Music-Oriented Video Games IQP (2023)

An Interactive Qualifying Project
Submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
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Report Submitted to:

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Abstract:

The scope of this project involved the role of video games as means to facilitate transferable finger dexterity skills applicable to musicians. We refined a mobile game prototype and interviewed a music specialist and educator by the name of Will Kuhn, who concluded based on gameplay footage that the game's mechanics had potential, but that smartphone screens are too smooth for developing musical dexterity.

Acknowledgements:

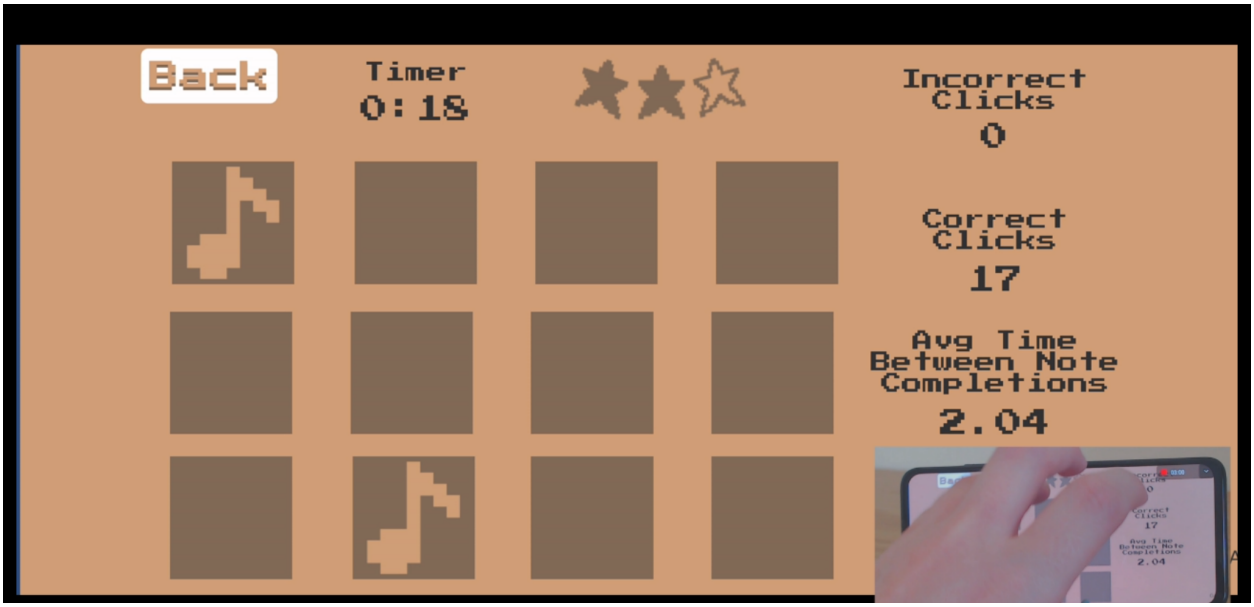
We would like to thank two people for their involvement in this IQP. V.J. Manzo, our sponsor and advisor, offered invaluable advice every step of the way for this project. Will Kuhn graciously agreed to be interviewed for this IQP, giving us an experienced insider perspective on Dexterity Now. Without them this project would not exist in its current form, if at all.

Authorship:

We distributed the writing work for this IQP paper mostly evenly. Benjamin and Carolyn both worked on every part of the paper, with Carolyn doing most of the editing. Benjamin set up and conducted the interview with Will Kuhn, while Carolyn created the demo to show in that interview and transcribed the interview itself.

Table of Contents:

List of Figures:



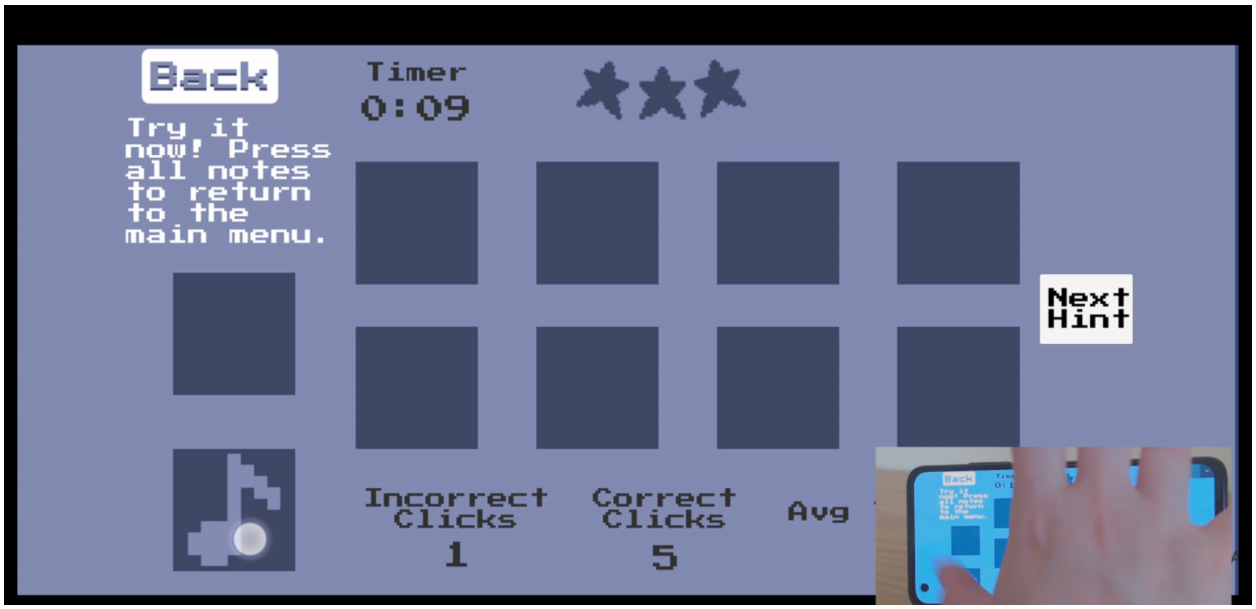


Figure 3: Dexterity Now! Gameplay–piano mode 15

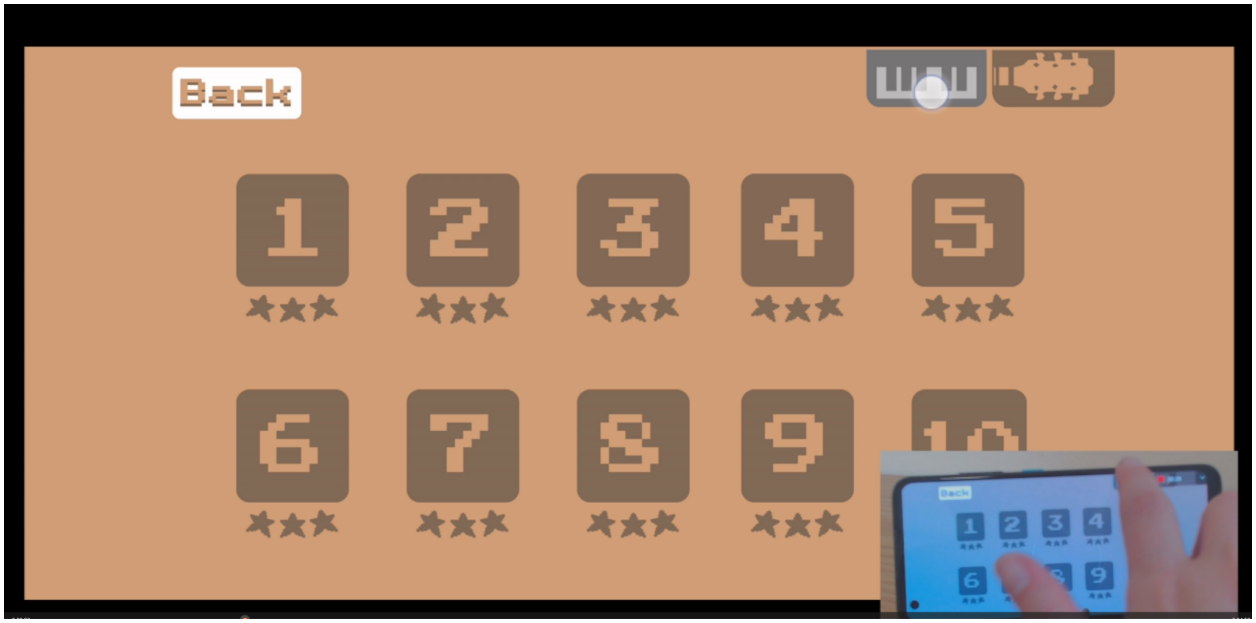


Figure 4: Dexterity Now Level Select screen(guitar) 16

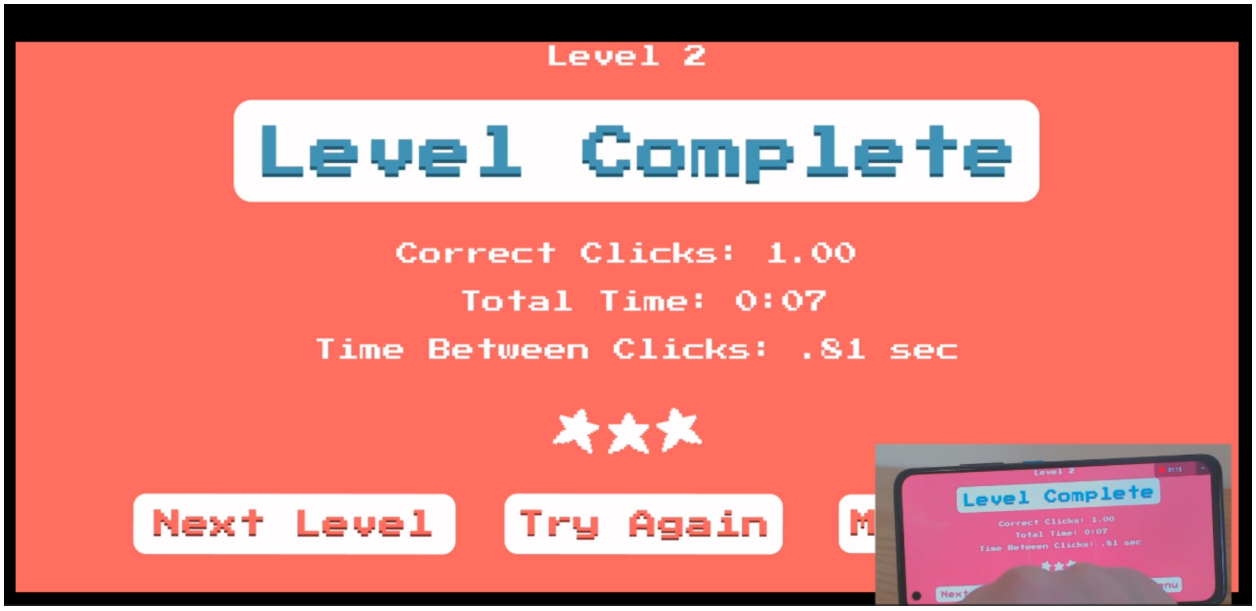


Figure 5: Dexterity Now “Level Complete” screen 17

Executive Summary:

Our team sought to examine the degree to which music video games could improve one's musical skill (rather than simply improving one's ability to play the game) by isolating the physical actions of musicianship and developing them through an enjoyable game that invited repetition of physical movements akin to the performance of some musical instruments.

Our research brought us to Dexterity Now, a game with an assortment of buttons that are set up in a grid formation. You play the game by setting your fingers across the screen in a set order. To play the game, one presses one of the buttons that is on the screen when that button is changed to have a musical note on it. The goal of the game's levels is to tap all notes in the proper sequence. The game is scored based on the speed in which you tapped the buttons when they appeared in the proper order.

Will Kuhn, a music educator with a wealth of experience, agreed to be interviewed on his thoughts on Dexterity Now. Although this interview was extremely helpful, it was somewhat inconclusive. Kuhn proposed multiple options to improve Dexterity Now; he believed its current form would not help with finger dexterity, but without proper testing we cannot be sure that is the case. The data was insufficient for us to come to a definite conclusion about Dexterity Now's effectiveness and how to proceed in the future.

There are several paths forward from here for Dexterity Now. One option would be adapting the game to have an actual physical set of buttons (either like a piano keyboard or something more guitar-oriented). Another similar option would be to adapt it for use on a computer using a computer's keyboard for button inputs.

Dexterity Now could also rebrand itself and reorient into being a rhythm game or Simon Says style game. One also could just continue developing Dexterity Now in its current form knowing that it would probably not improve finger dexterity in a way applicable to musical instruments, but that it could develop finger muscles to be better suited to learning how to play.

Introduction:

“Music-oriented video games” is a broad topic, so we knew immediately that we should focus on a narrow subset of this topic. We decided to look at whether or not music video games could improve one’s musical skill (rather than simply improving one’s ability to play the game). Many games focus on rhythm and timing; *Guitar Hero* and *Beat Saber* are probably the best-known games with this focus. WPI students have already focused their studies on games like these–could there be another way in which video games could develop musical skills?

Our research brought us to Dexterity Now, a game with an assortment of buttons that are set up in a grid formation. You play the game by setting your fingers across the screen in a set order. To play the game, one presses one of the buttons that is on the screen when that button is changed to have a musical note on it. The goal of the game's levels is to tap all notes in the proper sequence. The game is scored based on the speed in which you tapped the buttons when they appeared in the proper order.

The background section immediately follows this one and provides more details on Dexterity Now. The methodology section follows that one and explains what we did in this IQP. After that, a single section covers our results, conclusions, and recommendations.

Background Research:

To investigate ways video games could develop musical skills, we looked at how people learn music in general. Did they learn through a formal education, or were they self-taught? Could we narrow things down to a single successful education technique and then expand upon that?

Thanks to Lucy Green's research (detailed in both *How Popular Musicians Learn: A Way Ahead For Music Education*–first published in 2002–and *Music, Informal Learning and the School: A New Classroom Pedagogy*–first published in 2008) we were able to find answers to those questions. Green summarized her conclusions from *How Popular Musicians Learn* in *Music, Informal Learning and the School*; the former was how she got her answers, while the latter was what to do with that knowledge to encourage people to create music.

Formalized learning methods for music have been developed, but many more informal methods exist because of the variety of instruments, learning styles, and musical styles that exist (Green, 2008). Formalized music education actually is seen less often in the background of professional musicians than the informal ways of learning an instrument (Green, 2002).

> By far the overriding learning practice for most popular musicians, as is already well known and is also clear from existing studies, is to copy recordings by ear. It seems an extraordinary fact that this practice has developed in only the eighty or ninety years that have elapsed since the spread of recording technologies, across many countries of the world, through the activities of children and young people, basically in isolation from each other, outside of any networking or formal structures, and largely without adult guidance. (Green, 2008, p. 6)

Benjamin and Carolyn both have a more formal or traditional musical background, meaning that this method was not entirely familiar to either of us. Thankfully, Green elaborates further on learning by copying by ear:

> I wish to distinguish between two extreme ways of conceiving of this practice, each situated at the opposite ends of a pole. At one extreme there is what I call 'purposive listening' (Green 2002a), that is, listening with the conscious purpose of adopting and

> adapting what is heard into one's own practices. … ['Distracted Listening'] occurs when music is heard in the background, but is not attended to in a focused way, so that it enters the mind almost entirely through unconscious enculturation. Not only purposive listening, but also distracted listening carry on beyond the early learning stages and into professional realms. (Green, 2008, p. 6)

The fact that just listening to music, regardless of whether or not one is focusing on the music, can improve one's musical skills implies that it is possible other aspects of musical skill can be passively developed. Perhaps, then, one can improve more physical aspects of musical skill with an action independent of practicing the instrument–such as playing a video game.

Many scholars have already contemplated this possibility. One Andrew Mercer wrote an article aptly titled *Game Play to Music Play–Video Games in the Music Room*. This 2009 article primarily explains the mechanics of some of the more popular music-oriented video games before ending with:

> What can these games do for our music students? Perhaps Sing It will help them find their voices and the confidence to perform. Perhaps Wii Music will introduce an instrument that will provide years of study and enjoyment. Perhaps Dance Dance Revolution will help students find a sense of beat, a love of movement and a healthy lifestyle. And perhaps Rock Band will inspire them to be the stars that we already know they are. Embracing this medium and using it as a legitimate teaching tool will provide students with a relevant supplement to their musical education and hopefully bridge the gap between game play and music play. (Mercer, 2009)

This ending implies that non-educational games can have an educational purpose in the music education sphere. This conclusion is also supported by Green in *Music, Informal Learning and the School*. "The final statement of the anonymous questionnaire in Hertfordshire was: 'Using informal learning practices in the classroom has generally changed my approach to teaching for the better.' Twelve teachers ticked 'Strongly agree' and the remaining five ticked 'Agree'."(Green, 2008, p. 224)

Initially we wanted to create a game that could fill this role, but considering the scope of such a project and our skill sets, it wasn't viable to do so. Professor Manzo, our advisor, brought a game known as Dexterity Now to our attention.

Dexterity Now was conceived of and published by Professor Manzo, but prototyped and developed by WPI students working under him in various projects. Its goal was to help develop finger dexterity for playing piano or guitar. Thus, using it would allow us to test whether or not games not focused on rhythm could help develop skills applicable to playing a musical instrument–distinguishing this IQP from past iterations of it.

Methodology:

We began working in two main areas after deciding to use Dexterity Now–the mechanics and functionality of Dexterity Now, and how to tell whether or not it would be an effective tool for improving finger dexterity with musical instruments.

Dexterity Now

Concept

Understanding the concept of Dexterity Now was simple enough. Dexterity Now is a simple game in which the player presses buttons when a music note appears on them. Starting up the game brings one to the Main Menu, where one can choose to start the game over and wipe all of the saved scores, continue from where one left off and exit the game. This menu also has a mute button (which can be seen in the lower left of Figure 1 below).

Figure 1: Dexterity Now Main Menu

The game has two separate button layouts–one button layout is a 4x3 grid (as shown in Figure 2), while the other has two additional buttons to the left of a 4x2 grid (as shown in Figure 3).

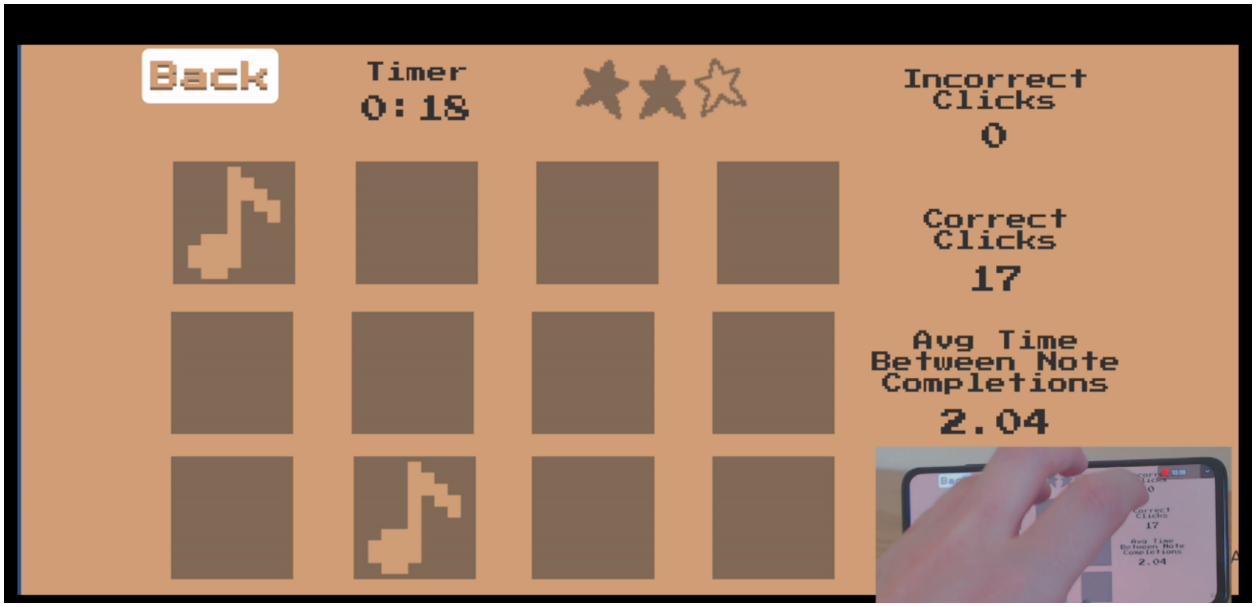


Figure 2: Dexterity Now! Gameplay–guitar mode

The layout displayed in Figure 2 is meant to emulate the positioning of the left hand's fingers on the neck of a guitar when playing; in the lower right, one can see that the left hand is being used to play.

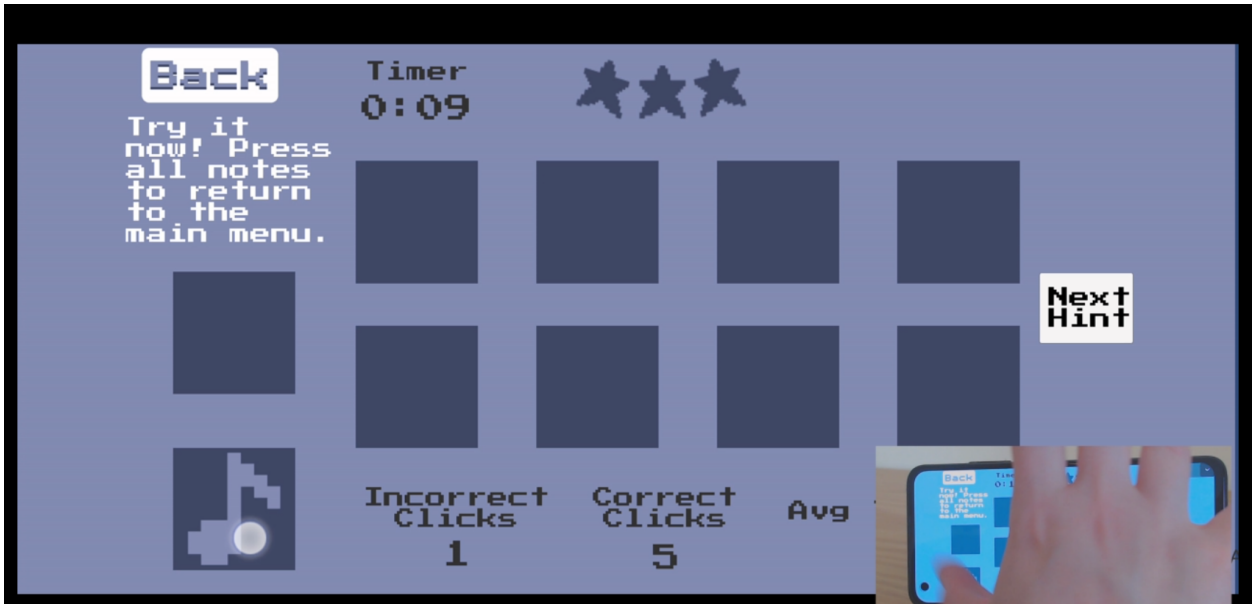


Figure 3: Dexterity Now! Gameplay–piano mode

The layout shown in Figure 3 is meant to emulate the positioning of the right hand's fingers when playing piano; one can see in the lower right corner that the right hand is being used to play.

The game is split into two modes–piano and guitar. In piano mode the right hand is used; the thumb is used to press the leftmost buttons, the index for the second to left buttons, and so on until the pinky (used to press the rightmost buttons of the grid). In guitar mode the left hand is used. The index finger is used to press the rightmost buttons of the grid, the middle finger for the second to left, and so on until the pinky (used to press the leftmost buttons of the grid).

Each of these modes has 10 levels, selected from a menu displayed in Figure 4 on page 16.

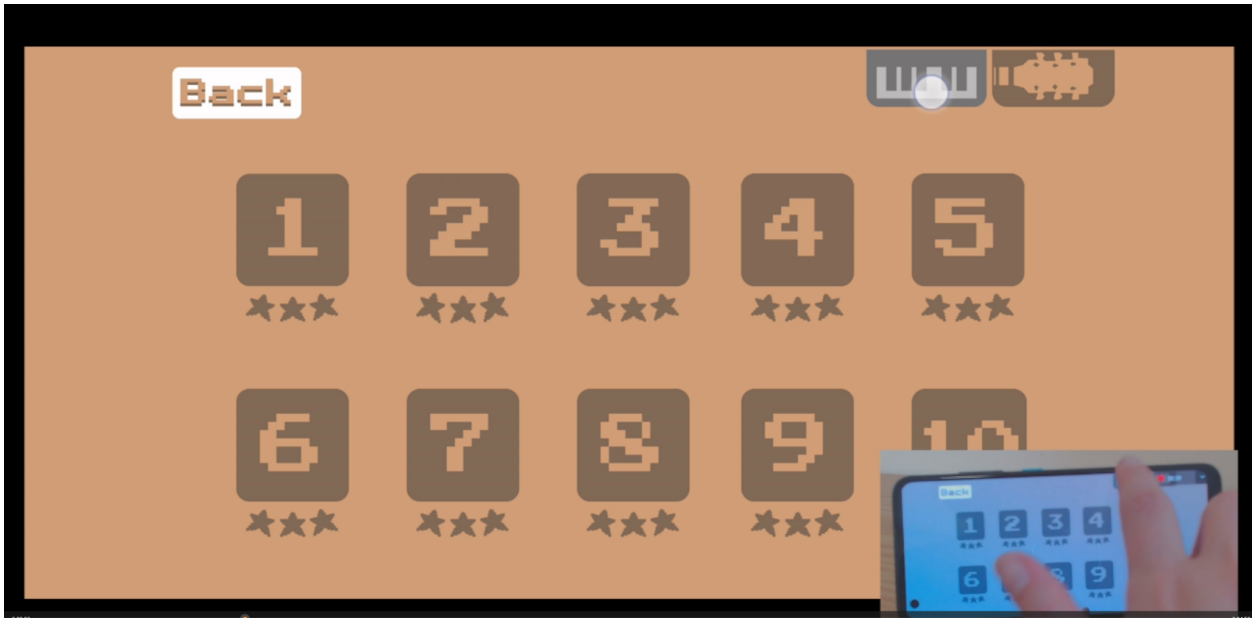


Figure 4: Dexterity Now Level Select screen(guitar)

These levels display music notes on the buttons in an order specific to the level. The player has a limited amount of time to press all of the buttons in the sequence without pressing any wrong buttons. Pressing a wrong button results in the sequence starting again from the beginning. After a level-specific amount of time elapses, or all of the buttons in the sequence are pressed, the game changes to a different screen, the "Level Complete" or "Game Over" screen in Figure 5.

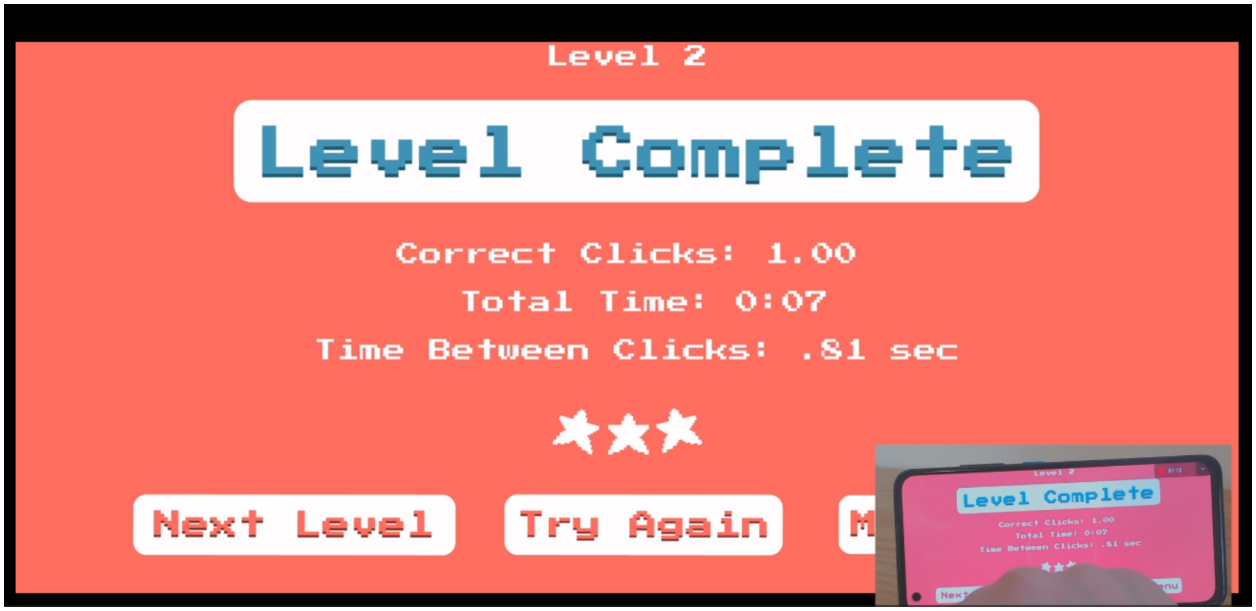


Figure 5: Dexterity Now "Level Complete" screen

This screen displays a number between 0 and 1 indicating what percentage of buttons were pressed correctly, total time, the average time between clicks, a star rating based on speed and accuracy of button presses, and several options for the player. The option blocked off in the lower right hand corner of Figure 5 is the "Main Menu" button.

If the player failed to finish the sequence in time, or failed to earn 2 or more stars, two options are available instead of 3: replay level and main menu (additionally, the top of the screen will say "Game Over"). If the player earned 2 or more stars, the "Next Level" button will be displayed as it is in Figure 5.

Functionality

Dexterity Now was initially published in 2018 for iOS by Clear Blue Media (full credits provided in Appendix A). It was removed from the Apple App Store at some point in the past five years, making it incredibly difficult to play on a mobile device with a touch screen as intended.

Thus, the first real step was getting Dexterity Now running on a mobile device. Since we still had the files used to develop the project, this should in theory have been easy. The age of the code and massive changes made in the past five years to how its game engine worked complicated things.

One problem was that we did not have access to a Mac compatible with modern iOS devices. This meant that running it on any iOS device was not viable, as one must have a Mac in order to test apps on iOS. The solution there was to make it run on Android.

This meant rebuilding the app for Android, which meant having a copy of the game engine used, Unity, installed on a computer. However, a core part of Dexterity Now was running using a paid add-on to Unity that had not been updated in the past few years. Additionally, the version of the add-on being used in Dexterity Now was incompatible with modern Unity.

One would think that the simple solution would be to use the older version of Unity to get Dexterity Now working. However, this older version of Unity only guaranteed compatibility up to Android 7–six versions out of date. Dexterity Now, when generated on the old Unity for Android, was unusable on modern devices.

This meant Dexterity Now would have to be made for Android using a new version of Unity incompatible with the old code. Thankfully, we discovered that the old incompatible code was only being used for one purpose, and modern Unity had a built-in function that could replace the code. It was relatively smooth sailing after replacing the old code with the built-in function to get it running on Android.

With a usable version of the app, we were able to move on to the next step in the IQP: getting data to draw a conclusion.

Interview

The logical thing to do to gather data seemed to be getting Dexterity Now into the hands of as many people as possible and then surveying them about the app. However, this idea had issues. For one, Dexterity Now was only possible to use for people with an Android device, and additionally getting it onto that device required some technical know-how. Since this IQP was being conducted in the summer, using a single device for multiple students to try out was not possible. Besides that, the quality of the data would be questionable at best with the small sample size we were likely to get.

We decided to follow in the footsteps of Lucy Green when it came to gathering the data. In her 2002 book, Green interviewed multiple musicians to get in-depth, quality answers about learning music. Interviewing a few very qualified people would give us better data than a random survey and so seemed like the better option.

We reached out to several experienced individuals in both the music field and the game development field to see if they were available to tell us what they thought about Dexterity Now. Ultimately, Will Kuhn, a music educator, was the only one to respond and agree to an interview.

Thankfully, Will Kuhn has a wealth of experience in the musical field. According to his website (willkuhn.com/about), not only is he a co-author of a book currently in use by Ableton (a music company), but he also is the president of TK:ME, the Technology Institute for Music Educators. A curriculum he developed has been used annually by over 250 students as well. All of this, besides being the founder of a music and media technology program at a high school in Lebanon, Ohio, makes him an ideal interviewee for evaluating Dexterity Now's educational potential.

Questions

Before conducting the interview, we wrote a series of questions to ask so that we would get as much information as possible in a single interview. The questions were as follows:

For music educator(s):

1. What methods of musical instruction have the highest success rate for you and your students?

2. To what extent do you think finger dexterity for musical instruments can be developed outside of instrument practice?

    1. [If yes] What do you think could be a good way of increasing one's finger dexterity for musical instruments outside of playing music?

    2. [If no] Could you please elaborate on why you think that?

After game demo:

For music educator(s):

1. What did you think of the audio of the game?

2. What did you think of the visuals?

3. Do you think this is or could be a good teaching tool for increasing one's dexterity?

4. Why?

5. What alterations, if any, would you make to improve this app's music educational value?

6. What do you think the demographic of this game is?

We also wrote questions intended for Interactive Media and Game Development professors at WPI, but as none responded to our interview requests these questions went unused.

Demo

The questions above show that we were planning to show a game demo in order to provide an understanding of Dexterity Now. This demo was simple enough. It showed both gameplay and finger movements in a single video. The gameplay showed where the player touched the screen while the finger movements and hand positioning were shown overlaid on the gameplay. Game

audio was included in the demo. The demo showed the game's tutorial, playing in piano mode, and playing in guitar mode.

Results, Conclusion, and Recommendations:

Our interview with Will Kuhn was extremely informative and lasted just under 30 minutes. In the first few minutes, we explained what Dexterity Now is and then asked general questions about music education.

Below we have Kuhn's answers to our interview questions and other relevant information he provided. These answers have been edited very slightly for brevity and clarity. Our questions and parts of the interview have been italicized while Kuhn's answers have been indented for viewing convenience. The transcript of the full interview without editing can be found in Appendix B.

What methods of musical instruction have the highest success rate for you and your students?

> The main teaching techniques that I use are group based projects and individual project time like one-on-one and a very light amount of performance…you could say some of it's like one-on-one but usually these are one-on-one consultations on a project they're trying to make.

To what extent do you think finger dexterity for musical instruments can be developed outside of instrument practice?

> Hm…I dunno. …Let's say you're learning finger drumming. Part of it is the coordination and the ability to time up with what you're trying to play. But part of it is the muscle memory and like hitting the targets and I've never been able to totally separate those two. I feel like the device you base your learning on it usually is the one that you're planning on getting good at. …Personally I haven't seen success separating those two things.

How important do you think finger dexterity is to just instruments in general?

> I think it's pretty important to most instruments. Yeah, I would say that's very important.

We then began showing Kuhn a video demonstration of Dexterity Now. There were some technical issues initially, but we resolved them. Upon stopping the demo video, Kuhn had some questions for us.

> [on the topic of the level complete screen] So…there were a couple of those where I saw the person play and it said they only had one correct click?

Yes.

> …But it looked like they got them all correct

…There are a few bugs in the game still…we did not create the game. [Soon after this we clarified that Clear Blue Media created the game]

> And is this measuring how close to the center of that square or just anywhere in the square …is considered a positive?

Anywhere in the square is considered a positive but what happens is if you misclick it will reset to the very beginning of the track so you have to re-input like the. If you got like four right and got the fifth one wrong you have to restart from the beginning and do the first four again in the correct order and then get the fifth one right

> Okay…huh.

What did you think of the audio of the game?

> I like the aesthetic of it. …Some of the pitches that it was picking to play sounded…not rewarding me. …So I couldn't tell if that was intentional, not rewarding the person…the menu music sounds very pleasant and consonant… The notes it was producing I couldn't discern a pattern.

I believe there is no pattern and that was one of the things we noticed when we were going over the code of the game and actually looking through the bugs of the game as well.

It felt like maybe there should be a different sound if you make a mistake or something could be helpful.

What did you think of the visuals?

The visuals were simple, it was functional… it was mostly clear where you're supposed to put your hand. The piano version…took me a while to figure out that was like a thumb. So maybe some kind of instruction on that is given the first time you launch it but I'm not sure I would have known to put my hand there and use that same finger every time. I think I would have just poked with my index finger every time and not realized it was supposed to do this.
The guitar mode…I'm not a guitarist but that looked a little more like a guitar but I'm not sure I would have known what to do with my fingers there either. If that was supposed to be four fingers doing this up and down it looked like that was what it was trying to do. But I liked that it was simple and it wasn't trying to distract me with other pictures or anything. It was very straightforward once you know where to put your hand.

Do you think this is or could be a good teaching tool for increasing one's dexterity?

I think that if you were to marry this to a physical object…that has friction and resistance and like those kind of characteristics I feel like Dexterity on a glass screen that's slippery that's meant for swiping and scrolling is…Our fingers are supposed to grab onto things with friction. I feel like if … you were to plug a little keyboard in and use it as a game there the game itself is totally fine. it's the glass screen–I feel like that makes it not as useful.

There's similar ones for finger drumming that exist where you can do 'em on a typing keyboard, you can do 'em on a screen but they're really meant for…hook up a MIDI

controller and…[using] the thing you're trying to get good at. So y'know, let's say you hooked this up to…one of those light-up LUMI keyboards or something. That'd be great, that'd be a really useful tool. It'd be like a typing class but for piano. It's been that kind of idea's been around for a long time…if they made some kind of game that was approachable for that, that'd be really cool.

You also could do it on a laptop keyboard… I feel like that would be more useful just because the targets never move…you can feel where the edges are on them. I think dexterity is like a two-way street because… you're not just trying to memorize a motion, you're trying to memorize the feeling of the motion. You're picking up all kinds of…sensory information from what you're pressing your fingers on and the glass removes all of that.

What alterations, if any, would you make to improve this app's music educational value?

…[T]he closest thing I've used…is something called Melodics um which is kind of like a teach-you-how-to-drum on a grid kind of thing. It…has a little more of the timing piece to it…That would be an interesting way to expand the existing program but as a "do the thing on the screen, follow the instructions" … let's stick with the piano mode and it would be interesting to hear that play a little more of a song or teach you something that's a little bit more usable outside the game…the random notes don't associate with where I'm putting my fingers. I'm imagining a five point scale …it's laid out like a piano and I should probably be hearing something like that I imagine.

…Introducing an element of timing and introducing a kind of physical control would help make that…useful in a classroom. Melodics is close and the only problem that I have with Melodics is I can't integrate that stuff into a project I'm using. That'd be the hardest piece to implement, but if I [could] somehow get that information out of the game and into a project… Maybe it's a MIDI clip, maybe it's an audio recording. … I had kind of a scaffolded hand drum thing…it's harder to picture what the implementation would be like for that, I guess, but that would be the most useful thing to me…if I had something like that.

> People like me usually will implement some kind of …a technique as we're teaching it to make sure those work, like teaching kits out of quantize stuff or putting …a note repeat on our device so that everything you play comes out at the right time rather than it being exactly on the grid….I really like if something like Ableton's learning music site had something like that built in that was kind of a version of this or Melodics or something like that. That would be… really useful as that could export a file like an Ableton file.

What do you think the demographic of this game is?

> The target of the game I saw looked like little kids to me. It seemed to me like… the easiest thing to turn that into would be one of those…music games where it's like a Simon Says kind of a music game..you could do that like kind of the "Do this, this, do this, this." You could turn it into that kind of a repeat after me kind of game. Those are kind of fun and they do teach you some timing like within a boundary of how in-time you can be.

Kuhn proposed multiple options to improve Dexterity Now; he believed its current form would not help with finger dexterity, but without proper testing we cannot be sure that is the case. The data was insufficient for us to come to a definite conclusion about Dexterity Now's effectiveness and how to proceed in the future.

There are several paths forward from here for Dexterity Now. One option would be adapting the game to have an actual physical set of buttons (either like a piano keyboard or something more guitar-oriented). Kuhn believes finger dexterity improvement requires a memory of the feeling as well as a memory of the motion, so creating a custom controller and revising the game to work with it could significantly improve Dexterity Now.

Another similar option would be to adapt it for use on a computer using a computer's keyboard for button inputs. Whether or not this would be extremely effective for improving finger dexterity to play instruments is unknown, though.

Dexterity Now could also rebrand itself and reorient into being a rhythm game or Simon Says style game. This way it could improve mental skills involved in playing an instrument instead of targeting physical skills. This would be a complete foundational shift.

One also could just continue developing Dexterity Now in its current form knowing that it would not really improve finger dexterity in a way applicable to musical instruments, but that it could develop finger muscles to be better suited to learning how to play. This would require testing to ensure it would work.

Dexterity Now has some features to improve and bugs to remove regardless of which path is chosen. Kuhn pointed out that the noises are not rewarding (as they are completely random) and there doesn't seem to be a punishment noise or incentive to hit the right buttons. There is, in fact, a different noise for incorrect button presses, and it was in the demo, but clearly it is not different enough from the noises for correct button presses.

Besides that, the noise in the tutorial for an incorrect button press is currently different from the one in the game. Currently a man screams when pressing a wrong button in the tutorial, with a different noise in the actual game. The noise issue could be corrected in two ways: having the buttons always produce specific, distinct notes, or by having the button presses play out a song. The former would be better as identical finger movements while playing an instrument always produce the same notes.

Dexterity Now has several other features that need to be adjusted. The game has pre-programmed levels that always produce the same sequence of button presses. A single wrong press in the game makes it go back to the beginning of the sequence. Dexterity Now has time limits on each level (which do not display–another aspect of it that needs to be adjusted) and the sequence resetting itself can make it impossible to complete the level well enough to move on after just one wrong button press.

Kuhn noticed that, on the level complete screen, the game displays a number between 0 and 1 for correct button presses. It seemed nonsensical to him, but in fact that number is just a decimal form of the percentage of correct presses. In the future, this needs to either be made clear or, more simply, display as a percentage instead of a decimal.

As we mentioned earlier, there are time limits on each level. There is a timer when playing a level, but it counts up instead of counting down. Thus the player cannot know for sure when the level is supposed to end even though there is a set time for it to end.

Currently, Dexterity Now has 10 piano levels and 10 guitar levels. The issue is that, after completing the last level, the “Next Level” button still appears if the player got 2 or 3 stars. This brings the game to a level where the time counts up, every button press is incorrect, no notes appear, and the only way out is to hit the “Back” button present on every level screen.

Carolyn fixed the buttons not having uniform positions, but did not have an opportunity to fix the non-uniform sizing of the title screen buttons. She also noticed that the toggle button for muting the game on the main menu doesn’t actually mute the game after navigating away from the menu. This button additionally creates game objects every time the music is turned on again, which could negatively impact how well Dexterity Now runs.

Dexterity Now does not have a credits page within the game, a feature that most games include. Ultimately, anyone who works on Dexterity Now in the future needs to do thorough research and conduct more interviews before deciding how to proceed.

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Appendix A: Credits from https://www.clearbluemedia.com/dexteritynow/index.html

Credits:

Published by Clear Blue Media

Created by V.J. Manzo

Developed by WPI students Brandon Clark, Michael Badanza, Marcus Lundgren

Additional development and app deployment by WPI student Lucas Mancinelli

Prototyping by WPI students Peter Chen, Jumbo Chen, Bradford Bonanno, Kezheng Dai, Zhi hui. Jingwei Shen, Xinyuan Wang, Shihao Xia, and Yunze Zhu

Appendix B: Transcript of Interview on Thursday, August 9, 2023

B: Okay, we're recording.

B: Hello, I'm Ben Dorr, and I'm a member of the Music-Oriented Video Game IQP. I work with my partner and my professor VJ Manzo. We want to do research into Music Oriented Video Games and how might one's skill from video games translate over to the real world. To get more specific on the interactions that we're looking into is whether or not music orientated video games have the ability to increase one's musical skill.

K: Okay

B: The game that we're looking at and choosing to study is called Dexterity Now. The game is meant to be a genre of like a cookie clicker type game if you know what that is. If you–do you?

K: Haven't heard the phrase before

B: Okay. I'll explain it real quick. It's a game where you just tap a button on the screen practically as fast as you can.

K: Oh, okay

B: This game, obviously, that we're looking at is a slight twist to that where it has a grid of buttons that is kind of set up where you place your hand across it like a piano or a guitar neck almost instead. And you press the buttons with your fingers as if you're trying to like almost press the button on the keyboard or piano or press down on the strings of the guitar.

K: Okay.

B: Um…one second, I just lost where I was, sorry. The purpose of the game is to improve your overall time and splits between each button press as well. Just to like so you can actually see the changes and hopefully you're increasing your dexterity with your fingers.

K: Okay

B: But that's just my quick little spiel that I had to say at the start. Do you have any questions about it so far?

K: I guess not

B: I have some questions to ask you now that aren't related to the game directly so I thought I would ask them prior to showing you the game. We were curious as to what methods of musical instruments have the highest success rate for you and your students.

K: What methods of musical instruments…?

B: Er, sorry. What methods of teaching is most beneficial for your students and you? Like best success rate I believe.

K: By methods you mean like…

B: Different teaching strategies and stuff

K: Different teaching strategies I would say project based strategies are most effective. Is that the kind of answer you're looking for?

B: No, that's fine. Is there like any others like that work well as well like outside of projects?

K: Yeah Playing in an ensemble…

B: Okay

K: Doing the main teaching techniques that I use are group based projects and individual project time like one-on-one and a very light amount of performance so that's the kind of and you could you could say some of it's like one-on-one but usually these are one-on-one consultation on a project they're trying to make.

B: Okay. Thank you. Next the question is to what extent do you think finger dexterity for musical instruments can be implemented outside of instrument practice?

K: Hm…um I dunno. Yeah I feel like finger dexterity it cuz part of when you learn like let's say you're learning finger drumming part of it is the coordination and the ability to time up with what you're trying to play. But part of it is the muscle memory and like hitting the targets and I've never been able to totally separate those two. I feel like the device you base your learning on it usually is the one that you're planning on getting good at. So if you're using an ableton push that has like inch size targets or an npc that has like 2 or 3 inch size targets I feel like that really changes like…I'm a percussionist so this part down (arm) is kind of the same but what you do up here (fingers) is very different for those. So I think of it like I'm hitting a little kind of drum but I think y'know if this isn't involved there are some people whose go to is just using fingers only so…I personally personally I haven't seen success separating those two things so yeah.

B: No, thank you. And then I guess I have one more question. How important do you think finger dexterity is to just instruments in general?

K: I think it's pretty important to most instruments. Yeah, I would say that's very important.

B: Okay, next we just have the video to show you. Let me just share my screen now. So this is Dexterity No–oh wait so let me hit share, sorry. Can you see everything fine? How clear does this look?

K: Yes that looks very clear.

B: Okay perfect, thank you. So this is Dexterity Now. We'll just watch a quick little demo video what it is. We'll have both the main screen recorded and then we have in the bottom right corner there will be another recording of the third person just so you can see what the hand placement's supposed to look like. And you'll be able to see one person taps on the screen on the screen recorded version which will be the main screen with a little circular white dot.

K: Okay

[Recorded demo; no audio playing currently]

B: And that was just the tutorial real quick and now we'll actually have some gameplay

K: Am I supposed to be hearing this?

B: Uh, there are some… yes, you should be, my apologies if you're not hearing it.

K: I just am not able to hear it.

B: There's not too much to hear but let me just fix that anyways. Let me just stop sharing real quick and go back in. Okay, let's see if this works. Can you hear now?

K: No.

B: No? Okay

K: Sorry

B: Let me see if I can fix this once more. If not we'll just have to go without music. Whenever a note shows up that's when the indication to tap the button and whenever you tap the button there is just a random musical note played. And then at the end when you hit when it a level is finished there's just some menu music I should say

K: Okay

B: Ah, there we go.

K: There we go. I can hear that.

K: Yeah, I can hear that now

B: Is it too loud?

K: No it's perfect

B: Perfect

B: Now we're just kind of doing what would be considered the guitar mode. It's very similar to the piano mode just with another layer of buttons. Would you like to continue watching or would you like to answer the questions now?

K: Yeah I'm just starting to understand what I'm watching here.

B: Okay perfect then

[The demo is paused]

B: Well that is the game Dexterity Now

K: So when there were a couple of those where I saw the person play and it said they only had one correct click?

B: Yes

K: Um but it looked like they got them all correct

B: Uh yes I will say that there are a few bugs in the game still that we are…we did not create the game.

K: Okay

B: This was made by…it was a past IQP group I believe I just need to find the name real quick

K: And is this measuring how close to the center of that square or just anywhere in the square where is considered a positive

B: Anywhere in the square is considered a positive but what happens is if you misclick it will reset to the very beginning of the track so you have to re-input like the. If you got like four right and got the fifth one wrong you have to restart from the beginning and do the first four again in the correct order and then get the fifth one right

K: Okay…huh.

B: Um the people er the group the company name they created for this game was called with ClearBlue Media.

K: I'm familiar with ClearBlue Media

B: Now we just have a few more questions but uh these are first few questions are more about the like how the game looks, how the game sounds, and what you think of the game

K: Okay

B: So what did you think of the audio of the game?

K: I like the aesthetic of it. It was a little…some of the pitches that it was picking to play sounded like it was uh not rewarding me.

B: Understandable

K: So I couldn't tell if that was intentional not rewarding the person or cuz the menu music sounds very pleasant and consonant and the notes it was producing I couldn't discern a pattern in those.

B: I believe there is no pattern and that was one of the things we noticed when we were going over the code of the game and actually looking through the bugs of the game as well

K: It felt like maybe there should be a different sound if you make a mistake or something could be helpful

B: Okay

K: Yeah, I mean other than that it reminded me of those really old Apple 2 games that would teach you typing back in the day

B: Understandable. No I…I don't think I had Apple 2 ones, but I remember some type and play games to help with typing. The next question we have is what did you think of the visuals?

K: Um the visuals were simple it was functional um it was it was mostly clear where you're supposed to put your hand The piano version it took me a while to figure out that was like a thumb. So maybe some kind of instruction on that is given the first time you launch it but I'm not

sure I would have known to put my hand there and use that same finger every time. I think I would have just poked with my index finger every time and not realized it was supposed to do this.

B: Okay

K: The guitar mode…I'm not a guitarist but that looked a little more like a guitar but I'm not sure I would have known what to do with my fingers there either if that was supposed to be four fingers doing this up and down it looked like that was what it was trying to do. But I liked that it was simple and it wasn't trying to distract me with other pictures or anything. It was very straightforward once you know where to put your hand.

B: Um now one of our so do you think this could be a good teaching tool for increasing one's dexterity or no?

K: Um…it like as a game

B: Or do you think it has the potential to?

K: I think that if you were to marry this to a physical object

B: Okay

K: That has friction and resistance and like those kind of characteristics I feel like

B: It would be

K: Dexterity on a glass screen that's slippery that's meant for swiping and scrolling is like our fingers are supposed to grab onto things with friction. I feel like if you had Like let's say you were to plug a little keyboard in and use it as a game there the game itself is totally fine it's the glass screen I feel like that makes it not as useful. There's similar ones for finger drumming that

exist where you can do ‘em on a typing keyboard you can do ‘em on a screen but they’re really meant for like hook up a MIDI controller and and use the thing you’re trying to get good at. So y’know, let’s say you hooked this up to like one of those light-up lumi keyboards or something that’d be great that’d be a really useful tool it’d be like a typing class but for piano. It’s been that kind of idea’s been around for a long time but y’know if they made some kind of game that was approachable for that that’d be really cool. You also could do it on a laptop keyboard and it would be I feel like that would be more useful just cuz the targets never move the targets you can feel where the edges are on ‘em. I think dexterity is like a two-way street because what you’re trying to you’re not just trying to memorize a motion you’re trying to memorize the feeling of the motion you’re picking up all kinds of like sensory information from what you’re pressing your fingers on and the glass removes all of that.

B: Okay. Well, thank you. Next this kind of blends into the last question but what alterations if any would you make to improve this game for its music educational value. I know you mentioned like making it more physical already

K: So yeah the closest thing I’ve used that’s like is something called melotics um which is kind of like a teach you how to drum on a grid kind of thing. It has a little less it has a little more of the timing piece to it which I that would be an interesting way to expand the existing program but as a do the thing on the screen follow the instructions um it would be y’know let’s stick with the piano mode and it would be interesting to hear that play a little more of a song or teach you something that’s a little bit more usable outside the game cuz the random notes don’t associate with where I’m putting my fingers. I’m imagining a five point scale where I have my hand like this and it’s laid out like a piano and I should probably be hearing something like that I imagine. And y’know introducing an element of timing and introducing a kind of physical control would help make that kind of useful in a classroom. Melotics is close and the only problem that I have with Melotics is I can’t integrate that stuff into a project I’m using. That’d be the hardest piece to implement but if I would have the ability to somehow get that information out of the game and into a project. Maybe it’s a midi clip maybe it’s an audio recording. So I had kind of a scaffolded hand drum thing that’s that’s harder and it’s harder to picture what the implementation would be like for that I guess but that would be the most useful thing to me is if I had something like that.

People like me usually will implement some kind of a a technique as we're teaching it to make sure those work like teaching kits out of quantize stuff or putting like a note repeat on our device so that everything you play comes out at the right time rather than it being exactly on the grid. So those are some ideas I really like if something like Ableton's learning music site had something like that built in that was kind of a version of this or Melotics or something like that that would be that would be really useful as that could export a file like an Ableton file. So that's yeah, a lot of thoughts.

B: And then just one more question–what do you think the target demographics of this would be? More like towards adults or more like kids teens and stuff like that?

K: The target of the game I saw looked like little kids to me. It seemed to me like uh the easiest thing to turn that into would be one of those like music games where it's like a Simon Says kind of a music game almost like I dunno if you remember like Space Channel 5 it reminded me of like you could do that like kind of the Do this, this, do this this. You could turn it into that kind of a repeat after me kind of game. Those are kind of fun and they do teach you some timing like within a boundary of how in-time you can be.

B: Okay…um, thank you for your time, by the way

K: Yeah, of course

B: That is everything. Thank you so much again

K: Alright I hope that was helpful

B: No, that was extremely helpful. Thank you so much

K: Best of luck

B: Thank you