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Computers should get a more prominent role in formal music education

Introduction and definitions

The discussion in this paper is based on the posts made on our blog[1] and the discussions in the comments on the posts, as well as an on an interview that we conducted with organ player and teacher Peter Breugelmans, including our own opinions. Presently computers have a use in many aspects of our lives. This includes music education, especially in informal learning. We believe the importance of using computers can have a larger weight in music education. We would like to discuss some possibilities regarding their role in formal music education in particular.

In order to be able to discuss this subject, we need to define what we mean when we talk about formal or informal music education. Since the definitions we could find were not strict and did not always match with each other, we present here our own definitions which will be used during the course of this paper. With formal music education we envision an organized setting where the student is taught by a teacher in a systematic way. In this way, the teacher will be the main person to design or adjust the study routine. Often the study routines will be personal for each student, even in the cases that the students are taught by the same teacher.

When we talk about informal music education, we mean that no such teacher, who has fixed time for the students and will have a personalized education plan for every student, is present. The students might have their own study plan for all or part of the techniques or just

haphazardly play whatever comes to their mind. Of course, even though the student has no teacher as a primary source of information, she has need of other sources and examples since it would be impossible, or at least highly impractical, to figure out everything on her own. Typically, the students get their information from multiple various sources, implying less structure and more independency. Examples include learning skills through the internet, or being shown a new technique by friends. In essential, the students won't have an "experienced" study plan from a teacher for their music learning. Furthermore (though there are exceptions) their study sources may not be organized or accessible in an ideal way in order to optimize their improvement.

Of course, in reality there is room for overlap. A music student who follows formal music education can easily learn a new technique from a friend and likewise an informal student might have taken a few lessons in the past, but with the basic distinction in mind, we can continue with the statement that we want to make.

Statement

Computers should get a more prominent role in formal music education.

This statement is an extension of the core idea of our thesis, which is basically that a computer application can be a useful guide for learning to play a musical instrument. It is the reason why we decided that this was the thesis that we wanted to work on. Before we go deeper on the discussion of the statement, it is better that we first list all the advantages and disadvantages of human teachers as well as of computers.

Advantages and disadvantages of a human teacher

Human teachers have taken a very essential role in the traditional formal music education. They do have a multitude of reasons to support why they are so important for the education.

Normally teachers will have their own method and special training for techniques in steps. The teacher knows which techniques are very important at the beginning and which order of training of different techniques would be the best for the students' personal progress.

Besides, teachers are familiar with different exercises and songs that can be used to train a specific technique, keeping the students' interest by avoiding that they get tired of the same songs or exercises after a while.

Furthermore teachers know quite a few ways to motivate the students. Especially for young apprentices, motivation is essential for them to keep learning instruments.

Another advantage for the human teacher is that they will always give feedback in various ways. Normally, the teacher will give the student feedback during the lessons. But also, sometimes they will find a way to let the students improve by having them give feedback to each other. For instance, some teachers will organize a "private concert"[2] for students to show their study results and as a platform to let the students communicate with each other; find chances of competition organization for the students; or just show the students how to play the instrument well and let them imitate or learn from it.

A teacher can teach "emotion", which is a key factor for experiencing music. Music not only contains logical structures but is also a way to express feelings. Sometimes, if the player uses a certain technique, a small difference will lead to totally different feeling. For example, if a cello player plays some notes with fast vibrato in a part of a musical piece, it will probably express a stressed or worried feeling. However, if the vibrato is slow, the feeling likely gets closer to sadness. Nevertheless, those techniques do not have a scale or look-up table to check so there is no strict way to learn it technically. It can easily taught by a human teacher.

One of the disadvantages of human teachers is that they cannot focus on all aspects of the student's playing at the same time. Take string instruments as an example: both hands have techniques to play the instruments well. But while the teacher is evaluating the left hand technique, he may not be able to point out if there is something wrong with the right hand technique.

Other inconveniences with teachers are that they are usually only available during certain periods of time (mostly during the lessons) and the cost of lessons may be an impeding factor.

Advantages and disadvantages of using computers

Computers can be very helpful and powerful. For learning specifically, but also even for general convenience (e.g. a page turning algorithm exists that eliminates the need for turning the pages of sheet music during a performance[3]). Computers have some characteristics that indicate they can be very useful during the music learning.

One of the characteristics is that they are ubiquitous. People do not need to focus on them all the time and they can provide people information without being disturbing. Besides, computers can measure and process data in a very fast and reliable way. This allows computers to give precise and immediate information to the students who are learning music.

Another advantage is that a computer is a platform to get access to and exchange sources, music learning sources in our case. The abundance of sources provides people with more possibilities to learn songs, theory and techniques. In the meantime, however, people are also confused by the overload of information. Often the information acquired to learn a technique on the internet is not as ideal as what a teacher could give, being either too specific or too general to be personal. Besides, it requires a lot of time and effort to find a decent answer that just suits the student's current needs. Indeed, all the information the student needs can be found somewhere on the internet, but it requires them to spend time and effort acquiring that information, while looking critically at it, which is not as straightforward as a teacher who presents them with quality information, hence not needing to spend this time and effort. Additionally the information given by a teacher is also less ambiguous and more reliable.

However, this is not necessarily a disadvantage because it means that the informal music student actually has to take over a part of the role of the teacher (meaning he has to decide what to play or practice and when). It puts more demands on the student. Mr. Breugelmans claimed in our interview that not everyone is capable of this, but if done correctly, this critical

attitude can put the student at an advantage compared to a student who purely obeys a teacher. Thus we are dealing with a double-edged sword: the independence is great for the development of the student, but it is at the same time its greatest disadvantage. For example when a student is using a wrong technique, a teacher would correct them in an efficient way, but without the teacher they have to figure out themselves that they are doing something wrong. If the student fails at this he is faced with a setback, but if he is successful, he will have made great progress.

The current situation of computer-assisted music education

First of all, the current situation is a precondition for our statement: the computer does not play an important role in formal music studies. Technological evolution in this domain is slow, as many people advocate a traditional approach towards formal music education.

As for informal music study, the extent to which computers play a role varies. For instance, learning via internet is a very popular approach, but in these cases the computer is usually merely a tool to access the desired information, as opposed to applications that actively focus on music training. Some applications on the computer perform an assisting function for the music learning, for instance metronome and tuning applications.

Discussion

The question whether a computer can replace a human music teacher was one of the main questions in our blog posts, and we also discussed this in the interview we conducted with Mr. Breugelmans. In general there seems to be the agreement that in the current situation, computers cannot be a replacement for human teachers, since they cannot provide some of the key elements related to teaching. According to Peter, some tasks can not be achieved by a computer easily but are easy to perform for real teachers. For example, the teacher can motivate the students easily and in a dynamic way. For the computer however, it is not easy to make it dynamic when the students are using the applications. A teacher can adjust the activities during the lesson based on the observation that a student has a hard time staying motivated. A computer cannot detect the emotional state of the student in the first place.

The main problem for the computer to replace a real-life teacher is to make the computer software to "think in a human way". The techniques and nuances that give emotion to music can be recognized by people, whereas for computers this is really a tough subject. It is however not entirely impossible: there exist algorithms to predict the emotional response of people to a piece of music.[4]

Even with this possibility in mind, it would require extremely complex and specific software to treat each student in a different way, to figure out what is the best approach to teach a specific student something, which is required for an optimal learning experience.

In the comments on our blog, there was an interesting difference in opinions about the future: some people claimed computers will never be able to replace human teachers. The inability of computers to experience emotion was mentioned. Mr. Breugelmans makes an interesting point about this: even though a computer cannot feel the emotions that are induced in humans by a piece of music, in theory they are perfectly able to distinguish all the elements that make the piece sound the way it does (e.g. by measuring frequencies, volume, duration…). Since computers can measure and analyze these characteristics with great accuracy, we believe that they can be a valuable addition in formal music education. Another advantage would be that they can monitor all these things without limit (provided they possess the appropriate infrastructure, both in hardware and software), whereas a human teacher might have to divide his attention.

Conclusion

The statement that computers could be a valuable addition to formal music education mirrors the central idea of our thesis that in certain cases it is a good idea to improve musical skills using a computer application. Currently computers still have clear disadvantages against a human teacher, and they might never be a complete replacement, but their advantages like accurate and fast data processing have potential to improve the quality of formal music education.

Acknowledgement

References

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