing Universities
6. Interview Professor Chery

The following section will elaborate on the details, methods, and purpose for each task.

Task 1: Interview Professor Zizza

The three of us conducted a preliminary interview with Professor Zizza in his Salisbury Laboratories office on November 4, prior to our project's proposal. The goal of this interview was to get an expert opinion on our project and suggestions for potential areas to explore.

Zizza has been active in the game industry since 1995 and has worked as an audio director for over 30 commercially released games. He began his teaching career at Berklee College of Music in 2008 where he taught game audio from a musical perspective. At WPI, he teaches Game Audio I and II and works to expand the audio curriculum for IMGD students.

During the interview, we outlined our planned project to Zizza and asked for his thoughts. Topics discussed included the need for better equipment, the prospects of WPI's IMGD department falling behind, and the feasibility of potential improvements, among others.

A summary of our questions and Professor Zizza's answers can be found in Appendix A on page 17.

Task 2: Survey Game Audio Students

We then created a 10-question survey to gather the thoughts of IMGD students in relation to audio quality on campus. We conducted this survey with the support of Zizza, who allowed Hannah to distribute it to his current Game Audio I course. The questions were focused on students' knowledge of the audio resources available on campus, and their thoughts on what makes an audio recording high quality. We obtained 24 responses.

A summary of the survey and sample responses can be found in Appendix B on page 19.

Task 3: Research Audio Industry Standards

During the early stages of our research, Matt looked into the audio industry using a variety of secondary sources. His goal was to discover the standards of audio equipment and experience, then determine how well WPI prepares their students for the industry.

Matt primarily looked into professionally-conducted surveys relating to game audio. He also looked into job postings for audio careers on LinkedIn. Through LinkedIn, Matt could determine common job requirements, while also viewing the total number of WPI alumni that have been hired for audio jobs through LinkedIn. These numbers could be compared to other majors to determine the amount of jobs WPI students are typically hired for in these fields.

Task 4: Interview Ellen Lincourt of the ATC

On November 18 and 21, Allison sat down with Ellen Lincourt of WPI's ATC in Fuller Laboratories for two hour-long interviews. The purpose of these interviews was to gain a better understanding of what audio resources the ATC could offer audio students.

Ellen Lincourt is the Senior AV Support Specialist at the ATC. She spends most of her time providing front-end support to students with an audio or video need, though she also helps manage the ATC's inventory. The interviews with Lincourt were discussion-based and centered around what the role of the ATC is and what would be needed to achieve a successful audio program at WPI.

A summary of the interviews with Ellen Lincourt can be found in Appendix C on page 20.

Task 5: Research Available Resources at Competing Universities

During the beginning stages for our research, Hannah looked into what other universities with similar majors offered as audio resources for their students. Using school websites, the goal was to figure out what different resources are used to prepare other students for when they enter the game industry and to determine how WPI compares.

An in-depth list of universities researched and their resources can be found in Appendix D on page 22.

Task 6: Interview Professor Chery

On November 25, Hannah sat down with Professor Chery for an hour-long interview in the IMGD department lounge in Salisbury Labs. The purpose of this meeting was to expand the number of universities that she was researching and learn what resources the schools he previously worked at offered. He has taught at universities including Fitchburg State University and Ithaca College.

The interview was conducted using discussion-based questions to understand where WPI falls in comparison to other universities in their audio resources. The interview focused on where IMGD might go as a whole rather than just audio resources.

A summary of Professor Chery's interview and the list of universities he previously worked at, can be found in Appendix E on page 27.

Results

The results from our research are presented in this section. The most meaningful data and information are described for each task, while additional data is listed in the appendices.

Task 1: Interview Professor Zizza

From our preliminary interview with Professor Zizza, we learned a lot about the current state of the audio department at WPI. Our main takeaways from the interview are discussed here.

Zizza expressed concern that WPI will be unable to keep up with the necessary advances in audio and is at risk of falling behind. Even though WPI was one of the first universities to offer a major in game development, there are now hundreds of schools offering interactive media degrees. Zizza feels that if WPI can't afford to upgrade to the latest equipment, then prospective students won't be interested in applying to WPI.

Part of the problem, Zizza said, is that IMGD is often overlooked by WPI as a whole. He feels that the IMGD department is continuously being pushed aside by "hot" engineering majors, such as mechanical engineering and robotics. This makes it even harder for audio—which is such a small subsection of the IMGD department—to get any funding for the upgrades that Zizza feels are necessary.

Regarding potential upgrades, Zizza knows there is room for improvement in many areas. He thinks that the school needs more high-quality microphones and surround-mixing setups, and he is currently working on getting approval for the construction of a portable voice booth to make up for the lack of soundproof locations of campus. However, he recognizes that the IMGD department currently does not have the budget to make such improvements.

Zizza estimates that upgrading all of WPI's current equipment, including microphones and digital audio recorders, would cost around $10,000, while building a new fully soundproof room could cost anywhere between $30,000 and $50,000. This is especially difficult when requests for these kinds of improvements need to be reviewed by many different committees and are often deferred or delayed for years at a time.

Finally, Zizza gave us some ideas as to what he hopes the future of IMGD audio will look like at WPI. He told us that a Game Audio III course is in the process of being approved, and the IMGD department is looking to add an audio concentration to the IMGD Bachelor of Arts degree. Additionally, there has been discussion surrounding the potential for a Masters or PhD program in game audio, though Zizza feels that WPI is not in a position to properly expand the audio department yet.

Task 2: Survey Game Audio Students

The survey was distributed to 24 students in Professor Zizza's Game Audio I course. As seen in Figure 1, the participants were primarily from IMGD-related majors.

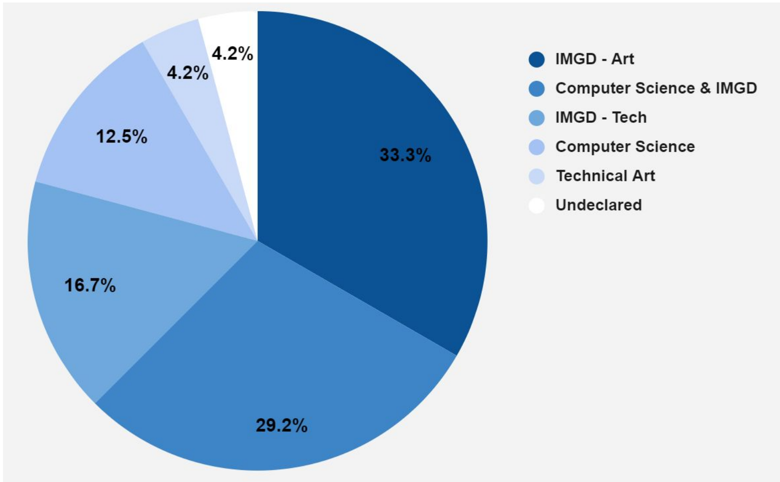

Figure 1. Pursued Degree of Respondents

The survey asked students to describe their reason for enrolling in Game Audio I. While the vast majority of respondents (79.2%) referred to it being a required course for IMGD majors, many students expressed an interest in audio design. Students commonly mentioned wanting to have the ability to work with professional sound designers and being able to create sounds for game design purposes. We also asked students if they have any prior experience with audio recording, with the majority (79.2%) having little to no experience at all.

In this next survey question, students were asked to identify what they believe makes an audio recording "high quality." When looking at these responses, we looked for specific key phrases, which are detailed in Figure 2 below.

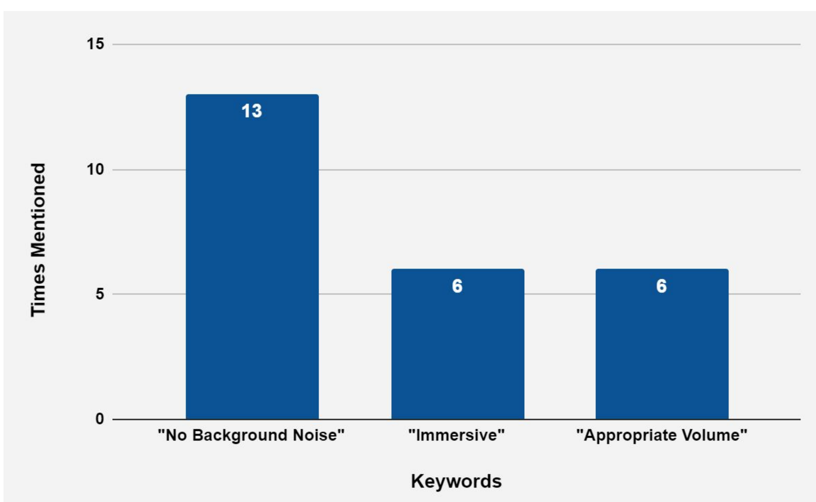

Figure 2. Keywords of High-Quality Audio

As shown in Figure 2, students were able to correctly identify key aspects of high-quality audio. This shows that they possess basic knowledge on the subject, likely due to taking Game Audio I. As this is a required course for IMGD students, this data suggests that all students pursuing a degree in IMGD will be taught the essentials of producing high-quality audio. Since the knowledge is certainly present, the primary issue must stem from a different source.

We then looked into students' knowledge of the resources on campus. Figure 3 shows the results of our question asking students to identify the best location on campus to record high quality audio.

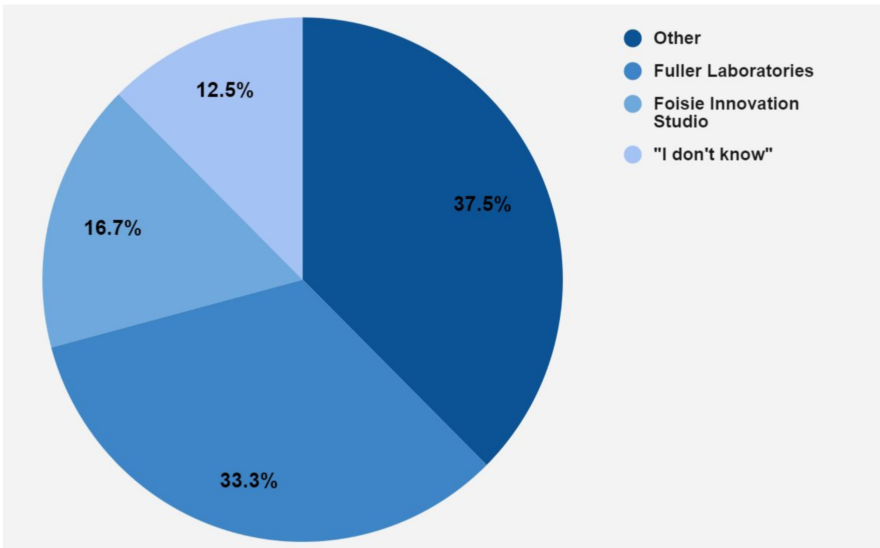

Figure 3. Thoughts on the Best Location to Record High-Quality Audio

As shown in Figure 3, half of the responses were able to identify the locations in Fuller Laboratories and the Foisie Innovation Studio dedicated to audio recording. The other half, however, were unable to identify a location, or chose one that would not necessarily result in a high-quality sound (such as an "empty classroom"). Only 33.3% were able to correctly identify Fuller Laboratories as the current best place to record audio, as that is where the somewhat soundproof room is located.

In a follow-up question, we asked if students had any experience using WPI's audio recording equipment, to which an overwhelming 91.7% said no. Of the 8.3% (two students) that said yes, neither had experience using the soundproof room in Fuller Laboratories.

Ultimately, the results of this survey suggest that IMGD students do not have experience using WPI's resources—whether due to a lack of knowledge, interest, or incentive. While students are well educated on what makes an audio recording high quality, they are not actively applying that knowledge in a practical manner. The exact reason for this is difficult to pinpoint, but the data from this survey certainly shows that this group of students do not utilize the resources currently offered.

Task 3: Research Audio Industry Standards

Matt's secondary research into the audio industry provided meaningful information regarding standard tools, statistics on backgrounds of individuals entering the industry, and comparisons to other careers WPI is preparing students for.

Through LinkedIn, a professional networking website, Matt was able to deduce that the majority of audio-related jobs require the use of ProTools. Many job postings mention experience with ProTools, a digital audio workstation used for sound production. This is a standard tool commonly used by the audio industry, which WPI does not utilize in their audio courses.

The 2017 Game Audio Industry Study—which, as its name would suggest, surveyed professionals in the game industry—revealed that 62% of respondents had an audio-related degree. The 2019 Game Audio Industry Study reported that this number had risen to 93% of recently hired game audio employees. With an increasing amount of employees having an audio-related degree, and WPI not currently offering one, it is important for the department to meet this new standard. An audio concentration is being added to the IMGD department at WPI which is certainly a step in the right direction.

WPI's current audio related offerings, when compared to their engineering offerings, are lackluster. With two game audio courses and an upcoming concentration, game audio is an extremely minimal part of WPI's overall course offerings, and it shows. LinkedIn shows the amount of alumni that have been hired to specific jobs. WPI has sent thousands of students into engineering, business, education, and computer science-related fields. Google, for example, has hired 145 WPI alumni that are registered to LinkedIn. Raytheon, a major U.S. defense contractor, has hired 531 WPI alumni. These are careers that benefit from extensive knowledge of business, project management, and science. Most audio companies on LinkedIn do not have a history of hiring WPI alumni, with some having up to five. Ultimately these numbers do not represent every WPI student, as this only shows students that are connected to the university on LinkedIn. This does suggest that when comparing audio jobs to other fields offered at WPI, very few individuals are hired into the audio industry. With WPI's lack of an audio degree, and students' minimal knowledge of on-campus offerings, WPI will quickly fall behind in this regard.

Task 4: Interview Ellen Lincourt of the ATC

Allison's interviews with Ellen Lincourt gave us insight as to what the limits of the ATC are and what would be necessary for an audio program at WPI.

According to Lincourt, the ATC is not suited for high-level projects like the ones being undertaken by game audio students and theater sound designs. Rather, the ATC is designed to cater to everyone's immediate technological needs, whether that's printing a poster or making a quick video for a Spanish class. As such, Lincourt says their equipment has to be simple enough that anyone can learn how to use it in five minutes.

The ATC doesn't have the optimal quality of equipment needed for creating high-quality sounds. Equipment is extremely limited, and students can only rent for 48 hours at most. Lincourt describes the available equipment as being not even semi-professional, and that's how it has to be. Students are not trained to handle complex, high-quality pieces of audio equipment, and so, if the ATC invested in good equipment, it would just get destroyed.

While the ATC doesn't have much to offer in terms of physical audio equipment, they can offer advice. According to Lincourt, planning is the most important step of any field recording, and she says that the faculty at the ATC can help student sound designers figure out the best time, place, and resources for a specific project, even if they can't provide the best equipment.

Lincourt feels that starting a sound design program at WPI would be incredible difficult. Finding the time and money to create the necessary labs and train students to handle equipment properly would be an incredible undertaking that can't happen anytime soon.

That being said, she thinks there are things that can be done to improve the current quality of student recordings. Namely, she believes that students should be in charge of buying their own equipment. Just like every student needs a laptop and a good pair of headphones, audio students should be responsible for building their own collection of audio gear. She says that a good starting setup for audio recording would only cost around $120, which isn't much compared to how much students already spend on textbooks. This could be even further simplified by taking advantage of a very powerful piece of recording equipment that every student already has: smartphones. Students could purchase smartphone add-ons, such as preamps and portable mics, which would improve the quality of their recordings.

However, Lincourt believes that the best solution may be even simpler. Most professional sound designers don't actually go out and create their own original sounds. Rather, they take their sounds from preexisting libraries and supplement with their own recordings only when absolutely necessary. Unless there is a need to directly teach students how to create the best field recordings, students could take high-quality sound effects directly from professional sound libraries to use in their projects.

Task 5: Research Available Resources at Competing Universities

Hannah primarily researched other universities that had either game development or communications majors. This includes the following universities:

- Becker College
- Champlain College
- Berklee College of Music
- Emerson College
- Fitchburg State University
- Ithaca College
- Northeastern University
- ITT Technical Institute
- New England Institute of Technology
- Mount Ida College

A majority of these universities have at least one industry-quality recording studio and post-production room. The resources in these facilities vary but include similar equipment. Figure 4 shows a comparison between WPI's minimally soundproof recording room and a recording booth at Berklee College of Music.

The students at these universities have access to various types of industry-quality microphones and soundboards. These resources are kept in soundproofed rooms that are often connected to another production room. In the recording room, there will be a space that audio students can set up the needed sound equipment to record different groups and sounds. The connected room holds soundboards and some post-production equipment, so sound designers and engineers can mix the audio live.

Figure 4. WPI "Soundproof" Recording Room (above) vs. Fully-Soundproof Recording Booth at Berklee College of Music (right)

These universities teach the latest skills to their students with the current software and equipment that is used in the industry. Hananh found that a majority of these universities listed that they used ProTools as their audio editing software, which is the primary choice for audio professionals. There are also specific classes offered at other universities that teach music composition for video games. Students learn how to work with virtual instrument libraries and MIDI equipment to put together game soundtracks, which is another important aspect to game audio.

The only schools that WPI is better than when it comes to audio resources is ITT Technical Institute and New England Institute of Technology. With the quality and number of resources offered at other universities that are comparable to what is used in the industry, WPI is falling behind in preparing their students for the working world.

Task 6: Interview Professor Chery

Professor Chery agrees that WPI's IMGD department, as a whole, will fall behind if they do not expand and update their resources. He makes the distinction that the program will not fall behind because of the quality of work produced by its students, but rather because the school is unable to give their students the proper skills and tools needed in the industry.

Even though the school speaks about supporting the department more, there has been no action on their side to give the department more funding and resources. While other departments have spaces designated for research, the IMGD department does not. Since game production is a combination of technical and artistic skills, students and faculty are not perceived as engineers. Though there are students initiative and passion to produce their own work, Chery notes that it is unfair to ask them to work even more on top of their studies and without being paid.

Students play a key role in helping the department though. When they establish themselves in the industry, students should be able to look back at the support they received and give back to future game developers. Students need people to look up to who understand the struggle of establishing themselves in the industry in order for it to seem achievable. Current students need to compete and produce their own work, so that WPI can make its name for game development. However, students cannot get there if they do not learn the necessary skills. Chery suggests that freshmen should be front loaded with IMGD classes to learn skills and techniques. By their sophomore and upperclassmen years, students need to be making original games and showcasing them.

Chery also spoke about how the department needs to set up resources to help students learn and cope with stress. The department should create a resource library of textbooks and user guides to different software. Students may contribute to this to help it grow and be listed as a reference if anyone has questions about a particular subject. Faculty need to do a better job of emotionally supporting students and teaching them how to communicate better. They should root for students even with their flaws, but help them improve those flaws as well. Female students especially, Chery pointed out, need this help since they may struggle with imposter syndrome. Both the students and faculty need to work together to build up the reputation of the IMGD department.

Conclusions

The conclusions we arrived at based on our research results are presented here.

WPI is Falling Behind

Based on our interviews with Professor Zizza and Professor Chery, our look into the audio industry, and our research into competing universities, we conclude that WPI will fall behind in terms of its audio offerings.

Our research into the audio industry suggests that WPI is not preparing students for the audio industry nearly as well as for engineering, business, or programming jobs. The lack of an audio-related degree, despite the vast majority of audio employees having one, is a key issue. Professors at WPI, such as Chery and Zizza, are in agreement that WPI will soon fall behind. Chery told us that students won't fall behind due to the quality of work, but rather their inexperience with tools and techniques, such as ProTools. Zizza told us that as tuitions increase, we need to have the latest equipment for audio to stand out among the many other universities offering better resources for audio designers. Both professors are in agreement that WPI does not treat IMGD students as serious as the more popular engineering majors, resulting in a lack of funding comparatively. Competing universities have more equipment, rooms dedicated to sound production, and audio-related degrees that fully prepare their students for the industry. WPI needs to improve their resources, or students with an interest in audio design will simply attend a different university.

Students Are Responsible

Based on our interviews with Professor Zizza, Ellen Lincourt, and Professor Chery, we conclude that students need to be responsible for getting the quality of recordings that they require.

Fancy equipment doesn't mean anything if students don't know how to use it. WPI can't invest in good audio equipment that's accessible to everyone; otherwise, it'll get damaged like most of the equipment from the ATC. Instead, those students who want to create those high-quality sound effects need to be properly trained.

This speaks to a larger problem in the IMGD department as a whole. Chery feels that IMGD students need to be pushed to understand that a game development degree means nothing without the skills and portfolio to back up, and that includes audio. It's on students to go beyond the classroom and apply their learning in independent projects that can help build the reputation of WPI's IMGD department so it's not so overlooked.

WPI Can't Provide Audio Resources to Everyone

The interviews with Ellen Lincourt on the role of the ATC showed us that it's not on WPI to provide quality audio resources to all students.

The purpose of the ATC is not to have all the latest and greatest technology for specialized IMGD audio majors. Rather, its goal is to provide simple, passable equipment to students unfamiliar with audio and video techniques. If the IMGD department wants to cater to the advanced technological needs of its students, then it must do so with a pool of its own equipment taken from the IMGD budget, just like the Global Labs department.

WPI Students Lack Experience with Audio Production

Students lack experience and knowledge about audio production and equipment. They enter WPI with varying levels of experience, but most who take Game Audio I have no prior experience.

Professor Chery's advises that freshmen front load IMGD classes, so they can build their experience and knowledge earlier in their WPI career. Students would no longer feel intimidated or overwhelmed when creating original work. By teaching IMGD similar to a trade school, students learn the tools and skills which makes them feel comfortable in what they do. For example in audio classes, students record and edit their own audio files which is not what happens a majority of the time in the industry. In the industry, studios buy licenses to sound libraries where audio professionals edit those sounds to cut down on production time. WPI does not provide the necessary tools or simulate what it is like to work in the game industry.

Recommendations

Based on our report, we recommend that the IMGD department pursue one or more of the following options.

Option 1: Substitute Textbooks for Tools

WPI could eliminate the need to purchase new equipment, or spend money on soundproof rooms, by presenting these costs to students. College courses typically involve additional expenses on top of tuition, primarily in the form of textbooks. Textbooks are typically over $100 and are almost always used exclusively for the class, then never touched again. By making equipment a required payment for WPI students, not only will WPI save money, but the courses will be able to go more in depth on techniques and practices without having to focus on the lack of equipment or space. In addition, these resources will be used by students throughout their career, unlike textbooks. Students would be required to purchase industry-quality tools and then attend the courses to learn how to use them effectively. They would then be able to keep these tools as they enter the industry, allowing them to expand their knowledge and experience on a professional level.

Option 2: Promote Sound Libraries

Students could eliminate the need to record original sounds by purchasing sound libraries. This option is far more representative of the industry, since most game developers do not have the time to record their own sounds. There are a plethora of high-quality, professional sound libraries available for purchase at every price tag imaginable. Students would be able to select sound libraries based on their individual project needs and financial means. Professors could require certain sound packs as part of their course, and the IMGD department could even keep a running list of suggested libraries for student projects. This would allow students to focus more on the implementation of audio in games rather than the logistics of recording a sound in the first place.

Option 3: Assist Student Initiatives

Many students do not know about the resources already offered on campus, and if they do, they know that the quality offered is not as good as it should be. If WPI invests in better audio equipment, students need to be taught how to properly take care of it. The ATC can teach the IMGD faculty and LNL first, so they can train the necessary people within their groups. This would allow for IMGD students and theater sound designers and engineers to learn how to us and preserve equipment. With access to state-of-the-art equipment, students can improve the audio quality in their projects, as well as build a sense of familiarity with equipment used in the industry. Targeting these specific groups allows for the necessary people to learn about the equipment offered and be able to use them.

References

Audio Post-Production at Emerson College:
http://www2.emerson.edu/media-technologies-production/production-centers/digital-audio

Becker College's Game Audio Concentration:
https://www.becker.edu/academic/academic-programs/design-technology/game-audio/

Ellen Lincourt Interview #1 (November 18, 2019)

Ellen Lincourt Interview #2 (November 21, 2019)

Facilities at Berklee College:
https://www.berklee.edu/voice/facilities-and-resources

Game Audio Industry Survey (2017):
http://gameaudioindustry.com/2017/08/03/the-results-of-the-game-audio-industry-study-2017-are-available-now/

Game Audio Industry Survey (2019):
https://www.gamesoundcon.com/single-post/2019/09/10/Game-Audio-Industry-Survey-2019

LinkedIn:
https://www.linkedin.com/

Professor Zizza Interview (November 4, 2019)

Professor Chery Interview (November 25, 2019)

Student Organizations at Becker College:
https://www.becker.edu/student-life/campus-life/activities-leadership/student-organizations/

Sonic Arts Specialization at Champlain College (Creative Media Courses):
https://www.champlain.edu/academics/undergraduate-academics/majors-and-specializations/creative-media/specializations-creative-media/sonic-arts-specialization-crem

Sonic Arts Specialization at Champlain College (Communication Majors):
https://www.champlain.edu/academics/undergraduate-academics/majors-and-specializations/communication/optional-specializations-communication/sonic-arts-specialization

Studio A at Berklee College:
https://www.berklee.edu/mpe/studioa

Appendix A: Interview with Professor Zizza

Questions	**Answers**
Why is having quality equipment and soundproof rooms important at WPI?	Each year the types of work we're doing in the department becomes more advanced—things like game engines or specific software for animation or audio. As that's happening, there's an expectation of a higher level of quality across the board in terms of the clarity of a recording and the type of equipment. We need to keep up to date on the latest microphones and physical hardware.
Is WPI in danger of falling behind?	There's that danger, yes, eventually. When the program started in 2005, it was one of the few schools with a major in game development, but now there's hundreds of schools offering some sort of interactive media courses. As tuitions going up, we need to have the latest equipment that we can afford. WPI doesn't stand out compared to other schools in terms of game audio. Improved soundproof rooms, or better resources in general, would greatly help our reputation in that regard. IMGD is being pushed to the side with the new resources in Foisie and ME/RBE resource needs. Audio in IMGD feels like an island within an island. We would need a bigger department to justify more audio personnel.
What equipment improvements does WPI need?	We desperately need more microphones and a surround-mixing setup. If we can't have an isolated room, I've been looking into portable voice booths [WhisperRoom] that I'm trying to get approved right now.
What are the challenges with getting better equipment?	Requires approval from lots of different committees. Requests can be deferred and delayed for years, and the people who are reviewing the proposal don't quite understand the language or needs. Budget is limiting: $10,000 to upgrade to higher quality microphones and other physical equipment, $30,000–50,000 to build a new soundproof room.
How do you feel about other majors or non-IMGD students, such as theater sound designers, using the soundproof room in Fuller?	I'm a proponent of interdisciplinary usage of the soundproof room (A20). The rooms that you have in Alden are terrible, and the rooms in A20 are underutilized. I would be a proponent of bringing in any group that needed the room.

What locations on campus are available to students looking to create a high-quality recording?	Soundproof room in the basement of Fuller, which isn't truly soundproof. People walking by still interrupt recordings because there isn't a double wall, and the insulation is poor. Rooms in Alden and Riley Commons with some surround speakers, a recording booth, and a mixer that are never utilized by students. Some of the rooms in Alden promote reflections, however. Global Lab in Foisie, which has acoustic treatment on the ceiling and a curved wall. This is under-utlized as well, and they only want global students using it.
What's in store for the future of audio in the IMGD department?	Game Audio III is in the works. We're looking at offering a concentration in game audio, as well as the potential for a Masters and PhD.
What's your background in teaching and audio?	I'm still active in the industry as a freelancer, though I work full-time teaching at WPI. I made the decision to teach after filling in for a friend at Boston University in 2008. I taught Intro to Game Audio at Berklee but that was just focused on music, and I wanted more project-based work. Nine years ago, I taught a pilot course at WPI and have been lecturing here since. I was involved in broadcasting in 1991. I got into the game industry in 1995, 24 years ago. I did some casting for voice talent and now do freelance work.

Appendix B: Game Audio Student Survey

Below is the student survey we distributed to Professor Zizza's Game Audio I course. We received 24 responses. For the questions that were not multiple choice, the number of responses is listed.

1. **What is your major?**

   12.5% Computer Science
   29.2% Computer Science & IMGD Double Major
   50.0% IMGD
   8.30% Other

2. **Why are you taking Game Audio I and what do you hope to gain from this course?**

   24 varied responses

3. **Prior to this course, did you have any experience with audio recordings, DAWs, sound editing, etc.? If so, what?**

   20.8% Yes
   79.2% Little/No Experience

4. **What qualities do you look for in a "high-quality" recording of a sound effect?**

   24 varied responses, with 62.5% mentioning "no background noise"

5. **Where do you think the best locations on campus are to record high-quality audio?**

   24 varied responses, with over half being unaware about WPI's current soundproof room

6. **Have you used any of WPI's audio recording equipment before?**

   91.7% No
   8.30% Yes

   The two who responded "Yes" were then sent to a section with additional questions, while the others were done with the survey.

7. **What resources have you used in your experience?**

   100% Microphones & Headphones
   50% Pop Filter & Field Recorded
   0% Windshield/Wind Popper
   0% Soundproof Room in Fuller Labs

8. **How satisfied are you with WPI's current audio recording resources?**

   100% Satisfied on a range from "Very Satisfied" to "Very Unsatisfied"

9. **If you have used the soundproof room in Fuller, how satisfied were you with the experience?**

   No respondents had used the room in Fuller.

10. **If you were not satisfied with WPI's audio resources or the soundproof room, could you explain why?**

    No respondents had used the room in Fuller.

Appendix C: Interviews with Ellen Lincourt

Questions	**Answers**
What equipment does the ATC have for students looking to record their own audio?	Equipment is extremely limited, which is why students can generally only rent for 48 hours. We have two Zoom H2s and 8 Zoom H1s (digital audio recorders), which are used for the game audio classes. We do have some Zoom H5s, which are much higher quality and support 4 channels, but they’re only available to Global Lab students because they were paid for with the Global Lab budget. We only have 4 TASCAMS (another type of digital audio recorder) for the entire university.
What improvements could be made to the ATC?	The equipment we have is not even semi-professional, and it can’t be. People don’t take care of the equipment; they’re not trained. So if we buy good equipment it will just be destroyed. The ATC is not designed for high-level projects. The equipment has to be simple enough that anyone can learn how to use it in five minutes. It targets those students who have an immediate, quick technological need, like printing posters or creating a quick video for their Spanish class. We cater to the general needs of all students, not specialized majors. We don’t have high-condenser mics or boom arms for people that need to record good dialogue. Planning is so important. The faculty at the ATC can be good resources to consult for field recordings to figure out what the best location, time of day, and equipment is for a specific project.
What do you think about the possibility for an audio degree from WPI?	I’m having a hard time thinking about a sound design degree here. A good sound design program at WPI would require a minimum of 3–4 soundproof labs run by a sound manager and many trained lab assistants. The creation of a really good sound studio would cost hundreds of thousands of dollars. A Bachelors in IMGD sound would be so basic. There are so many different branches of sound: Foley, live sound, studio sound, sound tracks. Would it even be worth the return on investment to go to WPI?

What would you recommend to improve the quality of student audio recordings?	Students need to be in charge of buying their own equipment. A good starting audio recording setup is around \$100–\$120. Everyone needs to have their own pair of headphones. Renting headphones from the ATC should be in emergencies only. You don't want to share headphones; it's unsanitary. If students have their own personal digital audio recorder with phantom power then they can come to the ATC and borrow a mic that would improve the quality of the recording. Most professionals don't go out and create their own sounds. They take their sounds from libraries. WPI could invest in student access to quality sound libraries for students to take sound effects from for their projects. Students should be using their phones more. Everyone has a smartphone, and they're very powerful. They could invest in add-ons for their phones, like preamps and portable mics.

Appendix D: List of Resources Offered at Other Universities

Becker College	• Has a center for global innovation similar to ours
	• Game audio is their newest concentration to the major
	    ○ Focuses on recording, mixing, sound-effect production, music composition, and game integration
	• Classes
	    ○ Digital Audio Production
	        ■ Signal processing
	        ■ MIDI
	    ○ Game Audio Production
	        ■ Fully record sound effects, music, and voice overs
	    ○ Digital Music Studio
	        ■ MIDI
	        ■ Virtual instruments
	        ■ Synth techniques
	        ■ Pro-tools
	    ○ Music Theory
	    ○ Music Composition for Games
	    ○ Foley and Field Recording
	        ■ Studio recording
	        ■ Advanced digital editing software
	• Audio Engineering Society
	    ○ Sound designers
	    ○ Voice actors
	    ○ DJs
	    ○ Recording engineers
	    ○ Music composers/producers

Berklee College of Music	• Voice Rooms
	    ○ Amplifier equipped rooms
	        ■ Private or small ensembles
	        ■ Also larger ones for groups
	    ○ MIDI equipment
	    ○ Compact disc players
	    ○ Digital phrase samplers
	    ○ Video and audio tapes
	• Recording Studio Complex
	    ○ 13 professional production facilities
	        ■ Multitrack digital and analog recording
	        ■ Automated mixdown
	        ■ Digital audio editing

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Video post production
5.1 multichannel surround mixing
Comprehensive signal process equipment

Synthesis Labs
250 synthesizers
Standard and alternate controllers
Effects processors
Recorders
Mixers
Software
Synthesizer programming
Electronic composition/production
Audio for visual media
Sound design
Software design
Performance

Performance Division Technology Lab
Five station lab to give a space to study new electronic instrumental controller techniques
Apple computers
Various synthesizer modules
MIDI controllers
Guitar
Bass
Keyboard
Percussion
Woodwind

Professional Writing Division Tech Lab
12 audio/MIDI workstations

Film Scoring Labs
2 labs
Self contained scoring studio complex
40 seat theater classroom
2 DAW/screening rooms

Film music composition
conducting
MIDI sequencing
Digital music editing

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<tr><td>Champlain College</td><td>

Film and Broadcast Media Production Stage
Professional soundstage

Sound Recording Studio

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<tr><td></td><td>
<li style="list-style:none">
Industry standard
sound boards
Microphones
Instruments
Four tracking room (recording areas)

Creative Media Major Specializations
The game development specialization is completely separated from audio production

</td></tr>
<tr><td>Emerson College</td><td>
Audio Post-Production

Annex
Microphone kits
Neumann U87Ai Condenser
Neumann TLM 67 Large Diaphragm Condenser
Miktek CV4 Large Diaphragm Tube Condenser
AEA A840 Active Ribbon
AKG C414 XLS Multipattern Condenser
Audio Post Production Facility
Latest Pro Tools
Apogee Symphony I/O
Avid ICON Control ES Control Surface console
5.1 and 2.1 DSP monitoring
Industry standard plug ins
Waves
iZotope
Blu-ray players
Panasonic HD DLP projector
Mulity-LED displays
Full ADR capability
Whisper room
Voice and ADR recording
API Mic Preamp and 500 series processors
Music production and Sound Design software package
Reason
Live
Max/Jitter
Sound Design Post Production Room
Pro Tools software (same)
5.1 mixing with Genelec monitoring

</td></tr>
</table>

        - Industry plug ins (same)
        - Sony PCM-R500 DAT
        - Novation MIDI controller
        - Music production software (same)
    - Analog and Digital multi tracking and surround mixing facility
        - Pro Tools (same)
        - API 1608-32 analog console with automation and DAW control
        - 5.1 and 2.1 DSP monitoring (same)
        - Antelope orion 32
        - Industry plug ins (same)
        - Dual 50” computer monitors
        - Full HD Projector (same)
        - Minimoog Voyager Performer Edition
        - Kurzweil 2600
        - OPPO BDP-103 Blu-ray Player (possibly same)
        - Novation MIDI controller(same)
        - Music production software (same)
        - Capacity to record Voice, ADR, Musical Instruments, & Foley
    - Vocal based studio production
        - Pro Tools (same)
        - Industry plug-ins (same)
        - Mackie Onyx 32x8 analog console
        - Dangerous Music Monitor Control System
        - Analog Outboard gear
        - Novation MIDI controller (same)
        - Music production software (same)
    - Mix to Pix studio
        - Mac Pro on Blackmagic UltraStudio hardware
        - Pro Tools software (same)
        - Avid Media Composer with Symphony option
        - Adobe Creative Cloud
        - Fulcrum Acoustic audio monitors
        - Panasonic HD video projector (same)
        - Avid Artist Mix console
        - Panasonic Blu-ray player (possibly same?)
        - 16mm interlock projection system including one Eiki Projector, six Magnasync Dubbers and one fullcoat record dubber
        - Foley pits for sound effects creation

<table>
<tr><td></td><td>Mix finishing room and 5.1 Mix to Pix surround sound room
Pro Tools Software (same)
Industry plug-ins (same)
Avid Artist Series Control Surfaces
Dangerous Music Monitor Control System
Antelope Orion 32 (same)
Neumann monitoring: K+H 0300Ds with KH 810 subwoofer
Avantone Mix Cubes
EAW Screening Room Monitors
Blu-ray / DVD Playback (same)
8 production suites
4 stereo
4 surround 5.1
Pro Tools Software (same)
Industry plug-ins (same)
RME UFX Audio Interface
Electro Voice RE-27 Microphone
Novation MIDI Controller (same)
Genelec Studio Monitors (same)
Music production software (same)</td></tr>
<tr><td>Fitchburg State University</td><td>Dedicated audio booths (Equipment/Space)
Sound stages
Two studios (size of the IMGD department room in Salisbury Labs)</td></tr>
<tr><td>Ithaca College</td><td>Five or six sound booths
Three sound stages
One and a half times the size of Fuller Labs 122
Eight sound studios
Sound booth
Dedicated recording space for both ensemble and dialogue</td></tr>
<tr><td>ITT Technical Institute</td><td>One extremely small room (somewhat treated to be soundproofed)</td></tr>
<tr><td>Mount Ida College</td><td>Some sound equipment</td></tr>
<tr><td>New England Institute of Technology</td><td>A couple of studios</td></tr>
<tr><td>Northeastern University</td><td>Two or three sound booths
Maybe one sound studio</td></tr>
</table>

Appendix E: Interview with Professor Chery

These are the previous schools that Professor Chery worked at and he touched upon what resources they offered best to his knowledge.

School	**Answer**
Fitchburg State University	They have dedicated audio booths. The video program specifically specializes in media, and similar to WPI, their program has different types of resources which include audio equipment, space, and software. The program has sound booths, stages, and two studios which are both the size of the IMGD department room in Salisbury Labs.
Ithaca College	There are five to six sound booths and three sound stages that are about one and a half times the size of Fuller Labs 122. In each of the eight studios there is a sound booth and dedicated recording space for both ensemble and dialogue work. The college found that there was too much background sound in the students' recording and they kept having to waste time to re-record. The college then built dedicated space to solve the issue.
NorthEastern University	There are two, maybe three, sound booths as well as maybe one sound studio.
ITT Technical Institute	Similar to WPI, there is one extremely small room that they treated as a dedicated sound space. It was not shared with the whole school, only audio students.
New England Institute of Technology	They have a couple of studios.
Mount Ida College	Similar to WPI, they had some sound equipment, but did not go all in.

Following the discussion about the universities he previously worked at, Hannah asked a range of questions about the direction of IMGD at WPI.

Questions	Answers
Will WPI IMGD fall behind if we do not improve resources?	Across the board, not just audio, the department will fall behind. Student work is better due to the latest resources and technology offered. They cut down and optimize development time. It won't be because the students fall behind by doing their work by hand. They will fall behind because they do not have access to new technology. They will not be able to demonstrate their techniques to companies during job searches. The software that comes out lets students be more ambitious and 10% of the software helps make things that don't seem possible, possible.
What are the odds of receiving more funding for IMGD/audio resources?	The school talks about supporting us, but the department hasn't actually seen it happen financially. IMGD at WPI is not seen as what it truly is even though we are recognized as a global industry. We are not seen as people who do technical work. Other people don't know that the thing that they want to do, we can do it here. Other departments have dedicated spaces for research, we don't have that. We would be able to speak to the industry differently when students graduated if they have the experience with the proper resources.
Do you think we are struggling with students breaking into the industry?	A lot more WPI students are in the industry compared to other schools. We haven't done enough to push students to understand that their degree means nothing without skills. We need to give them opportunities to build strong portfolios. For the students in the computer science concentration, we should be focusing on exciting them rather than weeding out the classes.We get people who are excited and if they feel like they'll make money, other students would double major. More space would mean that more students could double major and have more resources.
What comes to mind when I ask you what a soundproofed room is?	A room with wavy walls that is soundproofed. It has microphones that connect to another room with a glass wall in between the two.
Are you aware of Professor Zizza's room?	It's called a phone booth. It speaks to the disrespect that the IMGD department faces. We should charge $300 for students to use studio quality room rather than a textbook. They will use it as a part of their careers and hobbies. It is theirs and should be able to use it.
Is the IMGD department being pushed to the side by other majors?	There are people who like to work through the system and it can work for some. It doesn't for IMGD. We need to put more ownance on the students to win competitions and show quality work. We can't ask students to do more though on top of their

	school work without paying them. Making them do things that don't help their passion will not help them learn. The only time students should be, possibly, be working on something they aren't passionate about, is when they're working on their MQP as a senior. That's more like the real world. We should try experimental learning to feed their curiosity-that will get them to the top tier. The future of the IMGD department depends on students thinking about the support that they received and want to give back to that through donations. They will help future students by making long term connections and a community. IT's good to have people who can relate to the students, so they can relate to future students yet to come. IMGD is not going to get the same type of support as robotics.
What are ways to make game development less intimidating and more realistic?	We need to make the mentality of the first year as they will learn the skills and by the second year, they will make something. We need to front load IMGD classes, where they will learn the skills. The department also needs a better resources library whey students can have access to the newest resources. Everyone can contribute to the new knowledge and update information internally. The department also needs to provide students the scaffolding to start the "adulting" process. Students should have someone to come talk to about inner communications and someone who roots for them even with their flaws that can be fixed. All we give is permission to do something or use something, but we need to help students get through emotional barriers. People who are successful in everything don't understand the struggle to improve that their students face. Students need to know that the struggle is worth it to get to the point to be successful. I hope that the IGDA and asset maps will be that support. We also need to do a better job with female students and imposter syndrome. We need to support their accomplishments and build them up, especially in coding.
Is there a possibility to communicate computer science to non-computer science majors?	The Maya software spits out code when you do something. I'm trying to get a scripting course approve where students get an idea of what that code is then translate it into Python. This would hopefully count as a CS requirement for IMGD artists. A lot of them would make databases for sounds and rigging needs then proceed to get a minor. It would make us ten times stronger. We need to show artists how the code talks to the software that we use. It's similar to how low-level tech artists work. High-level artists work more like programmers. The CS bar of entry is to weed them out and teach theory which makes them lose people. You need to understand code first.