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STUDENT EXPERIENCES WITH A DIGITAL TOOL FOR MUSIC PRACTICE AND LEARNING

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Abstract

The research literature suggests that learning to play a music instrument can be a long and complex process. Weekly music lessons are challenging to students who are not motivated to practise between lessons, and who may stop taking lessons before reaching musical proficiency. The literature also suggests that those students who develop strong habits of self-regulation are most likely to succeed as musicians. The present study was designed to determine whether a digital tool, designed to support music practising and learning through self-regulation, could help motivate students to practise and to achieve musical success. Following a case study protocol, data were collected from three music teachers and their students, all of whom used a digital practice tool (Cadenza) over a 10-month period. The results indicated that Cadenza was a powerful motivator for many – but not all – of the students. Five student profiles were identified, ranging from weak students who did not appear to benefit from Cadenza, to strong students whose proficiency improved when using Cadenza. Of particular interest were the weak or average students for whom Cadenza was transformative. The study concludes with a description of the features of Cadenza that proved to be most important for motivating students and for the resulting progress in self-regulatory learning and musicianship.

Keywords: Digital music tools, Cadenza, student self-regulation

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1. Introduction

The lure of learning to play a musical instrument is a strong one. Young people and their parents often share lofty aspirations for musical proficiency, so that young musicians can enjoy music throughout childhood and make music throughout their adult lives. However, the process of learning to sing or to play an instrument is fraught with challenges, and the speed at which learning occurs can be excruciatingly slow (McPherson, Davidson, & Faulkner, 2012). In a digital age where information can be retrieved in an instant, and people can message each other and share video on smartphones with the touch of a few buttons, the time and the effort that it takes to learn to play an instrument stands in sharp contrast to digital activities where contact is instantaneous and where learning – at least on a surface level – can be quick. But what if those digital experiences were used to support the lengthy and sometimes arduous process of learning to play an instrument?

In a prior case study, involving one music teacher and her students, we explored how a digital notebook called Cadenza could enable students to persist with their lessons and to practise effectively between lessons (Upitis & Abrami, 2017). That initial study confirmed that Cadenza could both motivate and guide students, helping them to progress more quickly, which in turn, further motivated additional learning. The present study extends that initial case study.

Cadenza was designed to support the one-on-one weekly lesson structure for learning the Western musical canon. A long-standing challenge with this approach is the difficulty of motivating students between lessons. Consequently, the present study was designed to further understand student experiences between lessons, as reported by the teachers and depicted by the students' use of the digital portfolio tool. A second purpose was to attempt to characterize students' strengths and weaknesses in musical growth as they related to their use of the tool. Accordingly, the following research questions were addressed in the present study:

1. How do teachers use Cadenza to motivate students to practise?
2. How are student motivation and learning enhanced with Cadenza, and what features in Cadenza account for these results?
3. How can student experiences be categorized in terms of motivation, musical success, and use of Cadenza's features?
4. Is there evidence for the claim that Cadenza supports students who might not otherwise succeed?

2. Literature Review

2.1. Self-Regulation and Music Learning

Musicians who develop strong self-regulatory skills often experience more success and pleasure from their musical endeavours than those student musicians who fail to develop strong habits of self-regulation (McPherson, 2012; Varela, Abrami, & Upitis, 2016). Motivation is a key factor to becoming a self-regulated musician, in part because of the many years that must be invested to reach musical proficiency (Kupers, van Dijk, McPherson, & van Geert, 2014; McPherson, Davidson, & Faulkner, 2012). But motivation is also tightly tied to practice habits and strategies used by student musicians. Indeed, models for musical motivation have emphasized the importance of both environmental factors, including cultural, familial, institutional, and educational contexts, as well as internal factors, including cognition, self-beliefs, affect, and self-regulation (Hallam et al., 2016). Motivation is, in a word, complex. Bonneville-Roussy and Bouffard (2015) postulated that the combination of motivation, self-regulation, accumulated practice time, and deliberate practice strategies would predict musical achievement. Their study of 235 music students, representing a wide range of instruments, led them to conclude that formal practice was most effective when a positive motivational profile was combined with considerable practice time.

Researchers have also found that it is possible to teach self-regulatory strategies to student musicians, even to those students who are strong and are playing at an advanced level. For example, in a study of advanced wind players, Miksza (2015) found that those students who received the self-regulation instruction made significantly greater gains in performance achievement than those who did not, and further, that a range of strategies were employed by the students instructed in self-regulatory strategies. Nielsen (2015) similarly found that advanced jazz students used a number of self-regulatory strategies to achieve their goals, including metacognitive strategies such as strategic planning, and monitoring and self-evaluating their progress, and solo performances. Nielsen concluded that teachers should concentrate on approaching practice sessions through the lens of self-regulation, recognizing the importance of self-reflection for student music learning. A recent study (Boucher, Dubé, & Creech, 2017) also highlights the strong potential of video feedback for developing self-assessment of musical performances.

2.2. Self-Regulation and Cadenza

Prior research has established that digital tools can support music learning, especially when such tools have embedded scaffolding that helps develop student self-regulation (Brook & Upitis, 2015; Upitis & Abrami, 2017). Cadenza (<http://www.cadenzamusictool.ca>) is an

online music practice tool that is used by the teacher during weekly lessons, and then by students during practice sessions between lessons. It was developed over several years, using an evidence-based approach to design and development (Upitis & Abrami, 2015).

Self-regulation provided the theoretical underpinnings for the creation of Cadenza. Accordingly, Cadenza has a number of embedded features for students, such as scaffolding that supports the development of self-regulation, and cues that prompt them to engage metacognitively during practice sessions. For example, there is a section in the student view of Cadenza where students set goals within their personalized portfolios; these goals can be viewed by the teacher during and between lessons. In addition there are several reflective tools for students, including ‘emojis’ that can be used to rate their own practice sessions, prompts that encourage students to assess the nature of their practice sessions, and a feature that allows students to interact online with their teacher. Teachers can use the structure of Cadenza to negotiate effective task strategies for students to employ during the week and to set targets regarding both the nature and extent of practice sessions. As well, a media annotation feature allows teachers to interact with students mid-week, providing effective feedback at a time when it is most needed for students to remain motivated to practise and to make progress with their learning. The media annotation feature also provides students with an archived representation of the teacher’s comments and the possibility of making self-assessments of their learning – something that would otherwise not be available in a traditional lesson, where the teacher uses a pen and paper notebook and the student works with the notes made by the teacher and the memory of the lesson.

3. Method

3.1. Methodology and teacher selection

This was a 10-month case study of three music teachers and their 104 students, following the protocols of case study research (Yin, 2009). Research was conducted in accordance with the Canadian Tri-Council Policy Statement governing research with human participants (Canadian Tri-Council, 2010). The teachers were recruited on the basis of the following criteria: (a) familiarity with digital music tools to support student learning and prior experience with Cadenza in particular; (b) a studio practice with at least 15 students; and (c) a range of student abilities and motivation to learn to play their instrument.

3.2. Data collection and analysis

Data were comprised of a focus group interview with the teachers at the outset of the study, screen captures of the teacher and student Cadenza files, email exchanges, and individualized semi-structured exit interviews inviting the teachers to identify student profiles, based on use of Cadenza, lesson experiences, and student progress as reported by the teachers. Interview questions were further used to explore the specific ways that the teachers used Cadenza to support their teaching in terms of the student profiles, as well as unexpected successes in using Cadenza with students they characterized as weak or average. Throughout this paper, the three teachers are referred to by pseudonyms. The interviews, email exchanges, and screen captures were analyzed according to established protocols for qualitative data analysis (Creswell, 2012; Yin, 2009).

4. Results

4.1. Teacher Studio Composition

The teachers taking part in the study had studio practices ranging from 17 to 59 students. The proportion of students using Cadenza ranged from 53% (Jackie’s studio) to 76% (Emma’s studio). The primary reason for the variation in the proportional use of Cadenza was the age of the students. Nearly half of Jackie’s students were under the age of seven years; these students were not sufficiently proficient with digital technologies to make use of Cadenza. Both Jane and Jackie reported teaching mostly beginning and intermediate students. Emma’s students were generally more advanced, accounting for the greater use of Cadenza in her studio. All three teachers had students with a range of abilities and Cadenza use, as indicated in the table below.

Table 1. Cadenza use by student profile

Teacher	Studio Size	Students using Cadenza	Ages	Strong students: Use often	Strong students: Don’t use often	Average students: Irregular use	Weak students: Start and stop	Average/weak students: Cadenza transformative	Never use Cadenza
Emma	17	13	6 to 64	3	1	6	2	1	4
Jackie	59	31	4 to 16	15	2	2	5	7	28
Jane	28	17	5 to 19	1	0	12	2	2	11
<i>Totals</i>	<i>104</i>	<i>61</i>		<i>19</i>	<i>3</i>	<i>20</i>	<i>9</i>	<i>10</i>	<i>43</i>

4.2. *Teachers' Ways of Motivating Students with Cadenza*

This section of the results reports on the first research question, namely, how Cadenza assists teachers in motivating their students to practise and in making the lesson more effective. Four main findings emerged. First, Cadenza made it possible for all three teachers to document the lessons more effectively and quickly than would have been the case with paper-and pencil notebooks, thereby allowing them to accomplish more during the lesson time itself. Second, the checklist feature of Cadenza made it easier for teachers to clarify their expectations and identify practising strategies for their students. All three teachers reported that the checklist item, requiring not just a given number of repetitions, but a given number of *correct* repetitions, made a positive difference for their students. Third, the teachers used the communications features of Cadenza to check on student practising mid-week, between lessons, to encourage further progress and/or to clarify any confusion that might have arisen once students began practising at home. Finally – and perhaps most important – teachers found that, over time, they set higher expectations for students who were using Cadenza, as compared to those students in their studios who were not engaged with the tool.

4.3. *Enhanced Student Learning and Motivation*

The second research question focused on how student learning and motivation were enhanced with the use of Cadenza. For those students who used Cadenza diligently, taking advantage of its many self-regulatory and metacognitive features, Cadenza appeared to be highly motivating. In particular, the built-in reward system (points and badges), as well as the practice log and timer (with progress visible to both teachers and students), served to be very motivating. In addition, teacher interactions with students between lessons were cited by all three teachers as important for building and maintaining motivation. These mid-week communications helped students address specific problems and served to motivate students to practise, and to practise efficiently. Mid-week communications led to more self-reflection on the part of the students, which further enhanced the effectiveness of practice sessions. Further, students told their teachers that using Cadenza made it more “fun” for them to practise, and that they enjoyed being able to use digital tools and devices to advance their musical development. Finally, all three teachers indicated that the use of the media annotator made a considerable difference to student motivation and helped teachers give effective and timely feedback, both of which are critical in developing student self-regulation.

As a result of increased student motivation, teachers reported that they set increasingly higher expectations for students. All three teachers reported that those students who were motivated and supported by Cadenza to practise more effectively and joyfully were also more

successful in their examinations than they had been in prior years and as compared to their peers who did not use Cadenza effectively.

4.4. *Developing Student Profiles to Describe Progress and Cadenza Use*

Five student profiles were identified. These were (a) strong students who enjoyed using the tool and most of its features, (b) strong students who tried the tool, but found it to be unnecessary or distracting, (c) average students who used the tool irregularly or only accessed a few of its features, (d) weak students, who started enthusiastically but stopped soon thereafter, and for whom the tool did not help make practising more effective, and (e) weak/average students for whom the tool was transformative. These five profiles are now described in turn.

4.4.1. *Strong Students Using Cadenza*

There was a large group of Cadenza users (roughly a third of the total number of users in the current study) who were strong students to begin with, and Cadenza only made them stronger. These students especially enjoyed the ability to structure their practice times in clearer ways than with pen-and-paper notes alone. They reported using Cadenza to help jog their memories about what took place in the lesson. This group, more than any other, also made regular use of the reflection tools embedded in Cadenza. One teacher reported:

Even the strong practisers have benefitted greatly from the structure and specificity. Whereas before they might have put in the time and repetition but not the detail (“repeat correctly” is my favourite feature!), now they see the benefit of practising in smaller chunks with more specific tasks. They have voiced that they feel they are getting in more quality practice time and it’s making a difference in their playing and focus during lessons.

4.4.2. *Strong Students Who Don’t Use Cadenza*

There was another group of students who practised effectively, but who did not use Cadenza, for one of several reasons. Some strong students claimed that Cadenza was a distraction or that the movement between their instrument and the mobile device or computer weakened their concentration. This was especially true for instruments that are held with two hands (such as a clarinet), and where the music stand was not strong enough or large enough to hold the digital device. Typically, the students who found Cadenza a distraction had already developed self-regulatory skills to support weekly practice.

Other students exhibiting this profile used Cadenza for a while (several months, in most cases), and through Cadenza developed self-regulatory skills. Therefore, they felt that they no longer needed the support that Cadenza offered. An example of the latter student profile is illustrated by this observation:

I have one student who started on Cadenza last year who was a very poor practiser, and now is fabulous. She no longer uses Cadenza, but organizes her practice time much more efficiently (we now just use a notebook). I find she is able to focus better in the lessons as she understands now that what we do in the lesson needs to be practised at home. Prior to Cadenza, this was not really a concept she grasped well. She started with Grade 4 and is now sailing through the Grade 5 repertoire.

4.4.3. Average Students Who Use Some of Cadenza's Features

Some students, who were characterized as making moderate gains throughout the year, used Cadenza, but not to its full extent. These students typically would sign into their Cadenza accounts to see what had been assigned by their teacher, but did not consistently log their practice sessions using the practice log timer and checklists provided by their teachers. However, the teachers all indicated that even partial use of Cadenza was helpful for these students, because checking the assignments encouraged them to think about how to approach their practice session.

Teachers also reported that students who used Cadenza irregularly showed less improvement, week to week, than the students who used more of Cadenza's features, regardless of the level of musicianship. These irregular users also reported practising less frequently than strong Cadenza users, and were less motivated to practise. Finally, this middle group rarely used the media annotator, and therefore, did not receive the mid-week feedback from their teachers. As the teacher named Emma stated:

I'm not sure why they don't always log the practices, and I definitely see less improvement from week to week by comparison with the other three [strong students who use Cadenza regularly]. They always arrive at lessons and promptly tell me that they looked at Cadenza but didn't push the 'start practice' button every time. They still seem to know exactly what their assignments were though, so I feel they're still benefitting somewhat by using the program. I still find their motivation levels a bit lacking with practice, and they aren't using the recording feature.

4.4.4. *Weak Students Who Do Not Benefit from Cadenza*

Not surprisingly, there were some students who did not benefit from Cadenza, representing roughly 15% of students who tried the tool. These students were sometimes attracted to the digital interface of Cadenza at the outset, but their interest quickly dwindled. Teachers reported that unless students develop strong practising strategies and habits, with or without Cadenza or other traditional tools designed to motivate students such as stickers, fancy notebooks, or complex reward systems, progress is predictably limited.

4.4.5. *Weak or Average Students for Whom Cadenza is Transformative*

Perhaps the most interesting student profile is that of the student who is progressing minimally or not at all, and for whom Cadenza is nothing short of transformative. Each of the three teachers reported experiencing exciting transformations with several of their students who had struggled before using the digital tool. Teachers reported that Cadenza's ability to facilitate communication between lessons was an essential feature for these students, and also, that by logging practices, the students themselves could see week-to-week improvements in their habits. The structuring of tasks through the checklists also helped these students understand what was expected of them between lessons. As one teacher noted, in some cases it wasn't that the students were unwilling to practise – it was simply that they could not remember the details that were discussed and demonstrated through the lessons.

Emma described the following transformation in a twelve-year-old student:

My second student [whom] I tried Cadenza with (aged 12, Grade 4 piano) was a transfer student. It was taking us a while to jive together, as I needed to determine her strengths and weaknesses and she had little patience during the lessons. She was often interruptive and distracted in the early days, with very little progress from week to week. I thought I had been as creative as I possibly could during the lessons and in strategies for her to practise, but somehow nothing seemed to work. I was willing to try anything and Cadenza was the answer. Within 2 weeks I had noticed a huge improvement. With Cadenza, I was able encourage her in areas that need improvement, including sight-reading, self-criticism and the ability to 'drill' specific parts of pieces. She was incredibly fast with the technological side of things, and once she realized how many cool features Cadenza had (recording, reward system, commenting), she was off to the races with her practising. A big motivator in the beginning as well was that I had a window into her weekly practice time and she could now be held accountable between

each lesson. Without Cadenza, I am certain she would not have passed her Grade 4 exam and/or I may have lost her as a student.

Like Emma, Jackie related that accountability and consistency were important in a student who improved significantly with Cadenza:

One 9-year-old student, in the very beginning stages, was making slow progress. Since starting to use Cadenza, she has gained confidence, and she is seeing progress, therefore progressing more! The consistency in practice habits has increased. I believe knowing that I am on the other end has made a big difference for this student for accountability as well as support.

Jane also reported extraordinary progress with a very young student, five years of age, who used Cadenza with the help of her mother. As with Emma's student described above, this young musician was a transfer student:

She is definitely benefiting from Cadenza improving her tense, mechanical technique since I started capturing and annotating, "Good! Play THIS way every time!" moments from her lessons, using the media annotator, so she and mum could reference them at home. She came to me a classic mechanically proficient note reader and after a few months of unhelpful in-lesson correction/demonstration, I recently started using the video capture feature and WOW, it's made a big difference in only a couple of weeks!

The most powerful example of a transformation in a student was reported by Jackie, again with a relatively young student. In describing the transformation, Jackie noted that without Cadenza, she herself would not have been able to "look back and see our progress so that I can apply the successful strategies for this student in our next big musical hurdle." Nor, as she pointed out, would she be able to relate the progress without the documentation that Cadenza could provide. In other words, while archiving strategies and progress can be helpful for students, so too can teachers benefit from a running record of the strategies that have been employed and the progress that has been made. Jackie described the student's growth in this way:

One of my little Cadenza users has been struggling with the first movement of the Clementi Sonatina in C+ for months. We began in September, but nothing seemed to be "clicking." By February, we were still struggling with hands together playing in any

line except the first. I gave checklists of painstakingly slow hands together/hands separate work line by line, in scrambled order, in reverse order, smaller parts, passage work. I demonstrated, I sent recordings home. Progress was minimal, if not sometimes backwards!

Enter the Media Annotator. In February and through March, I started asking for mid-week videos of any line of her choice, so that I could give input, but also for her to see and hear the improvements, no matter how small. By April there was some progress, and I felt that this was actually going to be possible. We continued with videos and really focused on the recapitulation so that it would be a magnet to draw the other parts forward. Although the performance still had significant bumps, hesitations, memory stutters, rhythm issues, etc., she had the piece memorized and was playing it through. But by the beginning of May, I was concerned that she wouldn't be ready for her June exam. I like my students to have exam pieces for June ready no later than March.

Now, here's the important moment: for May, I didn't not make up the checklist of what to do. She dictated what needed to be done – I was just the secretary. I found that she used Cadenza without necessarily clicking "start practice." The targets weren't important anymore. The results were. She had created the checklist and so took the responsibility to get the job done and wasn't aimlessly playing it from start to finish with little to no results. She played it for me yesterday. Start to finish – musically, confidently, like she had climbed Mount Everest! I could care less how it goes in the exam. What a great accomplishment in self-regulation. So proud of this girl!

The teacher's summary of the student's progress is about much more than learning a piece of repertoire that the student found challenging. The real accomplishment – as recognized and named by the teacher herself – was that the student learned to self-regulate. Interestingly, her use of Cadenza also changed as she became more fully self-regulating as a musician. And this, in fact, is the overall aim: that students fall in love with learning to play music, not that they fall in love with a digital tool. The tool is only the means to the end.

5. Conclusions and Implications

The results indicate that Cadenza helped motivate a wide range of students, of varying ages and abilities, to practise between lessons. Not surprisingly, the students who were already strong before using Cadenza were able to progress even more smoothly and effectively by incorporating Cadenza as a practice aid. Cadenza appears to hold promise for supporting

students between their weekly lessons, thereby motivating them to persist with musical studies until the music itself becomes the prime motivator. Even more important is the evidence that suggests that Cadenza can be transformative for average or weak students who have difficulty understanding what needs to take place during practice sessions, or who are unmotivated to even begin a practice session. Of all of the features of Cadenza, there are four that stand out for these borderline students: (a) the ability to communicate with their teacher between lessons, both directly through messaging and also indirectly, through teacher monitoring of practice sessions, (b) the specific feedback received through the media annotator, (c) the ability to use Cadenza to create structured and nuanced checklists, and (d) the built-in reward systems for achieving goals and logging practice sessions. Finally, it should also be noted that without dedicated teachers and parents supporting student learning, digital tools are likely to have limited success. After all, it is not the tools that do the teaching – it is ultimately the teachers who help guide students to become self-regulating musicians, with the support of a home environment where music is valued and parents are willing to help their children succeed as musicians.

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