

# **THE EUROPEAN DIGITAL MUSIC ACADEMY**

Needs and perspectives on digital skills training  
in higher education institutions in four European  
countries.

An ERASMUS+ funded project

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## 1. Introduction to the TEDMA project

The world is getting increasingly digitalized and especially since the Covid-19 pandemic all kind of areas of our daily life are getting affected. Starting by the workplaces that are increasingly replaced by remote work, communication technology that are shifting from face-to-face encounters to video-call conferences up to entertainment program – especially in the music industry – that developed live performance substitutes by creating digital livestream formats.<sup>1</sup> These few examples show the disruptive transformations we phase through the digitalization of both, private and professional life.<sup>2</sup>

Apart from this digital transformation process professional musicians have to deal with wide range of skills, starting with technical instrumental skills, to self-management, concert booking, brand and communication skills, knowledge about legal aspects, such as copyright issues, networking skills and creative potential, needed to succeed in the recent music industry.<sup>3</sup>

The digitalization of the music sector, inflicting new approaches to practice, production, communication and performance of music, raises the question of the necessity in the evolution of higher music education curricula. The European Digital Music Academy (TEDMA) was therefore created to address this much-needed innovation process in the live music sector and music education. Experts from four higher music education institutes and three music industry companies from four different countries, Germany, the Netherlands, France and Denmark, came together to analyze during two years the current stand of digital skills training in higher education institutes and develop a training methodology for these institutions that effectively transfer digital skills to music students. The participating partners were:

- Stiftung Neue-Musik Impulse (Germany)

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<sup>1</sup> Fischer, Benjamin: Konzerte für die Couch. In: Frankfurter Allgemeine Zeitung [online: <https://www.faz.net/aktuell/wirtschaft/musiker-in-der-corona-krise-die-professionalisierung-der-live-stream-konzerte-17049576.html> (last access 08.12.2022)].

<sup>2</sup> Döhring, B. et al: COVID-19 acceleration in digitalisation. [online: <https://link.springer.com/content/pdf/10.1007/s10368-021-00511-8.pdf?pdf=button>, (last access 08.12.2022)].

<sup>3</sup> Schneidewind, Peter and Tröndle, Martin: Selbstmanagement im Musikbetrieb. 2014, p. 14-15.

- TH Lübeck (Germany)
- Syddansk Musikkonservatorium (Denmark)
- Hanzehogeschool Groningen (Netherlands)
- SPOT Groningen (Netherlands)
- IMFP (France)
- SYL Production (France)

With this project partners from Germany, the Netherlands, Denmark and France the five following needs should be addressed:

1. The live music sector faces a digital shift and has to deal with new target groups, fast-evolving consumption habits with a demand for digital consumption and multi-sensory experiences. This requires new skills in the training of the current and future professionals (i.e. students) of the live music sector for them to be able to create new performance formats that will enhance the relationship between the audience and the performers and reach new audiences. It is an EU-wide challenge that requires cross-border collaboration.
2. Digital skills are not yet well integrated into higher education curricula: Students who aspire to work in the live music sector are not provided with the proper digital learning, practices, methods and tools to address the evolution the live music sector faces.<sup>4</sup>
3. The same higher education curricula is not yet fully integrated in a cross-disciplinary approach. At the same time, tomorrow's live music professionals will need to master various tools (for production, management and communication) to better adapt to the digital evolution of the sector and meet the audience's demands.<sup>5</sup>

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<sup>4</sup> Treß, Johannes: Acting self-determinedly and critically in a post-digital future? A critical review on digitalization in music education. In: cefjournal (2023), p. 67. [online: <https://doi.org/10.5281/zenodo.8010504> (last access, 28.03.2024)].

<sup>5</sup> Tobias, Evans: Inter/Trans/Multi/Cross/New Media(ting): Navigating an Emerging Landscape of Digital Media for Music Education. In: Randles, Clint (ed.): Music Education. Navigating the future. New York 2015, p. 91-93.

4. Work-based learning is still not a common practice within higher education institutes/universities, while this is beneficial for students who can have a more practical experience and for live music professionals who can profit from a new and fresh vision on their practices by today's 'digital native' students.
5. The different national higher music education systems are currently not yet well-connected, thereby hampering cross-border learning and exchanging practices.

Taking all this into consideration this project aims to answer the following research questions:

1. *What is the current stand on digital skills training in higher education institutions in Germany, The Netherlands, Denmark and France?*
2. *Which digital skills do musicians need to acquire during their studies in order to deal with digital transformations?*
3. *How can this skills be integrated into the academic curriculum?*

The TEDMA project aimed to enhance the digital skills and competences of higher education students and live music professionals. The project addresses the need for innovation and especially the challenge of digitalization in the live music sector, accelerated by the COVID-19 pandemic. While a few good practices exist, including both higher education institutes and live music organizations, to address those challenges, the project gathered both students and professionals from the live music sector to get trained on digital skills, thus increasing resilience towards the digital shift and adding value for a sustainable career. All this by creating a methodology that addresses these needs and includes a cross-disciplinary approach towards live music performances, connecting different disciplines of the music ecosystem (performers, sound and light specialists, PR and marketing specialists).

The following chapter we will firstly categorize and summarize the existing literature, describing the already applied methodologies practices and experiences from further higher education institutes. In the third chapter the experiences from the own studies during the TEDMA project will be shared, depicting the learning from the students, but

also from the reaction of the audiences when the results of the training were presented at four events in every country. Eventually, there will be a set of recommendations for institutions interested in applying digital skills training in their own education curriculum.

## 2. Digital Skills Training: Status Quo in higher education institutes

Before presenting the learnings from the TEDMA project research, an overview of the already exciting literature and theories for the digital skills training at higher education institutes should be given. As a starting point from the TEDMA project, the theoretical examination of already existing approaches to the digital skills training was carried out, not only to inspire and bring in new perspectives, but also to acknowledge the hypothesis that have been described in the introduction.

As Minors, Burnard, Wiffen, Shihabi and van der Walt state in their common paper concerning trends and issues in higher music education, the need to re-conceptualize and integrate technology in education is due to the digitized and competitive environment of the current market given.<sup>6</sup> Therefore, the necessity for this project can be derived from this statement and giving already a glimpse into the common situation at many education institutions we want to have a closer look now.

### 2.1 Digital skills training and methodologies for the live music sector in higher education curricula

Music learning has constantly evolved over the years. In an increasingly digital world, apps, smartphones, hard- and software have become more popular in dealing with music artistry. As Gouzouasis and Bakan point out, the use of digital devices and software

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<sup>6</sup> Minors, H. et al: Mapping trends and framing issues in higher music education: Changing minds/changing practices. In: London Review of Education (2017), p. 457-464 [online: <https://doi.org/10.18546/LRE.15.3.09> (last access, 31.03.2024)].

remains the foreseeable future in music education, patiently initializing a musical revolution in music making and production.<sup>7</sup> Jonathan Savage agrees by stating that the new technologies offer opportunities to create, perform, learn and share music from high quality using modestly equipped personal computers.<sup>8</sup> For higher music education institutes the objectives needs to be to aspire for their students the achievement of professional, flexible, innovative and creative skills, enabling a successful career in an constantly changing, competitive and digitalized music industry environment,<sup>9</sup>

In order to achieve this overall goal, the institutions, teachers and methodology need to adapt. As Wan outlines, the use of digital technologies contribute to the development of professional competences, such as technical, creative, lateral thinking and communication. Therefore, also the teaching has to evolve, focusing a student and practice-oriented approach.<sup>10</sup>

The only methodological approach described in the literature in connection with digital skill learning is described by Weijia Wan, Lecturer at the School of Music of Soochow University in Suzhou, China. Wan suggests the use of the flipped classroom concept, stressing out that the implementation of digital technology also implicates the introduction of modern teaching methods. The flipped classroom concept switch's locations of learning and practicing, giving the students the tasks to study at home the theory/music and then to present/explain/discuss content during classes. Even though, this concept demands an openness towards new approaches, the study at the University of China demonstrated higher competences and motivation among the participating students.<sup>11</sup>

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<sup>7</sup> Gouzouasis, P. and Bakan, D.: The future of music making and music education in a transformative digital world. In: UNESCO Observatory Refereed E-Journal, Multi-Disciplinary Research in the Arts [online: [https://www.researchgate.net/publication/237067499\\_The\\_future\\_of\\_music\\_making\\_and\\_music\\_education\\_in\\_a\\_transformative\\_digital\\_world](https://www.researchgate.net/publication/237067499_The_future_of_music_making_and_music_education_in_a_transformative_digital_world) (last access, 31.03.2024)].

<sup>8</sup> Savage, J.: Reconstructing music education through ICT. In: Research in Education, 78(1) (2007), p. 65-77 [online: <https://doi.org/10.7227/RIE.78.6> (last access, 31.03.2024)].

<sup>9</sup> Minors, H. et al: Mapping trends and framing issues in higher music education: Changing minds/changing practices. In: London Review of Education (2017), p. 457 [online: <https://doi.org/10.18546/LRE.15.3.09> (last access, 31.03.2024)].

<sup>10</sup> Wan, W.: Digital Technologies in Music Education: The Case of Chinese Students. In: Música Hodie (2022) [online: [10.5216/mh.v22.70752](https://doi.org/10.5216/mh.v22.70752) (last access, 31.03.2024)].

<sup>11</sup> Ebd.

Wan also conducted a survey among the students to figure out the abilities before starting the own training experiment. Her quantitative research revealed that 66% of all students already use digital technologies to a certain extend leaving a third of the student not using digital tools at all. Only 32% indicated to have high competencies in digital technologies and 48% even stated to have a low level of competence.<sup>12</sup> The results reinforce the need to implement a training program involving digital skills development, depicting a lack of competence progress along the studies.

A major issue that can be found throughout the literature is the problem of creating an attitude towards an adapted learning methodology. Many teachers and also students appear to be reluctant to new ideas and prefer to rather stick to traditional way of teaching. The ignorance of the needed change in teaching prevents a development of a digital technology-based learning.<sup>13</sup> One cause of this issues could be due to the relation of the teachers to digital technologies. Jonathan Savage elaborates the concept of “digital immigrants” – people that did not grow up with these tools – and “digital natives”, who are accustomed to these tools. As many teachers can be categorized into being “digital immigrants” the integration of digital technologies is often impeded.<sup>14</sup>

Generally, digital technologies enable an integration into several fields of music education. While already for music practice many applications arise, it is the music production that created many opportunities through for example recording and mastering software for artists to create music with low costs. And also, the distribution of music could be democratized, making it very easy nowadays to release music on all kinds of streaming platforms. A broad field are also communication systems, allowing artists to connect worldwide, create, produce and perform music decentralized and especially promote their music through social-media and other channels. Finally, also on

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<sup>12</sup> Wan, W.: Digital Technologies in Music Education: The Case of Chinese Students. In: *Música Hodie* (2022) [online: 10.5216/mh.v22.70752 (last access, 31.03.2024)].

<sup>13</sup> Gouzouasis, P. and Bakan, D.: The future of music making and music education in a transformative digital world. In: UNESCO Observatory Refereed E-Journal, Multi-Disciplinary Research in the Arts [online: [https://www.researchgate.net/publication/237067499\\_The\\_future\\_of\\_music\\_making\\_and\\_music\\_education\\_in\\_a\\_transformative\\_digital\\_world](https://www.researchgate.net/publication/237067499_The_future_of_music_making_and_music_education_in_a_transformative_digital_world) (last access, 31.03.2024)].

<sup>14</sup> Savage: J.: Reconstructing music education through ICT. In: *Research in Education*, 78(1) (2007), p. 65-77 [online: <https://doi.org/10.7227/RIE.78.6> (last access, 31.03.2024)].



the performance side, digital tools enable a broader variety of sets to express artistically.<sup>15</sup>

## 2.2 Existing training practices and materials for higher-education teachers and students

Outgoing from the general situation at higher music education institutions, this chapter will explain more in detail specific opportunities to integrate music technology, giving concrete examples of apps, software and platforms. But also, the Benefits & issues of using digital technologies and concrete practices will be explained.

Throughout the literature, a variety of use-cases for digital technologies in music education is described. The conducted research used mainly different hard- and software enhancing the practice and production of music.<sup>16</sup> But more possibilities are described and should be presented.

### **Music practice**

Musical practice is done to ameliorate the technical skills and music understanding. Digital music technologies enhance this process by supporting the practice with information, background sounds or opportunities to practice in different locations (e.g. in public transportation). Examples include applications such as *PocketGuitar*, *Chordplay*, *Ireal*, *Ocarina* or *Groovemaker*.<sup>17</sup>

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<sup>15</sup> Minors, H. et al: Mapping trends and framing issues in higher music education: Changing minds/changing practices. In: London Review of Education (2017), p. 457 [online: <https://doi.org/10.18546/LRE.15.3.09> (last access, 31.03.2024)].

<sup>16</sup> Savage: J.: Reconstructing music education through ICT. In: Research in Education, 78(1) (2007), p. 65-77 [online: <https://doi.org/10.7227/RIE.78.6> (last access, 31.03.2024)].

<sup>17</sup> Gouzouasis, P. and Bakan, D.: The future of music making and music education in a transformative digital world. In: UNESCO Observatory Refereed E-Journal, Multi-Disciplinary Research in the Arts, p. 3-9 [online: [https://www.researchgate.net/publication/237067499\\_The\\_future\\_of\\_music\\_making\\_and\\_music\\_education\\_in\\_a\\_transformative\\_digital\\_world](https://www.researchgate.net/publication/237067499_The_future_of_music_making_and_music_education_in_a_transformative_digital_world) (last access, 31.03.2024)].

## Music production

Music production software has been the most disruptive changes in the latest music industry decades, perhaps together with the shift to streaming services distribution. Here music production software such as *MAGIX*, *Cubase* or *Ableton* – including DAW, MIDI or synthesizer modules, enabled the recording of way more advanced musical products.<sup>18</sup>

## Communication Channels

Smartphones, Social-Media, video call systems and much more have tremendously shaped our recent communication, also concerning professional musicians giving more opportunities to promote individually their music. But apart from Branding topics, also for the co-creation, co-practice and also performance of music, digital technologies have brought up new possibilities. Platforms such as *Glee* or the *Online Orchestra* as a digital music project can be related to this topic.<sup>19</sup>

Even though other categories could be additionally mentioned (e.g. distribution) these are the most relevant when considering music education. Gouzouasis points out that so far most of these tools are used outside the classroom leaving learning, practicing and teaching to the students themselves. It is now therefore the task of the teachers to proactively bring these tools into the classrooms in order to enable a more profound and in-depth exchange and learning for the students.<sup>20</sup>

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<sup>18</sup> Gouzouasis, P. and Bakan, D.: The future of music making and music education in a transformative digital world. In: UNESCO Observatory Refereed E-Journal, Multi-Disciplinary Research in the Arts, p. 3.-7 [online:

[https://www.researchgate.net/publication/237067499\\_The\\_future\\_of\\_music\\_making\\_and\\_music\\_education\\_in\\_a\\_transformative\\_digital\\_world](https://www.researchgate.net/publication/237067499_The_future_of_music_making_and_music_education_in_a_transformative_digital_world) (last access, 31.03.2024)].

<sup>19</sup> Minors, H. et al: Mapping trends and framing issues in higher music education: Changing minds/changing practices. In: London Review of Education (2017), p. 457 [online: <https://doi.org/10.18546/LRE.15.3.09> (last access, 31.03.2024)].

<sup>20</sup> Gouzouasis, P. and Bakan, D.: The future of music making and music education in a transformative digital world. In: UNESCO Observatory Refereed E-Journal, Multi-Disciplinary Research in the Arts, p. 3.-7 [online: [https://www.researchgate.net/publication/237067499\\_The\\_future\\_of\\_music\\_making\\_and\\_music\\_education\\_in\\_a\\_transformative\\_digital\\_world](https://www.researchgate.net/publication/237067499_The_future_of_music_making_and_music_education_in_a_transformative_digital_world) (last access, 31.03.2024)].

Savage detects not only advantages by using digital technologies, trying to highlight the benefits and issues of the practical application of digital technologies. In his detailed study he points out the following pros and cons:

#### Pros:

- 1 Boys getting more involved in music.
- 2 Pupils exhibiting an increase in pride, enthusiasm and motivation about their own work and taking greater responsibility for their own learning process.
- 3 Changing the music curriculum to make it more stimulating and relevant.
- 4 The ease with which pupils approach pieces of technology compared with the learning of traditional instruments.
- 5 New approaches to composition, with technology facilitating pupils who lack traditional instrumental skills.
- 6 An increasing interest in GCSE music and other music technology options post-16.
- 7 A general raising of standards and enhancement of pupils' abilities across the Key Stage 3 curriculum.
- 8 Being able to give an accurate representation of current issues and creative processes in the music industry.

Advantages digital technology use (In: Savage, J.: ICT, 2007)

#### Cons:

- 1 Practical and technical difficulties of sourcing, implementing and maintaining music technology within a busy classroom environment.
- 2 A noticeable loss of conventional musical skills in some cases.
- 3 Decreasing confidence from pupils in respect of musical performance.
- 4 Decreasing peer-to-peer relations, interactions between pupils and group work, with too much computer-based musical work.
- 5 Difficulty ensuring equal opportunities, particularly with limited resources.
- 6 Varying pupil responses to using ICT, particularly from pupils who had traditional instrumental skills.
- 7 Pupils not being able to judge quality of work from quantity of work, particularly within compositional tasks. 'It's easy to create a lot with not much in it!'

Disadvantages digital technology use (In: Savage, J.: ICT, 2007)

While students were more motivated, involved and creative, finding new approaches to music, the conservative mindset and altering teaching and learning habits caused issues during the learning process. Even though the change process towards digital technologies includes defiances, the advantages predominate.

There are several best practices of institutions integrating digital technologies in music education. Five examples should be presented here:

1. In Singapore an experiment with video-based learning approved the development of cognitive abilities through the activation of all cognitive processes, such as imagination, perception, thinking, reproduction etc.<sup>21</sup>
2. In Aalborg University Copenhagen researchers suggested the use of virtual and augmented reality in music education, serving to visualize content and include a more diverse and interactive teaching environment.<sup>22</sup>
3. In England an integrational approach including digital technologies have been implemented, using a similar approach to the flipped classroom concept. Students studied in instrumental groups, allowing them to develop communication and feedback skills by exchanging in class. The practice-oriented approach included digital technologies during the self-studies and increased creative, reflective, strategic and digital skills.<sup>23</sup>
4. In Spain researchers identified improved academic performance of students when using modern technologies. Here mainly mobile applications and online learning platforms have been used, resulting in 75% of the students achieving a higher academic level.<sup>24</sup>
5. In Belgium the *Music Paint Machine* software was developed in order to combine interactive visual technologies and audio software. It combines innovative and

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<sup>21</sup> Chua, S.; Tan, L.: Examining online video-based professional development for music teachers. In: Music Education Research (5, 2021), p. 580-593 [online: <https://doi.org/10.1080/14613808.2021.1977786> (last access 01.04.2024)].

<sup>22</sup> Baker, D. et al: 'Don't follow them, look at me!': Contemplating a haptic digital prototype to bridge the conductor and visually impaired performer. In: Music Education Research (21, 2019), p. 295-314 [online: <https://doi.org/10.1080/14613808.2019.1605344> (last access, 01.04.2024)].

<sup>23</sup> Gibson, S.-J.: Shifting from offline to online collaborative music making, teaching and learning: perceptions of Ethno artistic mentors. In: Music Education Research (23, 2021), p. 151-166 [online: <https://doi.org/10.1080/14613808.2021.1904865> (last access, 01.04.2024)].

<sup>24</sup> Aróstegui, J.: Implications of neoliberalism and knowledge economy for music education. In: Music Education Research (22,2020), p. 42-53 [online: <https://doi.org/10.1080/14613808.2019.1703923> (last access, 01.04.2024)].

traditional methodologies and supports instrumental music teaching and learning.<sup>25</sup>

The literature implies that the integration of digital technology in higher music education supplies a variety of advantages and additional skills attainment. Some best practices already exist, providing some evidence of the improvements by implementing digital technologies. Although, this change management process needs to be tackled open minded and needs guidance by external or internal experts to successfully prepare the teachers for this task.

### 3. TEDMA Project: Perspectives in four European countries

The European Digital Music Academy provides another piece in the bigger picture of the integration process of digital skills in higher music education. The project supplied further insights about the value of including digital technologies in music education focusing on the development of digital skills and the development of a practical, cross-disciplinary methodology, supplying a practical guidance for other institutions seeking to refine their curriculum.

The following chapters should give an overview of the initial state of the art at the participating institutions and further education institutions in Germany, the Netherlands, France and Denmark, provide insights about the learning progress of the participating students and young professionals and effects of the developed performances from the audience perspective.

The developed methodology won't be described in this paper and will be published in a separate document. However, both papers will be accessible freely online on every partners website as well as on the EPALE platform.

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<sup>25</sup> Wan, W.: Digital Technologies in Music Education: The Case of Chinese Students. In: *Música Hodie* (2022) [online: 10.5216/mh.v22.70752 (last access, 31.03.2024)].

### 3.1. Current status in digital skills training in four countries

During the second transnational meeting of the TEDMA project, held in Salon de Provence in southern France, the results of the executed desk research were presented. The desk research was a questionnaire disseminated by all partners in their own education institution and among partnered institutions on a national level. The survey was conducted among 500 students from different institutions.

As a general overview, two from the four participating institutions already integrated partly digital technologies in their curriculum. While the partner from Denmark Syddansk Musikkonservatorium Odense more likely was an expert partner, as digital music programs were initially existing. The Dutch partner Hanzehoogeschool Groningen partly used digital communication and practice tools, without including a general methodology and genuine strategy, while the partners in Germany and France did not use digital technology beforehand (Musikhochschule Lübeck for Germany).

Firstly, the dissemination and target group of the desk research should be explained:

Syddansk Musikkonservatorium (SDMK): conducted the survey among the freshmen of classical jazz, folk and electronic music.

Hanzehogenschool Groningen: Apart from own music students, also other institutions in the Netherlands took part in the survey. Participants were mainly from percussion, electronic design/interfaces departments.

TH Lübeck: did not conduct the survey at their own institution, as they don` t have music students. Therefore, other higher music institutions in Lübeck and Hannover conducted the survey. Participants were mainly from vocals, composing and conducting classes.

IMFP: conducted the survey among their own music students.

The outcome of the different survey questions is summarized and presented below :

#### **1. Which digital skills in live performance are taught at your higher education institution?**

Some areas of live digital performance are covered at the partners education institutions. However, this is not done in a structured curriculum, and it depends on the teacher, if digital technology is part of the lectures. Also, the quality of this content – if taught - is unclear. Depending on the institution, automatic lighting, sound design/ sequencing, use of electronic devices, video and live streaming, electronic photography, logic visuals, sensory devices, use of visuals, immersive audio and DAW programs are offered.

**2. Which digital skills in promotion are taught at your higher education institution?**

The area of digital advertising is taught in parts, but not to the extent needed nowadays. Here too, it depends on the teachers and their input.

**3. Which digital skills in relation intellectual property rights are taught at your high education institution?**

Since the area of copyright is not taught at all, students do not know which (copy-) rights they held and how it is executed in especially new digital distribution systems.

**4. Which digital skills in relation to entrepreneurship are taught at your high education institution?**

Entrepreneur-classes are mostly covered by extra-curricular classes. It is difficult to transfer knowledge to students with additional courses. Some of them are overwhelmed and show little self-initiative, which is why they should be specifically prepared within the curriculum to strengthen there own learning.

**5. What's the biggest hurdle in successfully offering new technologies at your higher education institution?**

One often mentioned problem are the limited digital skills of many lecturers. Also, a missing willingness to adapt programs is an issue. Furthermore, the lack of time,

restricted financial resources of the universities and specializations in certain areas of music of the students are hurdles.

**6. Which digital skills in relation to the audience concert experience (live and online) are taught at your higher education institution?**

The area of audience interaction is rarely dealt with, which is why artists sometimes only perform without building up audience connection, in order to play further performances.

**7. Are there any digital skills that are currently not taught at your institution that you wish were included in the curriculum of your higher education institution?**

Out of the desk research less input could be achieved by this question, as the students lack themselves the knowledge of the skills needed. Therefore, the main output of the discussion was that institutions need to encourage students to integrate digital learning in their self-studies.

The results of the desk research clearly reinforced the assumptions that digital skills training is not yet an integral part of the curricula of higher music education institutions in the four participating countries. It is mainly self-driven approaches from a few teachers, who partly include digital technologies. Mainly the theory of the “digital immigrants” can be confirmed, as many students perceived their teachers of lacking the skills to teach digital skills.

The need for a methodological, strategic approach to include digital skills training in higher music education can be confirmed through the research of the project.



### 3.2. Student digital skills evolvement during the project phase

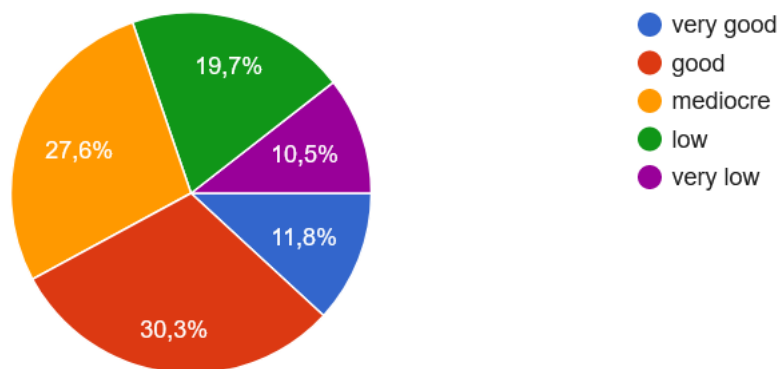
The second part of the research conducted by the The European Digital Music Academy was to survey the progress of the participating students, giving some insights to the success of the implemented methodology. For this reason, three surveys – one before, in between and after the TEDMA activities - were conducted depicting the progress and evolvement the students experienced during the project phase.

The participants of the survey were between 19 and 30 years old and were evenly split between all project partners, as every partner brought ten participants to the project. The study programs very varied from classical instrumental studies to sound engineering, digital music and sound art studies assembling a wide range of disciplines and knowledge.

#### **Pre-activities survey**

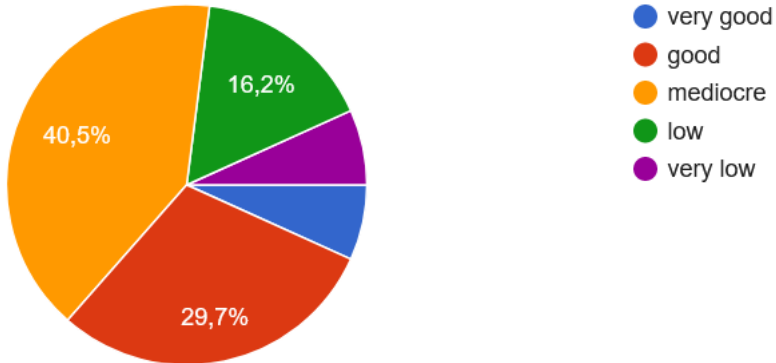
Before starting the TEDMA project, all participants were asked questions concerning their digital abilities. Among the sample of students and young professionals, half of the students perceived their digital skills as “good” while one third (33%) rather ranked themselves as mediocre.

While 65% have already used once a music production software, just 33% conclude to have good skills in the utilization of these software tools.



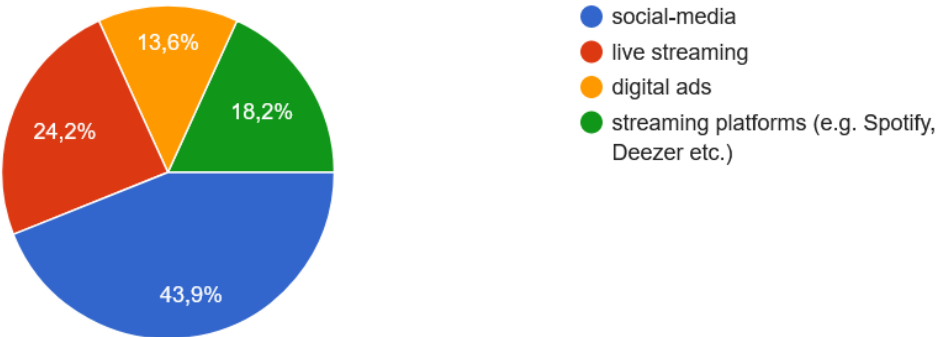
Ranking of skills in music production software usage (2022)

Concerning the digital skills for music creation 40% assessed themselves mediocre and 16% even low, revealing the need to increase the training in these fields.



Ranking of skills in music creation (2022)

Moreover, were the digital communication and distribution level rather low, as the following graphic shows:

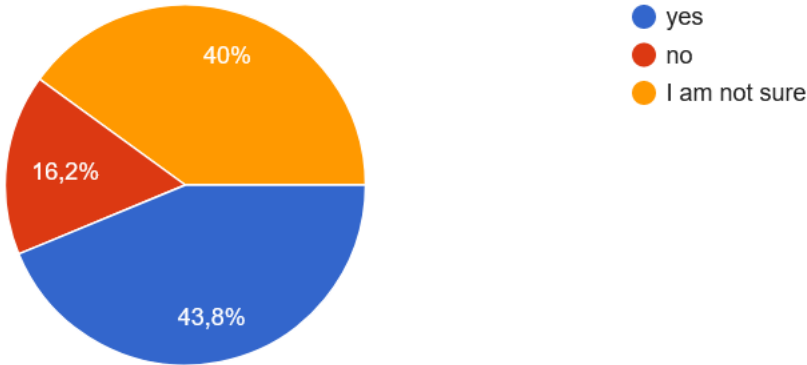


Ranking of skills in digital media usage (2022)

**Inter-activities survey**

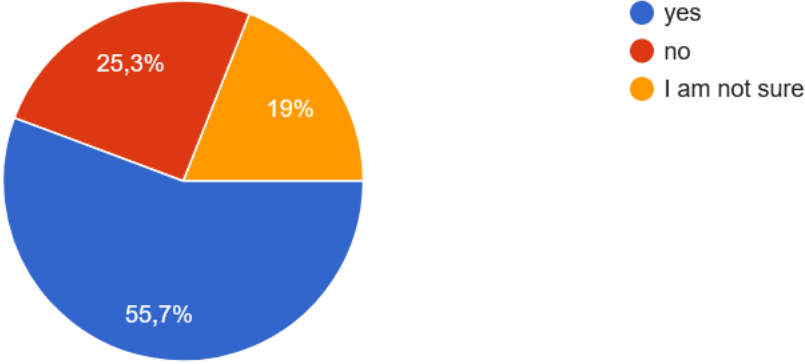
The inter-activities survey was conducted after the test training of the methodology development. After the participation the effects and learning were focused during this questionnaire.

Almost half of the participants agreed to have improved their digital skills by participating in the training activity. Out of discussion with students the 40% who were unsure mentioned either self-taught knowledge that was applied during the training, or an overwhelmed feeling that made it difficult to judge the improvement right after the training.



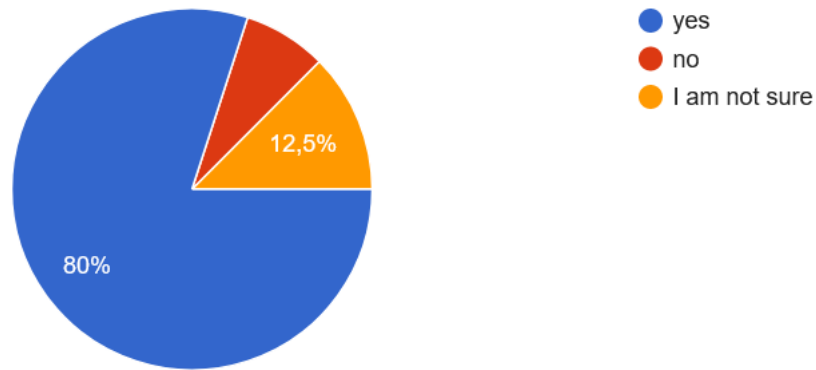
Skills enhancement after training activity (2023)

When comparing music creation skills, using digital technology, 55% perceived an improvement of their individual skills.



Skills enhancement music creation (2023)

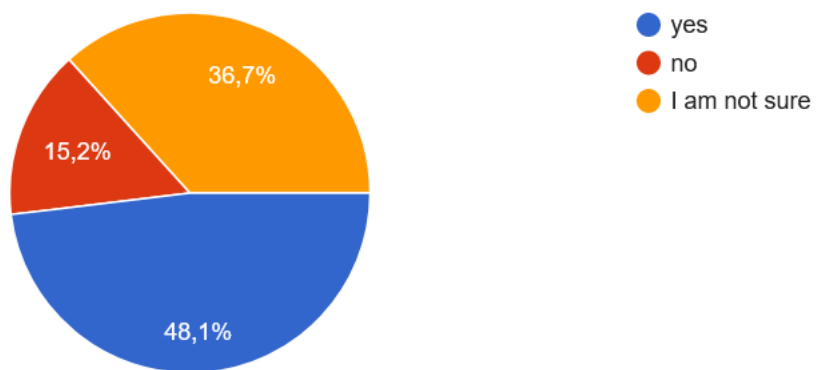
And especially the digital promotion skills could be increased through the methodology, as 80% of the participants stated.



Skills enhancement music creation (2023)

### Post-activities survey

The final evaluation of the participants skills took place after the presentations of the performances developed during the test training. 49% of all participants improved their digital skills training, while a third (36%) could not improve it. This is caused to the students with digital music programs and non-musical students (other disciplines, such as designers, engineers).



Post-activity digital skills enhancement (2023)

Most of the students also perceived the training to be helpful for their career (76%) not only transferring digital skills, but also creating networking opportunities with other

music students and also from other disciplines, providing possibilities for creative exploration and the development of teamwork skills.

Even though not all participants were convinced by the program – a also unrealistic objective – the majority of the participants perceived the training positive.

### 3.3. Project presentation & audience reaction analysis

The last activities of the TEDMA project included for Multiplier Events, one taking place in each country. The Multiplier Events had several purposes, serving as a platform for the students to present their developed performances, experiencing with the use of digital technology in performance situations, as well as an opportunity to disseminate the project results and eventually to analyze the audience reaction to the performances. Considering that the audience is the target group of every performance artist, the persuasion of the audience maintains a major task, also when using digital technologies.

A qualitative approach has been chosen in order to analyze the audience behavior during the performances. With a group of five researchers observed the audience reaction during the concerts, additionally informal interviews with parts of the audience were conducted, asking for the perception, valuation, critics of the performances. Furthermore, the interviewed persons were asked how likely they would take part again in such a performance.

During the variety of performances, including abstract, intellectual and also mainly atmospheric concepts, the audience followed attentively all performances. Outgoing from the reactions (clapping, shouting, whistles), a positive perception could be observed, although some performances led parts of the audience puzzled. Digital technology use and visualization created positive feedback auditive and visually observable.

The conducted interviews confirmed this perception, as many attendees give positive feedback concerning the performances. Some voices from the audience even stated to be “highly inspired” by the performances.

Eventually, also the students assessed the use of digital tools as a strategic competitive advantage, leaving a set of additional tools in comparison to analogue music performance tools.

#### 4. Conclusion & Recommendations

The digital transformation of the music industry also inflicts the higher music education tremendously. New application, hard- and software, platforms and communication and distribution tools increase the opportunities for artists, implying however the knowledge for using these tools.

Currently only few higher music education institutions seem to integrate extensively digital technologies and lack awareness, knowledge or methodological approaches. As the literature stated, the implementation of digital technologies holds several educational advantages and support the objective of preparing music students effectively for a competitive and digital music market.

Digital skills, augmented performances, creative and lateral thinking, as well as communication skills can be ameliorated by using digital technologies in music education. New pedagogical and methodological concepts are needed in order to effectively use these tools. Teachers need to be trained with regards to content, but also class management. Further conservative perspectives on teaching need to be cracked open by strategically moderate this change management process institutionally.

The TEDMA results have confirmed the needed change. Outgoing from the missing methodological approaches, a test training and performance situation was created to test the developed methodology. The research has revealed that the methodology increases the digital abilities of the participants and that also the audience perceived the application of digital technologies during musical performances.

The TEDMA partners therefore suggest the integration of digital skills training for higher education institutions, providing free access to the developed methodology.

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