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PEDAGOGICAL POTENTIAL OF MENTAL PRACTICE IN TEACHING BRASS INSTRUMENTS AT UNIVERSITY

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ABSTRACT

At any level of musical education, it is very important to improve one's musicianship skills, which can only be achieved through consistent training and playing their musical instrument. Physical training is a very important part of the learning process; however, its combination with mental practice has been proved to be much more effective. Although such an approach is important at all levels of musical education, the paper addresses it in the context of higher education. Thus, the aim of this study is to determine the pedagogical potential of mental practice in the process of teaching music in higher education. The research was implemented in two stages. First, a survey was conducted to gather information about the respondents' habits when learning musical pieces. At this stage, the study involved 68 brass students from different universities around the world between the ages of 19 and 25. The second stage of the research comprised the development of the program of mental practice (PMP) with structured observation as a method and 7 participants from Latvian and Norwegian higher music education institutions. The obtained results allow to conclude that the inclusion of mental practice in the practicing routine significantly improves the overall level of concentration and stability both in the process of training and during performances. Mental practice also provides an opportunity to increase the duration of training as well as enhances the overall effectiveness of practicing and concentration during performances.

Keywords: *effectiveness of practicing brass instruments, learning brass instruments, mental practice, music pedagogy, music performance perfection, musical mind, pedagogical process in higher education.*

Introduction

It is important for any musician, both student and professional, to improve their instrument playing throughout their professional activity, and it can only be achieved through a consistent process of playing a musical instrument. It is a continuous work, which requires not only physical

but also mental energy; moreover, as in sports, the specific nature of this profession is in showing one's best performance on stage. Therefore, no matter how powerful (or not so powerful) a performance might be in the practicing process, the demonstrated result is paramount. To achieve the best result, one needs to develop their own technique how to prepare for different types of performances. It is noted that although physical training is a very important part of learning to play a musical instrument, still, the combination of mental and physical practice is much more effective (Pascual-Leone, 2001).

In contrast to mental practice in sports, where the subject has been studied much more extensively, mental practice in music education is a relatively new approach and received recognition only in the second half of the 20th century. There has been an increasing emphasis not only on playing the instrument, but also on the importance of mental processes that take place in the mind during the play – allowing the body to play automatically, allowing the flow, allowing the mind to be free from any kind of thought during a performance (Green, Galwey, 1987). Although in recent years the popularity of this topic among musicians has grown, this approach is still alien to many music schools and higher education institutions. The aim of the research is to study the potential of mental practice in the learning process of playing brass instruments.

General description of mental practice and its' potential

The preparation to perform a musical composition generally requires a long period of systematic development of technical and artistic skills, the development involving both mental processes and motor skills. Therefore, in the process of skills development, their systematic and ergonomically correct training is a topical issue, because systematically repeated activities in a safe environment strengthen the habit, which in the performance situation (including its stress) is revealed in an enhanced way. Habitual behavior is the most enduring one, and it is a fundamental part of a person's ordinary and professional life. The process of learning a composition is also determined by habitual behavior, with habits of systematic exercise being persistent and difficult to change. Systematic exercise is an important aspect that includes both physical and mental aspects: practice with an instrument (physical) and practice without an instrument (mental). Although physical practice is the most well-known method of improving musical performance, mental practice has also increasingly been accepted as a method of musical performance enhancement (Mielke, 2016). The rationale for using mental practice in music includes its help in improving learning and memory, enhancing training effectiveness, overcoming

technical difficulties and developing skills, raising sensory awareness, promoting interest in music, focusing on performance, increasing self-confidence and endurance on stage, promoting greater control over negative emotions or emotion management, establishing connection and presence with the audience, and gaining maximum experience (Williamon, 2006).

Mental practice is one of the simulation methods. In combination with practice, mental practice is an effective way of learning. Although it cannot completely replace physical training, it can be used very effectively in situations where physical training is not possible for various reasons. Allsop and Ackland (2010) also emphasize that mental practice is a useful method to prevent the possibility of injuries resulting from repetitive physical practice, as high frequency and duration of physical practice are among the factors causing injury.

Higher education is not only the acquisition of specific competences and qualifications, but also the process of developing human talent, emotional intelligence and personality (Medne & Jansone-Ratinika, 2019), so the potential of learning methods at this level of education is a significant issue. Analyzing the concept of potential in the context of learning, Mörz (2011) concludes that due to the lack of a definition of this concept, one might think that the concept of potential is not particularly important in the learning process. However, in scientific and popular literature, both human potential and the potential of a method are often used (Mörz, 2011). On the basis of his research, Mörz (2011) claims that learning in itself is a form of potential. In turn, Fedorinova and colleagues conclude that today the essence of the concept "potential" for education is new, so it is not possible to provide a detailed literature review on this topic. In the context of learning, the authors emphasize that the concept "potential" is seen as something that creates and develops qualitative certainty, namely the ability of a method to influence both the quality and nature of engagement and its outcome (Fedorinova et al., 2015).

Thus, the potential of mental practice as a learning method in music includes both mental and physical aspects for the dynamics of qualitative certainty, with the possibility to extend the duration of training and increase its effectiveness in the moments when the body is physically tired but the mind is focused and able to function.

Steps of mental practice in the daily practice process

In the research process, five successive steps were identified to structure the content and form of mental practice and its potential.

Step 1 of mental practice is sound. Steenstrup (2017) emphasizes the phonetic creation of a sound image, or imagining the sound in the mind, which is especially important when playing brass instruments. The sound means

a phonetic image, a desired sound of the instrument, which includes all the musical aspects such as tone, timbre, pitch, dynamics and *vibrato*. The stronger the phonetic image, the clearer the message in the brain that will be sent to the physical structures involved in playing the instrument.

Step 2 of mental practice is movement. The play of any musician is based on their habits and requires new stimuli or mental concepts to change them (Nelson et al., 2006). Playing brass instruments involves many movements that are not very suitable (non-ergonomic) for the human body. As in sports, imaginary movements in music are sometimes much more effective than physical ones, and mainly so because the performance in the mind can be 100% perfect, 100% ideal and 100% simple – the result that can rarely be achieved in the real physical world; mistakes need not be learned in mental practice (Steenstrup, 2017).

Step 3 of mental practice is Centering. The ability to concentrate is an important aspect that often determines the quality of a performance. Persistent attention over a long period of time is essential in the process of mastering a musical composition in order to achieve the optimal or even maximum performance quality (Greene, 2002). The way to improve the concentration skills is a process called Centering – a technique that aims to control emotions, that is to regulate energy and apply it in a way that is useful and productive.

Step 4 of mental practice is interpretation and story. The composer has a clear idea of what the story of the piece is and what each note means, but in the notation this link disappears (Dahl, 2017). It is important to be aware that it is not possible to perform a composition with an original idea, it can only be recreated from one's own experience, with one's own story. The benefit of a story created by the performer is not only in the interpretation of the composition, but also in the processes that take place in the mind during the performance (Greene, 2002).

Step 5 of mental practice is imagination. The goal of mental practice in music is to achieve the best possible performance, so it is important to train the performance itself (Immonen et al., 2012). When performers are able to see themselves in a "perfect" performance situation in their mind, they gradually begin to believe that they are capable of a real successful performance (Weinberg & Gould, 2003). This phenomenon can be explained by the Pygmalion effect, which is a form of positive self-fulfillment demonstrating how expectations affect performance (Niari et al., 2016).

Analyzing the findings about mental practice, its meaning and forms, it can be concluded that:

- in combination with physical training, mental practice is one of the most effective methods of music learning,
- using mental practice can change behavior,

- incorporating elements of mental practice in the daily practice process helps to extend training duration and maintain or even increase its effectiveness.

Method

For the implementation of the research, a mixed research design was chosen. Since it was equally important to identify the specifics of the industry as a whole and to recognize the potential of mental practice, the study made use of a sequential explanatory design of mixed method research and was carried out in two stages.

A survey was chosen for the implementation of **the first stage of the research**. The objectives of the survey were: (1) to identify the specifics of the industry, (2) to obtain information about the daily practicing process and habits of playing brass instruments, (3) to process data, to obtain information about the use of mental practice in daily practicing process and stage performance. The survey consisted of closed-ended questions, using both nominal scales, where features do not have different levels, but different qualities, and sequential scales, where features are assessed subjectively and can be divided into ranks. As the survey was based on the theoretical findings concerning mental practice, the set of questions consisted of 6 groups: *general information, sound, movements, concentration, interpretation and imagination*. Before starting the distribution of the questionnaire, a sample of respondents was selected on the basis of the following parameters: (1) the respondent plays a brass instrument, (2) the respondent practices regularly, (3) the respondent studies or has been studying music at least at the level of secondary vocational education. The questionnaire was distributed internationally, namely, to players of brass instruments in Latvia, Norway, and Denmark. A total of 68 respondents of all levels of education (Bachelor's, Master's, and doctoral) took part in the survey (first stage of the research) filling in the questionnaire designed and distributed in both Latvian (28) and English (40).

For the implementation of **the second stage of the study**, a structured observation method was chosen and 7 participants from Latvian and Norwegian higher music education institutions were involved, the method characterized by a preparation period when systematic observation maps or tables corresponding to the research questions are developed. In this study, it was a program of mental practice (PMP), and it was not the researcher who was chosen as an observer but the person being studied. Such a method of data acquisition is predicated on the subjectivity of the musical performance and its evaluation, with performers being the most capable of feeling and describing the changes in their play. Prior to the start of the

research, there was conducted a purposeful selection of a group of participants, with their parameters meeting the following requirements: (1) playing a brass instrument, (2) training the instrument regularly, (3) being a student at a higher music education institution. Before the start of the study, the participants were introduced to the theoretical basis of the mental practice plan, as well as instructed to include mental practice in their daily practicing process, with the PMP divided into five successive steps of sound, movement, Centering, interpretation and imagination. Each participant had the right not to choose one of the steps or to terminate their participation in the research at any time. The second stage of the study ended with a qualitative open questionnaire. All participants took part in the research voluntarily; the data of both surveys are anonymous. Both stages of the research were integrated in the part with the interpretation of research results.

Results

Description and analysis of the Results of the first stage of the study

The method of descriptive statistics was used for the analysis of the data obtained in the first stage of the study. This method is the basis for further research and is supplemented by data processing in the data processing program SPSS.

The first aim of the survey was to identify the specifics of the industry through obtaining general information about the respondents' daily training habits. Summarizing the results, it is obtained that 63 out of 68 respondents admit that in their practicing process, in addition to playing the instrument, they use other methods, with the most popular ones being breathing exercises used by 52 respondents, listening to recordings (52) and singing (49), while practicing of a composition mentally was applied by 36 musicians, which is 53% of all respondents. Only 24 of the respondents devote more than 30% of their daily practice time to abovementioned methods.

As the questionnaire was designed according to the 5 steps of mental practice, the answers to these specific questions were grouped accordingly.

Step 1 *Sound.* Hearing an accurate pitch of the sound before playing it the majority of respondents assigned high (40) or medium (22) importance. To the question "Can you sing a melody before playing it?" the respondents fully agreed (40) or answered "sometimes" (28). Listening to recordings (46), singing (49), playing a melody on the piano (43) and imagining a melody in the mind (56) where the methods for imagining the right pitch of the sound before playing it.

Step 2 *Movement.* More than half of those surveyed (39) find it monotonous to hold their instrument. When asked about tension, they feel it almost all the time of the practicing process (20) or sometimes (44), and only a few (4) do not feel it at all. Yoga and meditation as well as a massage to reduce muscle tension are mostly used by the English-language speaking respondents, while in the Latvian survey, there are more respondents (8) who do not use such methods. The majority imagine their movements (of fingers, hands) at the moments when physical training is not possible (54), and only a few (14) never do it.

The questionnaire did not contain direct questions on *Centering*, given the experience that this term is not popular among musicians; however, when asked about practicing yoga or meditation, 37% of respondents answered in the affirmative. When asked in depth about their commitment to the instrument, again, there was a significant difference between the answers in Latvian and English. None of the Latvian-speaking respondents who have practiced yoga or meditation (9) believe that these methods would significantly affect their play. At the same time, none of those answering in English believe that they do not affect playing the instrument at all, and they marked yoga and meditation as causing a high (5) or low (11) impact. For evaluating the effectiveness of their practicing, two thirds of the respondents rate it at 50–90%, and although a small number (18) value it below 50%, high ratings between 71–100% are also common (27). Another question related to concentration was the focus during the performance, where 95% of the respondents rated it at 50–100%, while the most common answer was 71–90% (25).

In the part of *interpretation*, the respondents were asked about the connection of a piece with a story, colors or pictures, and it was confirmed by the majority of the Latvian respondents (22), but only 21 out of 40 among the English-language ones. All of the respondents who responded to this question in the affirmative are able to maintain full or partial focus on the stories, images or colors they create.

In the last stage of the questionnaire, *Imagination*, it was clarified whether the respondents tend to simulate their performance, to which 48 out of all participants gave a positive answer, admitting that they do it often (25) or sometimes (23). In their turn, 54 respondents tend to live through a performance in their mind. For the option of "imagining a positive result" there is a significant difference between the respondents answering in Latvian and in English, with only 5 of the former but 18 of the latter imagining a positive result when simulating a performance.

At the next step of the research, the survey data were processed in the data processing program SPSS, where the correlation analysis was used to find out whether or not there is a correlation between different sets of

features. The program helped to obtain 8 results under these conditions (Table 1).

Table 1. Respondents' responses about the use of other methods

Respondents	**Using more than 30% of other methods**	**71–100% of training effectiveness**	**71–100% of concentration during performance**
1	5	6	6
7	4	6	6
27	4	5	6
38	4	5	5
41	4	5	6
44	4	5	5
51	4	5	5
59	4	5	5

In the course of further research, it was necessary to find out whether using more than 30% of other methods affects training efficiency and concentration when performing. Thus, there were offered zero (H_0) and alternative (H_1) hypotheses and calculated the correlation coefficient (Table 2):

H_0: incorporating mental practice into the learning process does not improve training effectiveness and concentration during performance,

H_1: incorporating mental practice into the learning process improves training effectiveness and concentration during performance,

Table 2. Correlation calculation

		efficiency	**concentration**
efficiency	correlation coeff.	1	0.577
	p-value		0.134
	number	8	8
concentration	correlation coeff.	0.577	1
	p-value	0.134	
	number	8	8

Since $r = 0.577$, a definite positive correlation is identified, and it can be concluded that with a probability of 95%, the null hypothesis can be rejected, and the alternative hypothesis accepted; there is a moderate relationship between training efficiency and concentration during

a performance. Asking similar questions and processing data in other groups, it was concluded that there is a moderate relationship between training effectiveness and concentration in each of them. The highest correlation coefficients were in the fourth question about the plan before the start of training (0.595) and in the sixth question about the simulation in the mind (0.592). The lowest correlation coefficients were in the third question on imagining movements (0.500) and in the fifth on the connection of images with interpretation (0.500).

Analyzing the results of the first stage of the research, it is possible to identify several trends related to the aspects of playing brass instruments. As a first tendency, there should be mentioned a relatively low daily length of practice sessions in most cases, and although a direct question on the justification of practice duration was not asked, the response to other questions can be seen as indirect answers. Both the monotonous holding of the instrument, which is mentioned among other non-ergonomic movements in more than a half of the respondents' answers, and the tension, which is often or sometimes felt by 94% of the respondents, could be the main reasons for the practice duration. This conclusion is also confirmed by another result of the questionnaire, and it is that 92% of respondents include other, not requiring to hold the instrument methods in their practicing process.

An important aspect of playing a brass instrument to be emphasized is sound, with most respondents noting that hearing or imagining a sound before playing it on the instrument is of great or moderate importance, as well as the ability to often or sometimes sing a melody before playing it on an instrument. There were no negative answers to the latter question. From these results it can be concluded that they are sounds and their accurate hearing which are the basis of playing brass instruments as a whole, and there should be paid attention during the training process.

Description and analysis of the Results of the second stage of the study

In order to test the relevance of theoretical findings in practice, at the second stage of the research a statistical or null hypothesis was formulated on the basis of the research question and the results of the first stage, and it was as follows: the inclusion of mental practice in learning improves training efficiency and concentration. An alternative hypothesis was also accepted, namely, the inclusion of mental practice in the learning process does not improve the effectiveness of training and concentration during performance. The results of the second stage of the study were analyzed using continuous comparative analysis, and the aim of the second stage was to process the results and accept or reject the null hypothesis accordingly.

The duration of the research was between 7 and 20 days, depending on the participant's possibilities and wishes, with no observation or counseling taking place during the time. The study ended with a questionnaire consisting of 28 questions mostly related to self-assessment, so during the processing of the results, a table was created (Table 3) with the answers of each of 7 PMP participant (A, B, C, etc.). As the PMP was developed in the five steps, the final questionnaire highlighted those steps of sound, movement, Centering, interpretation and imagination.

Table 3. Evaluation of Program of Mental Practice

	A	**B**	**C**	**D**	**E**	**F**	**G**
Amount of days	11	18	18	14	7	20	20
Practice time before PMP (h)	2.5	2	1	3.5	2	3	2.5
Practice time during PMP (h)	2.5	3	1	4	2.5	3.5	2.5
% of PMP included in daily practice time	20	33	20	12.5	20	20	20
Sound (evaluation, %)	70	90	78	100	12	50	70
Movement (evaluation, %)	50	90	65	100	26	60	60
Centering (evaluation, %)	30	60	84	–	–	–	30
Interpretation (evaluation, %)	40	70	79	100	42	50	76
Imagination (evaluation, %)	30	95	67	100	65	70	70
Concentration before PMP (evaluation, %)	50	65	55	90	20	20	60
Concentration during PMP (evaluation, %))	100	75	80	100	29	45	73
Concentration during performance (evaluation, %)	70	60	90	110	76	70	60
% of performance potential	60	75	80	95	14	70	–

The table clearly shows the answers of each participant, with each step that the participant had included to their training process before taking part in PMP, are marked in light gray. The numbers in each of the fields represent how the participants rated their performance, while the "–" sign means that the participant did not take that particular step. The PMP steps after which the participants felt significant improvement of their practicing process or performance, are marked in dark gray.

As in the first stage, the questionnaire was designed in six parts, including five PMP steps and general information. Participants were also asked to evaluate the PMP and express their views on it. In the first part, obtaining information about the participants' training habits, it was found that the duration of training before the start of the program varied from 1 to 3.5 hours. During the study, four participants managed to find additional time to devote to the exercises developed within the program, while the others took away time from their regular practice time.

The most successful and positively evaluated were the first two steps of PMP, namely, sound and movement, after which all participants saw positive changes in their play. In the first step, the participants imagined the best possible sound of their instrument, later trying to approach this ideal in a real performance. All participants saw improvements in their playing in a short period of time, most often as early as in five days, with improvements in tone quality, intonation, phrasing, register and sound accuracy. In turn, the performance at the second step differed between the participants – some preferred singing and physical movements without an instrument, while others imagined both movement and sound. Similarly in the implementation of this step, all participants saw improvements, admitting that it helped to become aware of their body as a whole and pay more attention to easier maneuvering without tension, correct body position and more control. The third step, which offered Centering exercises, was chosen not to be performed by three participants, while the rest described this step as the most difficult of all because it required a lot of mental energy, however they believed that training this step over a longer period of time could help improve their concentration. The next step was interpretation, in which the participants approached its very creatively, making stories and building images for their pieces. To some extent five of the participants had done it before, with four of them acknowledging that the stories they had created played an important role in performing the musical composition. In the final phase of the study, the PMP participants were asked to perform a piece they had practiced during PMP. Six of the seven participants were very positive about the performance, emphasizing a better degree of preparedness, a higher ability to concentrate and more freedom on the stage. Importantly, absolutely all of the participants rated

their concentration after participating in the PMP higher than before its start, as well as in five cases, the concentration during the performance was evaluated at 70% or higher.

Summarizing and analyzing the results of the second phase of the study, it is concluded that the alternative hypothesis can be rejected and the null hypothesis can be accepted, and it is that the inclusion of mental practice in the learning process improves training efficiency and concentration during performance.

Conclusions and Discussion

Analyzing the results of the empirical part on the potential of mental practice in the process of music learning, it can be concluded that the inclusion of mental practice in the daily practicing process has a positive dynamics of training efficiency and improved concentration overall. In general, in both stages of the study, several pronounced trends were observed in connection with the supplementation of daily practice with elements of mental practice, with the first two of the five PMP steps – sound and movement – were rated the highest. According to the results of the survey, the brass instrument players consider sound and hearing it in the mind before playing as one of the most important factors in the instrument playing. Training this step, the PMP participants saw the biggest improvement in terms of tone quality and phrasing, though with overall stability. Further, movements and their various combination with singing, sound imagination, finger or hand training without an instrument or imagining them mentally were also highly evaluated and recognized by the PMP participants as playing an important role in both preparing for a performance and overall body control and stress reduction. The third step of the PMP, Centering, was considered the most difficult and in some cases useless as at first, no impact on the training process can be felt. Although the desired result was not achieved, those participants who chose to train this step also want to continue learning it, which suggests that it is an important aspect of the potential of playing instrument. Positive dynamics was felt in the interpretation and imagination steps, with the analysis in the first stage of the research, as well as in its second stage, demonstrating the impact of the steps on both the effectiveness of training and the quality of performance. Then partial fulfillment of the mental practice requirements could be explained by the fact that learning a composition involves habitual behavior and it is difficult to change it, although the respondents consider the change effective.

Overall, the participants in the PMP study saw a number of positive improvements in their practicing process, the main ones being better

organization, higher concentration and better control over the body. Due to time constraints and a large amount of information, many of the PMP steps were not fully developed in individual practice, however, all PMP participants expressed a desire to continue working on them individually. Analyzing the results of the research, it can be concluded that mental practice contains pedagogical potential and is a resource in playing brass instruments:

1) mental practice in combination with physical practice is one of the most effective learning methods that can increase training efficiency and concentration, assist in changing behavior, increase training duration, promote better control of mental processes in general, as well as help to avoid injuries that occur during training,
2) the inclusion of a program of mental practice (PMP) in the daily practicing process significantly improves the overall level of concentration, stability in both practicing and performance, as well as provides an opportunity to increase the training duration,
3) identifying the potential of mental practice, it was concluded that the inclusion of mental practice in the learning process improves the effectiveness of training and concentration during performance.

Although the study found a significant correlation between the inclusion of mental practice in the daily practicing process and the improvement of training efficiency and performance quality, due to the limitations of this study, its results are not generalizable and can be only considered as trends. Thus,

- the topic is not sufficiently understood in the relevant (brass instruments) sector,
- no industry-specific theoretical literature was found on mental practice in playing brass instruments,
- only one study was found on the potential of mental practicing for playing brass instruments,
- in the first stage of the study, there was no direct link between the questions in order to establish the relationship between the use of elements of mental practice and the effectiveness of training / concentration when performing,
- there was only a small number of participants in the second stage of the study ($n = 7$),
- both overall time for the implementation of the second stage of the study as well as additional time for the participants to devote to PMP were limited,
- in the second stage of the study, various important performance-related factors, such as stress, health state, physical fitness, and audience size, were not taken into account.

Further research could continue the discussion of the raised questions, and it should expand on such dimensions of the study as the number of participants and the allocated research time. Secondly, the PMP methods should be divided into time periods, and the amount of information to be acquired in each of the steps should be limited. The third is participation in the training of the program participants, thus expanding the boundaries of this research.

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