TOWARDS A PARADIGM OF PRODUCTIVE MUSIC EDUCATION

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Abstract
A major change has occurred in schools, in teacher education and in general in Finland as well as other western countries. The latest Finnish national core curriculum emphasizes the importance of offering the pupils regular opportunities to compose, create music together and improvise (National Core Curriculum for Basic Education, 2014).
This article investigates the use of new technologies in teaching productive music education and explores the attitudes and conceptions of students specializing in music regarding the new ideas of productive music education (which presented in the article) and how to use them. The research was carried out among a group of students (N=8) specializing in music at the School of Applied Educational Science and Teacher Education of the University of Eastern Finland in Joensuu. The results clearly show a significant need for productive, pupil-centred education and add support to earlier research in defining a new direction and paradigm for music education for the future.
Keywords: *ICT, music applications, productive music education paradigm*

Background

In Finland, crucial changes in thinking have emerged in teaching mainly based on recent research highlighting the importance of emotional skills and of transforming the teacher's role from being a distributer of information and knowledge to one in whom they see a supporter and learning partner. This means moving away from teacher-centred learning towards learning through the pupils' own preconditions and skills and building knowledge according to the socio-constructivist learning concept in which pupils construct their own understanding. This is reflected in schools, teacher education and the whole society, which are moving towards creative solutions as is also required by the 2014 national curriculum (National Core Curriculum for Basic Education, 2014).

The Changing Paradigms

A paradigm is usually a commonly accepted system, a way of thinking, or direction. Generally, a paradigm refers to line of thought in scientific thinking or other epistemological points of view. In everyday speech, a paradigm means a theory or framework that is seen to be right and is generally accepted and has an authoritative position. Broadly, a paradigm refers to the way knowledge is gained (earlier religions, currently empiricism). More narrowly interpreted, a paradigm can refer to the central theory of a certain discipline. The term comes from the Greek *paradeigma* (παράδειγμα), meaning epitome or example (Liddell & Scott, 1940; Kiikeri & Ylikoski, 2004).

Paradigms change very slowly and almost unnoticed by most people. Many changes take place at the same time in pedagogical thinking, curriculum planning, learning research, technological development, and in the minds and thinking of teachers. The atmosphere in the classroom and the school can alter slowly, partly due to changes in the curricula, but more frequently, due to general changes in society. This is the current situation with respect to Finnish school music education. One reason for the changes has been the direction of development in teacher education with several studies arguing that future Finnish class teachers face considerable challenges in teaching music education at the lower comprehensive school level due to spending cuts imposed on the teaching of arts and crafts. The reason for cutting these subjects is easy to discern - national economic indicators cannot directly measure their benefits. Life enjoyment and happiness are qualities that arts and crafts produce and cannot be measured. The changes have made teachers eager to seize any opportunities that might assist their teaching in the challenging current climate and one of such opportunities has been the use of technology in teaching. At the same time, the significant development in music (teaching) applications has expanded the scene of music making, producing, and learning.

The change in the paradigm of music education is reflected not only in Finnish music education practices but also at the national curriculum level (see Juvonen, 2004). Changes are taking place in the content of music education as well as in the methods of teaching music in school. These changes are based on strong research results as well as on changes in teachers' thinking. The net result is a radical move away from traditional, *re*productive music education towards *productive* music education.

Traditional Finnish music education involves learning music theory, music history and note writing, as well as possibly solfege and music aesthetics, in a teacher-directed manner. It also includes learning to sing and play already composed songs by classical composers suited for school use as well as playing and making cover versions of popular songs and melodies in classrooms. In traditional Finnish school music education, a rather small role has been given to pupils composing their own melodies or songs, making their own rhymes, or inventing new rhythmic structures, not to mention creating entire songs in any musical genre or style of their choice during music lessons. Research has also shown that Finnish music teachers need additional training in the versatile use of technology in music teaching. This research suggests that teachers have sensed a shift away from the traditional paradigm, but in their struggle to meet the everyday challenges of the classroom have not realized the full extent of the changes in Finnish school music education paradigm as a whole. The traditional

approach to music education is what we here call the *reproductive music education* paradigm.

By the concept of *productive music education*, we refer to music teaching where something new is created during the music lessons and at home, instead of reproducing, i.e., rehearsing and performing previously composed works (as is done in traditional music education). While creative music making and productive music education are not new phenomena, their non-implementation in the classroom has long been the standard practice.

The teaching of the essential elements of productive music education practices for the use of future class teachers in Finnish teacher education varies considerably depending on the university. Resources for contact teaching in universities have dwindled over the years and Covid-19 has shown that teleworking will be present in our future teaching. On the other hand, it is impossible to teach multidisciplinary subjects entirely remotely. Traditional music education places a strong emphasis on singing, learning music theory and history, and the pedagogy of musical instruments, but the tools for use of technology and creative work in the music class must be provided.

The exploration of creativity through productive music education might be in the form of improvising on given harmony base with xylophones, drawing on five existing tunes to compose a new melody on a traditional Finnish kantele, making a drumbeat with an iPad and a music app, or creating a soundscape for a fairy tale or story, the possibilities are innumerable. The essential idea of productive music education is to offer activities in which something new is produced, whether by improvising, arranging, composing or lyricizing music. The opposite of this is reproductive music education: singing and playing songs that have already been composed. However, arranging old songs to create new, individual and personal versions can include elements of productive music education. The two approaches are, therefore, not in complete opposition to each other.

Productive Music Paradigm in Light of the Finnish National Curriculum

The change towards a productive music paradigm, which has been evident in Finnish teacher education for the past ten to fifteen years, has also made its mark on the Finnish national curriculum. The new National Core Curriculum for Basic Education (2014) emphasizes versatile music education, functionality in the classroom, considering pupils' own musical interests, offering pupils opportunities for creative activities through composing, arranging, producing their own music, and using technology in versatile ways.

The aim of the curriculum planners has not been to rule out former practices, but rather to change the focus of music teaching. The change towards producing new music independently in music lessons is a significant shift in the direction towards a new kind of education. The children improvise with the instruments found in the class (e.g. drums and other percussion instruments, xylophones, keyboards, pianos, kanteles, ukuleles and guitars), produce soundscapes themselves, compose songs, write lyrics to songs and rhymes, record and edit music. In addition, a significant time factor is eliminated, as pupils do not need to be able to analyse chords, mark time signatures or write notes

in order to be creative. These creative elements form the essentials for a productive music education.

The use of technology in creating, arranging and performing music has also found a footing in the national curriculum. The use of information and communication technology in teaching has been added to the goals from the very first grade, which in turn adds new skill requirements for teachers. By utilizing technology, we can diversify the learning environments and differentiate teaching to meet the wishes and needs of the pupils in even more versatile ways.

The Finnish National Core Curriculum for Basic Education (2014) emphasizes the development of thinking and learning skills, and accordingly teaching should stimulate pupils to explore and creatively work together, to enable and allow deep concentration in order to develop learning to learn skills. The teacher should encourage pupils to trust themselves and their choices while being open to new insights (National Core Curriculum for Basic Education, 2014). This aligns with the core ideas of the productive music education paradigm. Everyone can compose, write lyrics, and create something new, and each pupil in every class grade should have a safe atmosphere in which to express their own ideas in a group (Muhonen, 2016; Veloso, 2017). Nevertheless, it is important to recognize, that there may be students in the class who have already adopted the identity of a "non-musical person" (Muhonen, 2016, 275), and in those cases support and motivation from the teacher are extremely important.

Composing songs can develop a wide range of musical skills, including playing, singing, listening, and creating music; skills which facilitate not only learning musical concepts, but also developing a means of expression. From the earliest years onwards, the teacher should regularly provide opportunities that enable varied music making, facilitating the development of the child's expressive skills. This means working with sound and music, composing, producing songs, and other creative product. In grades 1-2, pupils' musical creativity, aesthetic and musical understanding should be fostered by creating situations in the classroom, where pupils can design and implement different sets of sounds, as well as use their imagination and ingenuity alone or in groups. The aims set down for teaching clearly state that the teacher should make room for the pupils' musical ideas and improvisation and guide them to design small-scale compositions or other sound ensembles using, among other things, technology (National Core Curriculum for Basic Education, 2014).

The goals of the Finnish national curriculum for music teaching in grades 3–6 strongly emphasize participation, collaboration, communality, and being a member of the group. Pupils learn to work in a group, creating a sense of togetherness and respect for the experiences and products of others. The ideas of productive music education thus offer a high level of interdependence and the development of collaboration skills.

According to the curriculum, in grades 3–6, a child's musical knowledge and creative production have developed in many ways, offering the child opportunities for holistic expression through the skills of playing and singing, music theory and history, exercising, and listening (National Core Curriculum for Basic Education, 2014). The goals laid out in the curriculum emphasize diverse learning environments, interaction situations, and collaborative music making, which are of paramount importance with respect to the ideals of productive music education.

Music teaching should always consider different learners and their needs. When the teacher has a wide range of tools to promote playing together, creative activities and sufficient skills to utilize information and communication technology, it is easier to differentiate and consider the needs of the pupil.

'I don't understand music and I definitely can't sing or play anything' is a commonly heard statement in teacher education, in schools, among pupils, and among people in general. To understand music, one does not need to know counterpoint or music theory, the history of music, or be a skilled instrumentalist. Understanding music means experiencing different emotions, imagining, or seeing issues inside one's own mind. Music has multiple effects on the mind and body. Messages can be sent through music, and it can be enjoyed in very many ways. It is seen as a part of general intelligence, and it has connections to verbal and mathematic abilities. Listening to music can affect mood and energy levels and is used as a means of therapy and rehabilitation. Music has short- and long-lasting impacts on the human brain and promotes divergent thinking processes (e.g. Kurkela, 1993; Harris, 2009; Lehtonen, Juvonen & Ruismäki, 2011; Hudziak et al., 2014).

From the point of view of music education, creative activity in the music class does not require musical talent; everyone is seen as capable of creating something new. However, whether the pupil is musically untrained or advanced, the approach of productive music education offers joy and challenges to everyone within his/her own skill level.

Overview of Technology Use in Finnish Music Education

Music technology with its devices and applications has evolved tremendously over the last decades. It is possible to make music even if the user has little or no theoretical or practical knowledge or instrumental skills. A vision of how you want the music to sound and some basic IT skills are all that you need. The result can be novel music that sounds like produced in a studio with real instruments.

iPads can today be found in most Finnish schools and pupils are experienced information seekers even if using nothing more than a smartphone. Several applications that can be installed on iPads can also be downloaded to smartphones and can be used in diverse ways in music lessons. It is easy to tune guitars and ukuleles with a tuner loaded onto a phone, or practice scales and chords with applications for studying music theory, pupils also use the GarageBand application with Bluetooth connected rings, and get to know music cultures by making music using Music towers, which give the opportunity to choose the most suitable instrument (vocal, acoustic instruments, keyboards, electronic string instruments, electric drums, mobile device applications) and participate in collaborative music making. Users can select either stand-alone or group listening mode from the required study format and save their work for learning assessment. A music tower can be attached to the classroom's sound system where it acts as a natural part of the collaborative music making of the class. It enables working as a 'silent band' with shared listening mode and different instruments.

Pupils can also create catchy drumbeats, practice band instrument skills with a variety of pedagogical applications, and record and edit self-made songs; the list could go on

indefinitely. In addition to various types of making music, it is ideally suited to a creative musical work and composition. Music Tower learning environments are already used in several Finnish schools and music schools.

Of the music-making programs, GarageBand is originally a computer-based music recording and editing program that has established its position in Finnish music education in the field of music technology. Today, GarageBand is a commonly used application on iPads and iOS smartphones. However, many other applications have entered the market that is also pedagogically beneficial (e.g. Samplebot, Launchpad, BandLab).

The use of iPads in music education has generated much discussion, since not all teachers perceive them as musical instruments and consider them inferior to traditional instruments. However, according to the Merriam-Webster dictionary (n.d.), a musical instrument is a device intended to produce sound. When we look at the violin and the iPad, for example, we realize that these are two completely different instruments, but the purpose of both in the context of music education is to produce sound. Williams (2014) has provided six illustrative examples:

1. In the hands of the right person, an oboe can be played beautifully. In the hands of the right person, the iPad can be played beautifully. Both can be used to produce great music.
2. The oboe in the hands of the wrong person can play badly. In the hands of the wrong person, the iPad can also play badly.
3. To make the oboe sound beautiful, the player must practice. For the iPad to produce beautiful sounds, its use must be practiced.
4. Both instruments require technical expertise. Practising technology develops musical skills.
5. Both instruments have their own limitations on what they can play. They work great in some situations, while in some others they do not.
6. There is no sound from the oboe without touching it. iPad does nothing without touching it. Both instruments are inanimate objects (p. 94).

Both instruments are most often at their best when used in conjunction with other different instruments. Many teachers say that they do not want technology to take too much time away from the teaching and use of acoustic school instruments. By school instruments, we mean instruments found in a typical Finnish music class (e.g. band instruments, percussion instruments, kanteles, ukuleles, classical guitars, recorders, and keyboards). Ideally, technology and school instruments go hand in hand. At its best, the music class offers the opportunity for creative musical experiences that combine both technology and all traditional musical instruments.

On iPads, making music with different applications has been found to be a great tool for implementing elements that are essential for fulfilling the ideals of the productive music education paradigm, like composing music, improvising, and making new soundscapes. In addition, the research has shown that iPads and their applications provide a great channel for playing together and creative activities for pupils with motoric challenges, handicapped pupils, autism spectrum patients and pupils with difficulties in concentration (e. g. Cumming, Strnadová & Singh, 2014; Hillier, Greher, Queenan, Marshall & Kopec, 2016).

A Challenge for Teacher Education

Teacher education also faces a challenge of enabling teachers meet the curriculum requirements through new ways of making music. Traditional teacher-directed teaching with traditional methods is no longer enough; functionality and creative learning environments are the modern keys to effective music education.

Universities responsible for teacher education in Finland have increasingly included the elements essential to productive music education in their course offerings. University programmes currently include more music technology, improvisation and arranging than previously. At the University of Eastern Finland, the pedagogy of composition has been included in subject-didactic studies and interdisciplinary creative projects, for example.

In 2016, Partti and Ahola published the book *In the Footsteps of Composer* that deals extensively with creative music education in the context of the Finnish school world. A nationwide survey conducted by the writers in 2014 revealed the priorities, strengths, and shortcomings of Finnish school music education. According to the study, singing and playing were present in music lessons, but less than one-sixth of teachers said they included improvisation (alone or in a group) in their teaching. The share of composing was even smaller, with only 5% of teachers reporting that they include composing in their lessons on a regular basis (Partti & Ahola, 2016, 46). The difference for teaching invested in singing compared to improvisation and music composition is thus huge and can be seen in the survey reported in this article.

The Changing Field of Music Education

The field of music education has changed remarkably during the last decade, bringing new challenges for teachers. The allocation of resources to music class, teacher education is under pressure and varies considerably between universities, and, according to several studies, many teachers feel incompetent to teach music (Juvonen & Anttila, 2008; Suomi, 2019; Mäkinen, 2020).

Although the curriculum (National Core Curriculum for Basic Education, 2014) emphasizes the essential elements of productive music education, they have yet to flourish at the classroom level to the extent that they should. The music played in music classes, listening education, and music analysis still have a strongly traditional focus on previously composed works and cover songs.

The main elements of productive music education have been included in the curriculum (National Core Curriculum for Basic Education, 2014) as equally important parts of teaching alongside traditional reproductive music education. However, a minority of Finnish schools have started to guide their music education in this new direction. The challenges that teachers meet are, above all, familiar ones: large group sizes, insufficient tools for implementing the elements of the new music education paradigm, time management and organization, and space and equipment problems. In addition, the share of music teaching per week is usually remarkably small and it often takes more time to complete a creative project than is available. It is also paradoxical, considering the multiple skills required of today's teachers, how little the music education system, which focuses on presenting, listening, and analysing music, has provided tools for the

new demands of the curriculum (Partti & Ahola, 2016). Times are changing and teacher education must change.

The idea of composing has also changed. Previously, it was thought that composing was possible only for a few, select pupils, those who were able to understand music theory, write music and play musical instruments. Today's music education highlights that composing, musical invention, improvisation and adapting music are possible for everyone, regardless of age or level of musical proficiency (Partti & Ahola, 2016). Composing together has to be a multidimensional phenomenon that involves multiple cognitive processes and feeds creativity that would not otherwise be possible to achieve (Veloso, 2017, 259).

Technology has gained momentum in Finnish schools. If we recall the music classes of a decade ago, the situation looked very different. The use of iPads and mobile phones in teaching is commonplace and pupils have usually become accustomed users of the devices from an early age. The number of musical applications is huge and finding the most pedagogical and teaching-friendly ones is not an easy task. Teachers use the ones they already know, and the rest depends on their own interest in music technology. 'The Creative Production of Music in Schools' survey revealed that four out of five teachers feel that they have not received any training in teaching the central elements needed for productive music education in school. Classroom teachers felt they were in the worst situation. Finnish university teacher education offers very little music education, and only a fraction of that addresses the elements of productive music education (Partti & Ahola, 2016).

From Reproductive to Productive Music Education

This article examines the productive music education paradigm and its implementation in teacher education, as well as its implementation in schools. Productive music education involves the creative production of music, musical invention, creative activity alone or in a group, encouragement to express one's own new ideas in a safe and open environment, using diverse learning environments in teaching, differentiating and responding to children's wishes and needs, and feeding creativity through playing and making music together.

The study by Hogenes and colleagues (2016) showed that creative tasks and activities are proven to engage pupils in classroom activities better than elements of traditional music education. These elements have to have positive effects on both musical and academic performance in school and to develop pupils' collaborative skills and creativity (Hogenes, van Oers, Diekstra & Sklad, 2016; Muhonen, 2016). All the mentioned elements of productive music education can be carried out in ordinary classes and have been found to be useful for the development of musical agency. Pupils are as capable of composing music as they are capable of singing, playing and dancing. While improvising, teachers can rely on peers' clues to invent new musical ideas (Veloso, 2017, 273). However, the comprehensive and exhaustive use of productive music education ideals requires a different pedagogical approach and new kinds of organizational and reflection skills compared to traditional reproductive music education. This poses a new challenge for teacher education as a whole (Hogenes, van Oers, Diekstra & Sklad, 2016). It is not a question of whether children are creative, but

whether schools and other institutions offer them opportunities for creativity and its development.

Aim of the Study and Research Questions

In the academic year 2019–2020, the first author of this article (S.A.) taught a study module on the use of music applications, arranging, composing, and improvising as elements of creative music education for a group of teacher education students specializing in music. Most of the respondents had heard of GarageBand and most of them had previously tried it. All of the band members were asked if they knew any other music programs besides GarageBand, - none of them could name any other applications. The aim of the module was to diversify the teacher students' knowledge of different music applications, music making software and browser-based programs, to better equip them to implement productive music education ideals with the help of technology.

The aim of this study is to explore (music specializing) student teachers' perceptions, prior skills and personal development in using music technology as a part of productive music education consisting of creative tasks in the classroom – improvising, composing, arranging, and producing own music. The first research question was:

What were the students' conceptions, expectations, fears, or other feelings regarding the use of technology according to ideas of productive music education before the study module?

We also explored how the use of technology improves student teachers' experiences and feelings of succeeding in teaching music. We consider that the requirements of the Finnish curriculum (grades 1 to 9) expect music to be taught in a manner that fosters the ideals of productive music education. Our aim is to legitimate the concept of productive music education, starting with this article. The second research question was:

What were the students' experiences of succeeding in teaching music using new ideas and new applications based on the productive music education paradigm?

We wanted to find out how the student teachers learn to use new tools and practices of productive music education, how these new practices would be implemented and utilized in real life, and how the student teachers experienced the study module on elements of the productive music education paradigm. This led to the third research question:

How challenging did the student teachers experience learning to use the new iPad music applications and learning productive music education practices and utilizing them in a real music teaching situation?

We wanted to find out how useful the student teachers found the study module on productive music education and whether they felt, they could use what they had learned during the study module in their future working lives. This led to the fourth research question:

What are the students' thoughts about using the new applications in their future work as music teachers after qualification?

Methodology and Data Collection

The study group participants (N=8) were fourth year or higher student teachers who graduated to become classroom teachers majoring in music education for grades 1–9. The participant group consisted of 7 female and one male member. They were selected to the music education programme by means of an entry exam in which they demonstrated their musical skills by singing and playing several musical instruments to a jury. The total study cohort comprised all student teachers studying to become at least upper comprehensive school music teachers in Finland (N=86). On a Finnish scale, the study group corresponds to fewer than 10% (9.3%) of all music teachers trained annually as upper comprehensive school music teachers.

The data were collected by an initial inquiry with open questions from the students at the beginning of autumn 2019. We asked the student teachers to identify their strengths and areas for development within various topics. We also asked them to write about their previous experiences and personal preferences regarding different areas of music education.

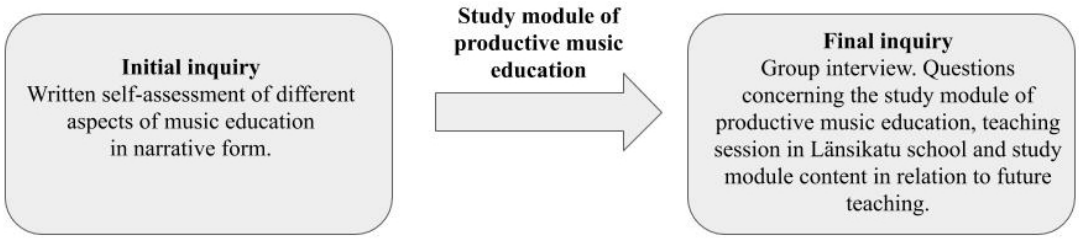

Figure 1. Data collection process

After the first data collection, S.A. taught the student teachers about the creative practices of productive music education with respect to the use of ICT applications, composing, and improvising during the 2019–2020 academic year as part of their pedagogical studies. During this study module, the student teachers became acquainted with a variety of browser-based music-making programs as well as iPad and mobile applications with various productive music education tasks (GarageBand, Samplebot, Launchpad, Incredibox, Patterning, ThumbJam, BandLab, Chrome Music Lab, Drumgenius, ProTools). The assignments were simple in the beginning and the aim was to adopt a variety of practices that the future teachers could exploit in all grades of comprehensive school (grades 1-9, age 7-16).

During the study module, the teacher students learned improvisation, composition, writing lyrics, arranging, recording, mixing, and producing their own music using a variety of technological applications and programs.

At the end of the study module S.A. interviewed the student teachers about their experiences and knowledge related to the use of ICT as a part of the productive music

education paradigm, newly learned practices and the use of technology, challenges along the way, and experiences of success. The interview was conducted as a group interview.

The collected data was analysed by applying a databased content analysis. Classification of the data led to determining the students' preferences of different fields of music education, strengths, areas of low confidence in own skills, and motivation to learn versatile skills in different pedagogical areas.

Results

The first research question was:

What were the students' concepts, expectations, fears, or other feelings prior to the study module on productive music education?

The initial interview revealed that the majority of the student teachers perceived the mentioned practices of productive music education as foreign to them, yet all of the respondents were keen to take the module in order to gain new tools for approaching the topic. Seven out of eight respondents found the topic interesting, but one respondent found it distressing due to not knowing how to approach the topic (third citation below):

"I don't have any experience in this area as a music educator. I think it's a really interesting and important area… "(Person 1, female)

"I find this field of music education one of the most interesting, but also one I'm most uncertain about for myself. I'm eager to learn new things about teaching improvisation and song crafting." (Person 2, female)

"Improvisation and composing always have been my weak spots in music. I've always found improvisation and composing really oppressive because I have too high demands for myself and I don't know what's expected from me." (Person 7, female)

The respondents highlighted being active and experimenting with new ideas, and the view that this should always feel safe although it includes stepping out of one's comfort zone. They also considered that making mistakes is not harmful, but an integral part of the learning process, and that the currently available elements of productive music education could teach pupils new things about themselves and their own skills through creative processes:

"In my case, my creative production has become unlocked as I've learned more about different areas of music and gained more self-confidence. I think I can't go much wrong if I use my own musical ideas and, if I do, it's okay because making mistakes is part of the learning process." (Person 8, female)

"I think through creative production pupils can learn new things about themselves." (Person 2, female)

The student teachers were asked to identify their own strengths in the field of music education. Instrument skills management was strongly highlighted, whereas the described elements of productive music education seemed quite unfamiliar. This reinforced our presumption that tools for teaching the essential methods and elements of productive music education are needed as part of music education studies.

> *"In my opinion learning instrument skills is one of the most emphasized areas in our education, and that's why I find that somehow easiest to manage." (Person 5, female)*

> *"I enjoy band playing the most and I feel I can master the basic instruments of the band well enough to teach them even in upper comprehensive school." (Person 6, male)*

The second research question was:

> *What were the students' experiences of succeeding in teaching music using new ideas and new applications based on the productive music education paradigm?*

Only one of the respondents had more experience of creative music making through previous studies at the conservatory, which had inspired her to compose songs on the kantele at a young age and later with her own band. However, the idea of teaching the elements included in the productive music education study module to a larger group seemed challenging. Most of the respondents could not recall any productive music education elements being implemented in music lessons when they were at school. Each of the respondents felt that they wanted to develop in the field of these novel ideas within music education – musical invention, song crafting, improvisation, and other creative musical activities were perceived as an important part of music lessons:

> *"I find this area of music education very important, but I feel I will need more education and develop my skills more, so that I could teach this area with confidence." (Person 4, female)*

> *"At this point I know that composing and improvisation can be really enjoyable, inspiring and relaxing activities, but I don't know how to approach them as a teacher." (Person 7, female)*

Using the data from these research questions, we explored the changes that emerged in the students' thoughts and conceptions as a result of the study module and compared the initial data with the data collected upon completion of the study module on productive music education. This led to the third research question:

> *How challenging did the student teachers experience learning to use the new iPad music applications, learning productive music education practices, and utilizing them in a real music teaching situation?*

In the final interview, all of the student teachers replied that they had gained a lot of different tools for teaching music by using the new ideas, their own technological skills had increased, and that the threshold for using productive music education methods and ideas was lowered through the diverse exercises and projects undertaken during

the module. Practical experience of teaching song crafting in a local school also increased the student teachers' confidence to start teaching creative music and composition:

> *"First, I was scared, but after composing an entire song with my peers, something happened and my thoughts towards composing changed and I don't find composing distressing anymore." (Person 7, female)*

> *"Well, I was scared too at the beginning about the idea of composing, but the applications we used were really inspiring and I've always been interested in creating and producing music. It was really easy to work with everyone in this group and I enjoyed how versatile all the assignments were." (Person 2, female)*

> *"I was nervous about teaching composition to the pupils, but after our sessions with the sixth graders in Länsikatu School, I realized that I can really do this!" (Person 3, female)*

At the beginning of the final interview, we asked the participants to describe what thoughts or ideas the studied elements of the productive music education paradigm (composing, arranging, writing lyrics, improvising, and guiding creative activity) had evoked. Half of the respondents had found the given deadlines challenging when given the assignments but were surprised when the tasks were completed on time. This helped dispel concerns whether a single lesson could lead to a finished output. Each respondent stated that they had benefited from the training period starting with sufficiently simple applications and sufficiently easy assignments. The assignments and application interfaces gradually became more challenging, but they also increased the student teachers' confidence in publishing their own ideas among the group.

The student teachers found the iPad applications inspiring and easy to use. The dynamics of the group was already well functioning in principle and the group had an open atmosphere that facilitated the mobilization, implementation and completion of even the most challenging tasks. The students also appreciated that assignments were scheduled at regular intervals, which lowered the threshold for engaging in them. One of the respondents experienced very strong feelings of self-criticism at the beginning of the study module and difficulty in expressing her ideas. As the tasks progressed, however, her emotional block against composing began to dissipate and her self-confidence increased considerably. The student felt that this 'unlocking' was facilitated by starting with small tasks and then gradually raising the difficulty level.

One of the major projects of the year was a music video project implemented in collaboration with the visual arts, which resulted in two ready-made compositions and music videos. The student teachers felt it was important to practice with smaller assignments prior to this major project (practising composing, writing lyrics, and arranging).

> *"I was seriously unsure about the time we were allocated when you gave us the assignments and I almost felt terrified. But once we started working it all went forward well, and we finished surprisingly quickly." (Person 3, female)*

> *"I felt like it was easy to work with everyone in our group and I enjoyed every task we were given because they were so varied." (Person 4, female)*

"By doing all the different types of tasks my self-confidence grew, and I got enough courage to share my ideas out loud with the group. When we started the music video production, I realized how much in my thinking had changed." (Person 7, female)

"It was a really good thing that we did several introductory exercises in the autumn term, without them it would have been really hard to start on the big music video project." (Person 6, male)

All the respondents found it easy to work in a group; they were given support, if they were unable to come up with new ideas themselves, developing and refining the different ideas felt easy, and the atmosphere was open. The respondents also felt that the skill level of the group was quite homogeneous, although there were different roles, and everyone was able to contribute to the tasks.

We also asked the teacher students to specify the key challenges regarding productive music education that they identified during the study module. They considered that the biggest challenges had been how to motivate pupils when allocating a new project, starting large projects efficiently, technology inefficiencies, and potential problem situations during teaching. Other challenges mentioned included assessing group competence and assigning the right level of tasks that motivate, and effective time managing. Some respondents also wondered whether the future workplace would have sufficient resources, such as technological equipment, for such activities.

GarageBand was revealed as the favourite application due to its versatility, but Launchpad was also highly regarded for its simple interface and high-quality sounds, Samplebot for its visuals and easy recording capabilities, Incredibox for its good samples and ease of use, and ThumbJam for its huge instrument bank and authentic sounds.

Favourite projects included composing a soundscape for a fairy tale, making commercial music, composing a radio jingle, making a music video, and a school visit to guide sixth grade students in composing rap songs.

The fourth research question was:

What were the students' thoughts about using the new applications in their future work as music teachers after qualification?

All the participants considered the teaching relevant to their education and future working life. The respondents also all stated that they intend to implement what they had learned regarding the elements of productive music education as well as other creative work in their future teaching. They considered it important that when something new is added to the curriculum, teachers consider it and put it into practice. All the respondents felt that they wanted to lower the threshold for composing and improvising using easy tasks and applications. Each also felt that they could implement the exercises and practices they had learned at all grade levels depending on the complexity of the task and the complexity of the application interface. The respondents were also all encouraged to notice that the different applications and programs had lowered the threshold to start creating something new on a fast schedule.

"I am going to include these methods in my teaching, and I feel it is important that when something new comes to the curriculum, teachers react to it." (Person 6, male)

"I will use these methods for sure! I loved all the small exercises, and I would use them regularly so that the threshold for composing and improvising wouldn't increase at any point." (Person 7, female)

"I'll definitely use these tools in my teaching, and I think I could implement these from grades one to nine. I'll use iPad applications and composition and song crafting teaching methods." (Person 5, female)

Ethical Points of View

The respondents participated in the study voluntarily and their responses did not affect the students' grades. The student teachers are accustomed to participating in various research projects during their studies (see Figure 2).

Figure 2. Student teachers having fun making their own music with iPad applications

The atmosphere in class was relaxed and confidential from the beginning, and one of the main reasons for this was that the student teachers knew each other quite well before their year of advanced studies in music education. The first author of the article, S.A., was their teacher and at the same time a researcher, but this did not affect the student teachers' stance towards the subject, the research, or the study module on productive music education.

Discussion and Conclusions

Times, teaching, and technology are constantly changing, and teacher education must stay up to date with the demands of the curriculum and development. Keeping up with technological development can set challenges for teachers, but evolving technology also provides ever-changing and new tools for teaching. The tools of productive music education therefore need to be added to teacher education to enable its practices to be implemented more widely in schools. By tools, we mean both technological skills and mastery of different teaching methods and applications.

A modern music teaching class teacher as well as a music subject teacher needs both traditional skills in music education (singing and instrumental skills in piano, guitar, drums, bass, percussion instruments, kantele, recorder etc.; music didactics and pedagogy skills, music theory skills, etc.) as well as technological skills (ICT, smart devices, applications, etc.). The use of technological applications has increased strongly in the last decade and offers many new opportunities for music teachers in their everyday work. This phenomenon has brought a deep change in the mindset and, consequently, the pedagogical thinking of music teachers, which, in turn, is bringing about a gradual transformation of the whole music teaching paradigm. This means giving traditional music teaching methods and elements a reduced role and introducing in their place new elements of music education that lead to new paths that offer pupils more opportunities for self-expression and natural creativity. This development is also encouraged by the new Finnish national core curriculum.

The University of Eastern Finland (UEF) offers student teachers diverse music education by teaching pedagogical competence, singing and instrumental skills management, music theory, arranging, music conducting, music cultures (classical music, rhythm music, folk music, world music) and music technology. In 2019, the teacher education unit of UEF remodelled its music specialization studies to support the newest developments in music education. Music pedagogy II, now one of the largest courses offered in specialization studies at UEF, equips students with versatile tools for teaching music in upper comprehensive school. We subsequently added the productive music education study module to this course and, after completing the module, the student teachers implemented what they had learned during the year with the sixth graders in Länsikatu School in the spring of 2020. This was also researched from the beginning by collecting data from the students at the UEF teacher education unit. This article focuses on the use of smart device applications for music teaching and student teachers' conceptions regarding their use.

After the study module, all of the study group participants wanted to take creative practices to school and approach productive music education using a variety of methods. This, in turn, requires that teacher education should offer diverse ways of implementing productive music education with various tools, and that those schools have the necessary equipment to implement it.

As previous studies have shown (Ruthmann, 2007; Hogenes, Oers, Diekstra, & Sklad, 2016), productive music education engages pupils better in the classroom compared to traditional music education. An active and participatory atmosphere was also clearly present in the study groups' lessons, as well as on school visits while working with the sixth-grade pupils at Länsikatu School. When tasks were of low-threshold and easy to

start, working with an unknown group was already easy. On the first school visit, the teacher students were able to carry out productive music education independently and found the visit to be a positive experience. The visit also proved to the student teachers that they had the ability to apply creative methods in the classroom.

National Core Curriculum for Basic Education (2014) emphasizes that pupils should be offered opportunities for creative music making (productive music education) on a regular basis starting from the lower grades of comprehensive school. If teacher education provides easily approachable low-threshold tools that are functional in different groups and spaces, the threshold for teachers to approach productive music education will also be lowered.

Although the study group represents a rather small sample of the basic group (the Finnish music teacher population, which is described earlier), the results support previous research (Muhonen, 2016; Partti & Ahola, 2016; Suomi, 2019). The results, especially combined with those of other studies related to this topic, show that practices of productive music education are needed. The results show that the new practices (taught during the study module) were very well adapted for the use in the classroom, and all of the respondents were determined to use their new skills in their future teaching.

Obtaining these kinds of results from a small intervention offered to an eager group of students specializing in music at the University of Eastern Finland indicates a great need for this kind of education and for specially planned study modules for this target group. Similar study modules would thus be of a considerable benefit to students conducting multidisciplinary studies in music education. Anttila and Juvonen made a similar finding in their study on music teacher education in Estonia and Finland (Anttila & Juvonen, 2003, 2006).

This study also shows that the music education paradigm is changing: when our aim is to address the needs of school music education, the requirements of the curriculum, and the needs of school pupils and future music teachers, the transition towards productive music education instead of repeating the traditional reproductive music educational ideas becomes unavoidable. This means improvising own musical ideas, soundscapes, compositions, arranging music, and creating something new, instead of merely repeating and practising existing works.

The paradigm of music education is changing for four key reasons:

1. Music, its use, and ways of doing things, such as arranging, composing, and producing new music are changing. Composing a song from demo to readymade piece can now be done entirely at home and, increasingly, younger students are able to utilize technology when creating music in their free time. This informal learning – taking place outside of school and a teacher-student setting – affords teachers opportunities to take advantage of wider learning environments, and teachers should be encouraged to do so.
2. Technology is constantly evolving and continually providing new tools for teaching music.
3. The Finnish national curriculum challenges and requires teachers to offer students creative musical tasks from the first grade onwards. Musical invention, song crafting, improvisation, and creative activity should be everyday life in the

music class. Technology together with numerous free or very inexpensive applications, make it possible to implement versatile and easily approachable tasks even in large groups.

4. Many teachers want to implement productive music education, have the skills required to do so, and continually educate themselves towards this goal. In turn, there are also teachers who are not familiar with productive music education methods and do not want to implement them in their teaching, as they are perceived to be too cumbersome and laborious and their own technological skills are perceived as insufficient. In smaller schools, insufficient resources, for example in terms of technology, also pose their own challenges.

Despite the challenges, productive music education in socio-constructivism context offers us great opportunities to enable students to develop into creative individuals who know how to work in a group as well as alone, offering their own musical ideas utilizing technology. The new ideas brought by the productive music education paradigm widen and enrich our perspective of creativity and bring creative work into our daily lives. With todays' methods and technology, composing is no longer an elite pursuit requiring a special skillset – it is possible for everyone. Above all, we see the changing music education paradigm as a beneficial development that is bringing many positive changes to the teaching of music and transforming the fundamental nature of Finnish music education from reproductive to productive.

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Received 05.11.2020
Accepted 18.12.2020