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ERGONOMIC CONTEXT OF FORMING TECHNICAL SKILLS FOR PLAYING PERCUSSION INSTRUMENTS

The study highlights the issue of forming technical skills for playing percussion instruments from the perspective of an ergonomic approach. It was noted that this problem hadn't been considered in terms of ergonomics. At the same time, it is found that such a methodological approach is used in various fields of science. The reasons why ergonomic knowledge was not widely used in the field of instrumental performance were noted. The purpose of the article is to determine the content of the ergonomic context of forming technical skills for playing percussion instruments, to identify ergonomics problems and to reveal ergonomic components, i.e., qualities that should be given special attention by teachers of the specialty "percussion instruments" during professional training.

The state of elaboration of the ergonomic problems and their influence on the further development of technical skills for playing percussion instruments is analyzed; the experience of colleagues-percussionists abroad regarding their approach to the ergonomic component of the performance process was noted. The concepts of "ergonomics" and "ergonomicity" have been clarified, and the essence of the latter lies in the ratio of the obtained performance result to the costs that are used during music-making, in fact, in how much the effort spent is proportional to the achieved result. Using interdisciplinary knowledge, a number of related concepts of ergonomics have been identified. It is emphasized that the term "comfort" is not always ergonomically appropriate in the method of forming technical skills in the field of instrumental performance. For the first time, a range of qualities, in particular efficiency, productivity and safety, which determine the content of the ergonomic context of forming technical skills for playing all percussion instruments, has been singled out, and their essence has been briefly characterized.

Key words: technical skills, learning to play percussion instruments, methodological approach, ergonomics, instrumental performance.

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ЕРГОНОМІЧНИЙ КОНТЕКСТ ФОРМУВАННЯ ТЕХНІЧНИХ НАВИЧОК ГРИ НА УДАРНИХ ІНСТРУМЕНТАХ

Дослідження присвячено висвітленню проблеми формування технічних навичок гри на ударних інструментах з позиції ергономічного підходу. Відмічено, що вирішення означеної проблеми в річці ергономіки практично не здійснювалось. У той же час виявлено, що такий методологічний підхід використовується в різних галузях науки. Відзначено причини, у зв'язку з якими ергономічні знання не були практично використані в галузі інструментального виконавства. Метою статті є визначення змісту ергономічного контексту формування технічних навичок гри на ударних інструментах, виявлення проблем ергономіки та розкриття ергономічних компонентів, тобто якостей, на які має бути спрямована особлива увага викладачів спеціальності «ударні інструменти» під час професійного навчання.

Проаналізовано стан дослідженості ергономічних проблем та їх вплив на подальший розвиток технічних навичок гри на ударних інструментах; відзначено досвід колег-ударників за кордоном щодо їх підходу до ергономічної складової виконавського процесу. Уточнено концепти «ергономіка» та «ергономічність», причому сутність останнього полягає у співвідношенні отриманого виконавського результату до витрат, які застосовуються під час музичної гри, власне у тому, наскільки є пропорційними витрачені зусилля досягнутому результату. Використовуючи міжпредметні знання, виокремлено низку споріднених ергономічності понять. Наголошено, що термін «комфорт» не завжди ергономічно доцільний у методиці формування технічних навичок в сфері інструментального виконавства. Уперше виокремлено коло якостей, зокрема ефективність, продуктивність

та безпека, які визначають зміст ергономічного контексту формування технічних навичок гри на всіх ударних інструментах, та стисло схарактеризовано їх сутність.

Ключові слова: технічні навички, навчання гри на ударних інструментах, методологічний підхід, ергономічність, інструментальне виконавство.

Introduction. In the modern world, in any sphere of human activity and its creation, ergonomics occupies an important place. Design of products, interiors, organization of the workplace, as well as design of special work tools and clothing in production require analysis and application of an ergonomic approach. Modern knowledge of ergonomics has not bypassed learning and performing on percussion instruments. Ergonomic aspects play a significant role in the process of formation and development of a performer's technical skills. Minimization of expended effort, saving energy during performance, absence of excessive muscle tension – this is a small list of tasks that performers and teachers in the field of “percussion instruments” should strive for during the training process.

Previously, due to the lack of necessary stands with a certain height for membrane instruments, a comfortable and convenient chair for a drummer or timpanist, various devices for adjusting the height of pitched keyboard percussion instruments, certain stands for xylophone, marimba for the youngest performers, all this led in the process of performance to serious problems related to mastering the art of playing these instruments. Today, based on the performance and pedagogical practice of playing percussion instruments, there is often detected a problem with the application of scientific knowledge on ergonomics. Moreover, even with the necessary equipment and modern designs, some teachers do not pay attention to the correct position and posture behind the instrument, based on the individual age and anatomical and physiological features of the learner. Thus, being part of the jury of the national and international competitions in Ukraine, the author of this study, during the contestants' performances, noticed significant problems regarding the correct position of the musician in relation to the instrument, the placement of his feet, the wrong position of the body, the roundness of the back, the wrong placement of the hands and so on. All this ultimately affects the quality of playing, makes it impossible to perform optimally various strokes, use playing techniques and causes excessive tension in the parts of the upper or lower performing apparatus. In this regard, the study of this problem in the context of learning to play percussion instruments is very important for the optimal formation and rapid development of technical skills for playing percussion instruments.

Analysis of research and publications. Despite the practical importance of this issue for performance,

learning to play percussion instruments and musical performance in general, this research topic in the music field has not received proper theoretical justification. Furthermore, in the methodological literature devoted to the method of learning to play musical instruments, the ergonomic context of performance is either not covered at all or mentioned indirectly. Thus, in V.K. Stetsenko's “Methodology of learning to play the violin”, in the paragraph on “Freedom and naturalness of playing movements”, the author notes that one of the important tasks of pedagogical work is “mandatory shaping of such playing movements, in which an essential condition will be *the minimum consumption of muscle energy, the maximum possible energy saving in the production of each movement*” (Стеценко, 1982: 6) (our italics – G.O. Ralo). In turn, M.A. Davydov, the author of “The theoretical foundations of the accordion player's performance skills formation” speaking about the peculiarities of sound creation on the accordion, notes that “with forte, the accordionist can improve the chordal technique by saving *muscle energy and the magnitude of movements* in the same way as in small technique, i.e. *without excessive swing, additional weight of the hand or inclusion of the mechanism of auxiliary movements of the entire apparatus*” (Давидов, 1997: 135) (our italics – G.O. Ralo).

Note that a more detailed study of the essence of ergonomics, in particular, pedagogical ergonomics, on which the author of the article relies, is devoted the educational and methodological manual “Ergonomics” written by O.H. Hervas. In particular, the author not only presents formation of ergonomics as a separate scientific discipline from a historical perspective, sections of her work are devoted to the theoretical foundations of ergonomics and the essence of pedagogical ergonomics, ergonomic analysis of technological processes and production equipment, highlighting the ergonomic approach to work organization and other issues (Гервас, 2011).

To determine the content of the ergonomic context of forming technical skills for playing percussion instruments, the author applied knowledge from various fields of science, which are reflected in the works of such researchers as H.A. Misko (Місько, 2020), O.I. Momot and A.O. Demchenko (Момот, Демченко, 2013), N.V. Rybachuk, T.O. Zhurko and Yu.I. Hanziienko (Рибачук та ін., 2015), O.H. Hervas (Гервас, 2011). In addition, to clarify the inte-

interpretation of the concepts of “ergonomics”, “ergonomicity”, the author relied on the definitions given in various reference literature (Білодід, 1980; Семотюк, 2008).

The purpose of the work. The presented study aims to determine the content of the ergonomic context of forming technical skills for playing percussion instruments, identify ergonomic problems and reveal ergonomic components, i.e., the qualities, which should be the focus of teachers’ special attention in the specialty “percussion instruments” during professional training.

Main layout. Ergonomics plays an important role and covers all the areas of human life. Arising in connection with the emergence of problems related to the operation of new technology and the urgent need to adapt a person to new complex technical devices, taking into account his capabilities, which could not be solved using the knowledge of only one science or certain sciences, it contributed to joining the efforts of scientists from various fields – anatomy, physiology, psychology, occupational hygiene, design aimed at improving the efficiency of human activity, ensuring labor productivity and its safety.

In order to determine the list and content of the qualities that make up the ergonomic context of forming technical skills for playing percussion instruments, it is appropriate, in our opinion, to clarify the term “ergonomics” itself. Taking into account the above mentioned, we find it necessary to consider its interpretation in the reference literature and peculiarities of its use in various fields of human activity.

In the primary sense, the science of “ergonomics” is related to the study of the effectiveness of the “man-machine-production environment” system functioning and its optimization, taking into account the anthropometric, psychophysiological characteristics of a person and the properties of equipment.

Thus, in the Dictionary of Ukrainian language edited by I.K. Bilodid, the term “ergonomics” is defined as “the science that studies the permissible physical, nervous and mental loads on a person in the process of work, the problems of optimal adaptation of the surrounding conditions of production for effective work” (Білодід, 1980: 682).

In the Modern Dictionary of Foreign Words O.P. Semotiuka defines the term “ergonomics” as “a field of knowledge that studies labor processes with the aim of creating the best working conditions” (Семотюк, 2008: 228).

Deserves attention the definition of the term provided by the International Council of Designers (1962), cited in the educational and methodological manual “Ergonomics” by O.H. Hervas. It is inte-

preted as a “scientific-theoretical and scientific-experimental discipline that investigates the psychophysiological factors of human interaction with various means of activity in conditions that require a person’s nervous reactions to circumstances that are constantly changing” (Гервас, 2011: 10).

In turn, in the educational and methodological manual “Ergonomics” O.H. Hervas reveals the essence of the term “pedagogical ergonomics” which is defined as “a direction in modern pedagogy that deals with the comprehensive study and design of the pedagogical activity of the teacher and the educational activity of the student in the system “teacher-student-educational environment” in order to ensure its effectiveness” (Гервас, 2011: 22).

At the same time, along with the term “ergonomics”, the term “ergonomicity” emerges when we are talking about a specific technical device, vehicle, interior item in the context of determining suitability for their use by a person.

Thus, the State Standard of Ukraine defines “product ergonomics” as “the property of a specific product, which consists in matching its technical properties with the ergonomic needs (requirements) or properties of the human user (consumer)” (Державний науково-дослідний інститут, 1995: 8).

In turn, just as in other types of activities, formation of technical skills to play percussion instruments must also necessarily take place on the basis of an ergonomic approach, and the mastery of each group of skills must correspond to ergonomic indicators.

Based on modern practice, the author’s personal experience as a participant and teacher of various master classes in the countries of Western Europe, it was noticed that teachers and performers on various percussion instruments attach great importance to the issues related to the ergonomics of performance. So, for example, during his master class on October 21, 2022, as part of the “X Ogólnopolskie Warsztaty Perkusyjne”, which were held in Gdańsk during October 19–21, 2022 for students of junior and senior school age (X Ogólnopolskie Warsztaty, 2022; Ogólnokształcąca Szkoła Muzyczna, 2022), artistic director of this event, professor, doctor habilitowany, percussionist, head of the department at “Akademia Muzyczna im. G. i K. Bacewiczów” in Łódź Piotr Sutt, focused attention on the performer’s posture and also determined the important points of his placement behind the instrument (snare drum).

In addition, during concert performances and private meetings, it was noticed that performers and teachers of percussion instruments, in particular, snare drum, abroad attach great importance to the correct instrument height regulation,

as well as the appropriate angle of the snare drum inclination. During master classes held within the events aimed at cultural exchange and cooperation between South Korea and Poland, in particular, a percussion concert at the “Centrum Kultury Koreańskiej” on April 3, 2014 (Programy Korean Cultural, 2014) a marimba performer, a winner of the prestigious 6th World Marimba Competition in Stuttgart in 2012, Semi Hwang during her speech at the Uniwersytet Muzyczny im. Fryderyka Chopina focused special attention on the appropriate height of marimba and a certain position of hands for instruments. In particular, during classes, she recommended the performers to place additionally the stand under instrument so that their hands were not directly parallel to the floor but placed in such a way that the hands hang down a little, in order to achieve greater freedom and movement speed.

During the open lessons dedicated to the art of playing the drum set conducted with students of art schools by the assistant professor of Odesa National Music Academy O.M. Ralo, it was focused on the teacher’s important attitude to the location of the “drum set complex” itself, the correct definition of tom-toms and snare drum height, the distance between instruments, as well as their placement in relation to the performer himself, the position of his body and hands behind the drum set. However, it should be noted that in their performances at master classes, both leading performers and teachers rely mainly on personal experience, on empirical knowledge gained both in performance and pedagogical practice, while there is no reliance on achievements in the field of ergonomics in other fields of science.

Note that to reveal the ergonomic context of forming technical skills for playing percussion instruments, it is necessary to determine which qualities characterize the concepts of “ergonomics” and “ergonomicity” better. So, in various sources, based on the description of the ergonomics of something, the words: efficiency, convenience, comfort, safety appear most often.

At the same time, O.H. Hervas, defining complex criteria for the optimality of pedagogical ergonomics, which express the degree of effectiveness of its system and compliance with human psychophysiology, singles out accuracy, reliability, productivity, as well as safety for the teacher’s and student’s health, the level of tension and fatigue, the emotional impact on the teacher’s and student’s activity (Гервас, 2011: 23).

In connection with a significant number of qualities inherent in ergonomics, in our opinion, it becomes necessary to specify the main of these concepts and determine their essence. First it is necessary to focus

on the concept of “efficiency”. It should be noted that the category “efficiency” is widely referred to in the scientific research in the economics (Місько, 2020; Момот, Демченко, 2013; Рибачук та ін., 2015).

Based on the analysis of scientific sources, it should be noted that scientists have not reached a consensus on the meaning of the concept. Thus, studying approaches to determining efficiency in the interpretation of various authors, O.I. Momot and A.O. Demchenko indicate a circle of scientists who associate this concept with a certain effect, result, equating it with the concept of “effectiveness” (Момот, Демченко, 2013: 209).

At the same time, H.A. Misko, studying the essence of the concepts of “efficiency” and “effectiveness” in management, provides a clear demarcation of their meanings, which cannot be considered synonymous. In particular, in her work, she notes that “efficiency reflects what result is obtained from a unit of costs, or what costs are incurred per unit of result (depending on the type of indicator), which characterizes costs effectiveness. Efficiency is calculated as the ratio of results to costs. Effectiveness is the degree of achievement of the planned result, characterized by such conclusions as “fulfilled” (effective), “not fulfilled” (not effective), “not fully fulfilled” (insufficiently effective)” (Місько, 2020: 100).

Clarifying the interpretation of the concept of “efficiency” makes it possible to determine its essence in the context of performance and learning to play percussion instruments, which consists in the ratio of the obtained performance result to the costs that are used during playing, i.e., how proportional is the effort spent to the achieved result.

The second component of the concept of “ergonomics”, along with “efficiency”, most often appears “productivity”. Usually, productivity is understood as the ratio of the number of products produced and the time used, the costs applied to their production.

Note that productivity is a very important component of the performance process. So, the extent to which the formed skill contributes to the productive growth of performance on percussion instruments can be determined by the application chosen by a musician, “connection” and use of certain parts of the hand during tremolo playing, various strokes, use of a certain localization zone on percussion instruments, etc.

Another interesting concept, in our opinion, is “comfort”. In a general sense, the concept of “comfort” is associated with such words as convenience, coziness, calmness. So, in everyday life, we use this word in relation to a comfortable seat or a household item, to comfortable clothes.

In the process of forming technical skills for playing percussion instruments, comfortable is not always the equivalent of correct. Thus, during the joint work in the lesson of the teacher and the student, aimed at mastering the performing grip, in particular, formation of grip skills, the student, practically in 99 % cases, tries to hold stick/mallet or sticks/mallets in his hand in such a way, that it seems comfortable to him. However, this choice of the grip, in most cases, is suboptimal and non-technological and it ultimately cannot contribute to the formation and development of grip and other skills. Based on this, the concept of “comfort” cannot always be attributed to the content of the ergonomic context of forming technical skills for playing percussion instruments.

“Safety” is one of the key concepts that contributed to the emergence and development of ergonomics as a separate science. Safety is manifested both in the technological product and in its impact on the human body, as well as in its safe operation by a person, which contributes to the minimization of injuries.

This concept, both in production and in other types of activities, is a very necessary component of the ergonomics of the formation and development of technical skills for playing, which is aimed at minimizing such injuries as overplaying the hand, excessive clamping of the hand, fingers, prevailing tension in those parts of the performing apparatus, which do not have the main function in the performance of the assigned task, etc. Thus, this indicator becomes extremely important and necessary and should constitute an ergonomic component of forming technical skills for playing percussion instruments.

Summarizing the above meanings of the concepts that make up “ergonomics” and “ergonomicity”, we can distinguish three main qualities that make up the content of the ergonomic context of forming technical skills for playing all percussion instruments: efficiency, productivity, safety.

Conclusions and suggestions. Therefore, the author’s development of this problem allowed us to draw the following conclusions, which can be divided into certain blocks.

1. The analysis of the scientific and methodological literature showed that the topic of consideration of the ergonomic context in musical art and pedagogy, in particular in the field of instrumental performance and learning to play percussion instruments, was not properly reflected. The study of the issue of forming technical skills for playing percussion instruments from the position of an ergonomic approach was not conducted at all. At the same time, it was found that ergonomic topics were reflected in various fields of science.

2. The reasons why ergonomic knowledge was not sufficiently applied in the field of instrumental performance and learning to play percussion instruments in the past in Ukraine are noted. The current state of ergonomic problems and their influence on the further development of technical skills for playing percussion instruments are analyzed. At the same time, the experience of fellow drummers abroad regarding their approach to the ergonomic component of the performance process was noted.

3. In the process of work, the concepts of “ergonomics”, “ergonomicity”, as well as the concepts highlighting the qualities that make them up, were clarified, using knowledge from various fields of science, in connection with which a circle of qualities that determine the content of the ergonomic context of forming technical skills for playing all percussion instruments (efficiency, productivity and safety) was outlined.

New considerations regarding the further development of the problem emerged. Thus, the author of this article considers to be promising the study of topics dedicated to a more detailed and specific consideration, description of the ergonomic context on the examples of certain groups or certain types of skills.

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