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## Simplest health-improving training means, forming “health-protecting respiratory technology” at physical culture lessons and providing students’ personality self-development

*Svetlana A. Fazleeva, Anatoliy A. Opletin, Valeriy D. Panachev\*, Leonid A. Zelenin*  
Perm National Research Polytechnic University  
Perm, Russia

ORCID: 0000-0003-1616-634X, fazleeva.svetlana@yandex.ru

ORCID: 0000-0002-3358-0123, opletin.a@pstu.ru

ORCID: 0000-0001-9569-1454, panachev@patu.ru\*

ORCID: 0000-0002-0292-3197, zelenindoz48@mail.ru

**Abstract:** The article considers created by us complex of innovative respiratory training devices, during which created diverse respiratory exercises are fulfilled, providing “Health-protecting respiratory technology” formation for self-development of a personality among people of different ages, including students at physical culture lessons. People, who train, gain knowledge concerning their respiration in statics and dynamics, during the exercises fulfillment ventilation increases. It creates blood flow in alveoli, the conditions for gas exchange increase in the lungs and health state improve. **Research methods and material.** We used scientific-methodical and special information sources analysis and summarizing in the research, narration, explanation, survey among the 1st-3rd course students of mining-oil industry faculty of Perm National Research Polytechnic University (Perm), in order to reveal the benefit of respiratory techniques and practices “Health-protecting respiratory technology” of personality self-development with the simplest respiratory training simulators use. **Results.** We used simple, traditional respiratory training simulators during the lessons. The respondents fulfilled different regimens of respiratory exercises. They provided vital capacity, the duration of inspiratory and expiratory breath holding increase. **Scientific novelty.** The research work considers the problem of respiratory system adaptation level improvement using the complex of original respiratory training means in a form of “health-protecting respiratory technology”. There is organism transformation process in terms of hypoxia as the way of general biological training. **Practical significance.** The complex of original respiratory training simulators helps to control the regimen of respiratory cycles, forms hypoxia process, develops respiratory function, chest flexibility, improves vital capacity, compensatory mechanisms of cardiorespiratory system, improves general fitness of organism in self-development of a personality. **Conclusion.** Physiological mechanisms of respiration stimulate self-development of a personality on training simulators, purposefully program the process of respiration in a correct way and preserve exterior structure of respiration owing to intensified inner respiratory transformation of the received information. It happens owing to nervous system plasticity. It helps to intensify respiration process, activates accessibility and improves coordinating respiratory skill.

**Keywords:** innovative complex, respiratory training devices, personality-valued qualities socialization, self-development of a personality during the process of respiration.

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### Introduction

It is impossible to live without respiration, life starts with the first breath and end with the last one- this is the base of life and health. Only a person can motivate himself, form and improve respiration with the help of simple training respiratory devices. They improve respiration function (both external and internal respiration). So called “Health-

protecting respiratory technology” provides health state improvement [1,3,8,5,10]. Psychic processes at physical culture lessons reflect dynamic reality in different forms. There respiratory trainings with the use of the simplest training devices are useful for any person, especially for people with disorders in respiratory system, motivate to social self-development of a personality [1,2,3,4,9].

The process of respiration for young and healthy students is the best way to influence psychically the consciousness in the ability to form the concepts at lectures for the laws and regularities of physical culture understanding during the process of personality self-development. Unfortunately, many students act irresponsibly in terms of own health state. It was revealed that organism gets older not at the age of 50-60, but earlier, after 20. It is seen only after 60. Psychological-pedagogical theoretical lessons help young people think of own health state, when they still have it, not when organism becomes weak and different health disorders appear, which turn into diseases. It is proved that 15% of young people, teen-agers and children are physically weak and functionally fall behind. Health-improving physical culture inspires the belief in self-development of a personality. It is reasonable for own abilities understanding in order to realize maximal development, helps to motivate to realize cognitive activity in the sphere of biological regularities of an organism. In socialization emotional-volitional component of psychic, physical and spiritual health demonstration is reflected, volitional and moral character traits, inner harmony, individual personality maturity in worldview positions gaining are formed, self-upbringing (personality self-development), deep integrative processes cognition, creative formation of a personality [2,4,6,8,9,10]. Processes of respiration in walking using the complex of simple traditional respiratory training devices in physical culture provide initial regulation of a student's behavior in scientific knowledge formation concerning respiratory organs, provide functional state of cardiorespiratory system development. Students have the desire to be popular and accepted in society. The popularity of original respiratory training means complex makes it convenient canal of influence on mass consciousness, helps to interpret theoretical material together with practical mastering of the main methods and ways in educational-training, extracurricular, independent, productive activity, in creative realization of professional and vital health-improving abilities and skills in a personality's self-development, in "Health-protecting respiratory technology" [1,2,4,9,10]. Elderly people during the lessons understand social significance of different attenuated respiratory exercises use with the help of innovative respiratory training devices. They master social principles of healthy life style. At the same time, psychic processes are caused by external training effects and nervous system stimulations. They come from inner environment of organism. They improve physical state, physical readiness, working capacity of an organism, mental activity, motivate to support and preserve own health in self-development of a personality. The simplest

respiratory original training devices emotionally prepare for the realized difficulties overcoming in respiration, volitional efforts demonstration, develop the sense of responsibility for own health, help to eliminate pain, slow down the process of organism aging and decrease the amount of used drugs [1,3,4,5,8,9].

Athletes' psychic processes in respiration training have different speed and intensity, depending on the characteristics of external influences of simple respiratory training means, develop psychic state of the training personality's self-development, activate lung ventilation, which mainly depends on depth and frequency of respiration. Athletes' each psychic characteristic is formed with different regimens of respiratory muscles with the help of the simplest training devices, gradually strengthens in practice; the depth of breathing is defined by the lungs capacity and functional abilities of respiratory muscles, it depends on external respiration apparatus. Respiration depends on the volume of the breath, becomes deeper, additional difficult structural components are included: clavisternomastoid muscles and other muscles. Defining selectivity, connected with the level of person's activity, is realized by created original respiratory training simulators, exhalation is fulfilled actively, inner and external intercostal muscles, front abdominal wall muscles are included into work [2,3,4,5,6,10]. Intensive respiratory trainings in "Health-protecting respiratory technology" form traits of character during intensified walking working on the simplest respiratory training devices. During this process very often we see external respiration decrease. It means ventilation decrease, hypoxemia appears and as a result high level of hypoxia, hypercapnia resistance and good endurance of respiratory muscles are created. They influence health state, working capacity and sport activity in personality self-development. All this in "Health-protecting respiratory technology" increases physiological reserves of organism systems and a functional state of nervous system [2,4,6,7,10].

The aim of the research is the effectiveness revelation of "Health-protecting respiratory technology", which influences personality's self-development during the complex of innovative simplest respiratory training devices use at the lessons, creates artificial respiratory training environment conditions, helps to improve central nervous system, regulates the work of the functional systems of respiration, increases CO<sub>2</sub> concentration in blood owing to volitional expiratory breath holding.

Created by us 8 original (traditional) devices, respiratory training means are called physical culture simulator. The devices have their own distinctive features. They are easy to use. A person of

any age can use it, as they don't demand great efforts for creation: physical, volitional and psychological. Special respiratory practices can be fulfilled using these training simulators during the training lessons and independently, when it is necessary. These devices can be made or bought. Each person can afford them.

In accordance with the content and the set aim of the research we defined the following objectives:

1. Study and analyze with the help of innovative complex of the simplest respiratory training devices psychic motivation for theoretical and methodical-practical knowledge gaining. It stimulates an objective respiratory process of personality's self-development.

2. To develop and create the complex of the simplest respiratory training devices. They provide the teaching process in socialization. They support, preserve and improve own health state in life and in sport, increase functional abilities of external respiration apparatus in personality's self-development. This process is closely connected with the functions of internal and external respiratory muscles systems of "Health-protecting respiratory technology".

3. To introduce into educational process the created and constructed innovative complex of simple respiratory training devices of "Health-protecting respiratory technology".

The stages of a consequent process of respiratory actions teaching:

1. "The stage of the initial teaching respiratory actions". At this stage we see teaching respiration using simple, traditional devices. It stimulates health-improving effect. Three training simulators are used at this stage. The first device is a training-health-improving respiratory simulator "many-colored balloon for children". It is used in everyday life for respiration improvement and by the patients with respiratory organs disorders. During the training lessons created by us two complexes of special respiratory exercises were fulfilled, exhalation into the balloon was realized with resistance, during the month each week the complexes alternated. The main principle: respiration process (inhalation) is realized by nasal cavity with gradual act (exhalation) prolongation. The methods of balloon inflation were even, alternating and conjugate, where the respondents trained respiratory system – it supports general tonus of an organism and creates good health state. The aim of the training using balloon for children is respiratory system development, rehabilitation and treatment. It is preventive and therapeutic means with the simplest and safe regimen. Balloon presents an easy regimen, inhalation is realized by nasal cavity and exhalation into the balloon is fulfilled with weak resistance. The abilities and

skills of different methods of respiration process organization are formed, respiration is controlled and evaluated and personality's self-development is realized [2,4,8,9].

The second device is the simplest training-health-improving respiratory training device "Truncated breathing tube" (length - 72 cm). One end of the tube has a narrow slot  $\emptyset$  (diameter) = 1,2 cm. It is put into the mouth cavity for exhalation; the other part of the tube gets narrow and transfers into a narrow slot with diameter  $\emptyset$  = 0,7 mm. It creates a short additional respiratory resistance during exhalation. The act of respiration is fulfilled in a calm state without volitional (physical and psychic) tension, nasal cavity fulfills inhalation and exhalation is presents a moderate additional resistance into a short and narrow fricative expiratory tube, in the end of the respiratory cycle a person holds his breath (pause). This device provides physiological respiration mechanism training, respiratory system and the whole organism transfer into a new, higher level of development, with longer period of expiratory efforts making. In this case hypoxic respiration happens and the method of endogenous respiration (tissue) is mastered. Multiple mentally realized exhalation into a short and narrow slot of the tube with resistance leads to personality's self-development, to respiratory system and the whole organism recovery [3,5,6,10].

The third simplest training-health-improving respiratory training device is the same "Truncated breathing tube" (length – 72 cm) with diameter  $\emptyset$  = 1,2 cm, which is put into mouth cavity for exhalation. The tube is cone shaped, the second end has a narrow slot diameter  $\emptyset$  = 0,7 mm, with "Holiday balloon". Inhalation is fulfilled with the nose and exhalation is accompanied by a double additional respiratory resistance into a narrow fricative short tube and attached to it balloon. During this process we master special methodology of respiratory process with the intensified and prolonged exhalation, with gradually accumulated carbon dioxide in blood. There usual level is increased a little- hypercapnic chemoreceptors are stimulated and this proves that oxygen concentration (O<sub>2</sub>) in blood decreases and the amount of carbon dioxide (CO<sub>2</sub>) increases – respiration becomes more intensive, hypoxia increases (hypoxic respiration). It helps to breathe through nasal cavity. Respiratory system develops, chest flexibility increases, special methodology of more intensive and prolonged double resistance during exhalation forms endogenous respiration. Training-health-improving lessons with this training device form axiological realized attitude to independent and moral choice of being healthy [5,7,9,10].

In order to improve the effectiveness of students' respiratory system at health-improving lessons we

created the presented three original respiratory training devices. It is reasonable to use at the second stage of teaching.

1. The stage of deep, detailed respiration. The 4th training simulator is a truncated narrow tube (1m 53 cm, with diameter  $\varnothing = 1,5$  cm). It is put into the mouth cavity for exhalation. During exhalation a person overcomes the resistance of a narrow slot of the tube, where  $\varnothing$  is 0,7 mm. The apparatus in a form, diameter and length has its own characteristics, inhalation is fulfilled by the nose and exhalation is realized with resistance into a long narrow slot. Respiratory resistance is created. It provides physiological mechanisms with active biological influence of carbon dioxide on different functions of respiratory system and the processes. They happen in the whole organism. At the same time, expiratory resistance significantly improves lungs ventilation and blood circulation in alveoli. We have an optimal gas exchange in lungs. It improves blood supply of all organs and tissues. The realized exercises for respiration increase the volume of carbon dioxide in alveolar air, create hypoxia, increase the capacities of bronchopulmonary respiratory system and the whole organism, influence acid-base state regulation. It is demonstrated in the development of a harmonious activity of respiratory system and blood circulation at a central level of regulation. Here work physiological mechanisms of respiratory muscles training, spasm decreases, the possibility of small bronchi and bronchial tubes contraction decreases, bronchial passability increases. The demonstrated variant of exhalation improves drainage function of bronchi and bronchial tubes. It provides lungs purification and provides easy breathing. Respondents didn't have any difficulties with this training apparatus use, the lessons with it develop immunity system. It is able to secure airways. This training device psychologically stimulates high working capacity, strengthens organism in personality's self-development [4,5,8,10].

The 5th simplest respiratory training simulator is "Extended truncated respiratory tube" (1m 53 cm-length). The diameter of the upper part of the tube is 1,5 cm, lower – 0,7 mm, the lower part has attached "balloon". Here the organism has the training. It causes responding developing mechanisms. The organism transfers into a new state, protects new abilities, new training form. Each exhalation is realized in terms of double resistance (narrow long tube and a balloon), the power of respiratory muscles, chest flexibility actively develops, the working capacity of diaphragm and abdominal muscles increases, inner organs are massaged – hypoxia method develops. Hypoxic trainings form the way of general biological organism training, when blood circulation, microcirculation in organs and tissues improves, reserve, earlier not functioning

capillaries open and new capillaries are formed. The concentration of erythrocytes and hemoglobin increases. It improves oxygen providing function of blood. Hypoxic training of respiration provides steady transformation of biological processes, cells and organs structure and new quality of health. Held by us questionnaire survey proves self-development of a personality, aesthetic direction formation. It is positively accepted and estimated by people, who train, free, good breathing, working capacity increase, stress resistance improvement and the effects of a deep, economic respiration realization. It is a perfect means in life activity [1,4,6,9].

The 6th educational-training-health-improving training device is a "Fist". Here inhalation is fulfilled by nasal cavity and exhalation is realized by the mouth. It is necessary to press the hand close to the mouth. There the fingers and the palm form different variants of diameter, presenting a narrow slot of the tube, roughness of the palm creates different expiratory resistance. In this respiratory process two ways of respiration are demonstrated.

The 1st way (exhalation should be fulfilled freely and in a calm manner, without tension), passive: under the influence of force of gravity abdominal muscles are relaxed, the air comes out of the lungs, in the end of the exhalation abdominal wall comes to the average state, in the position between the complete chest inhalation and complete exhalation. There abdominal muscles "stop", there is no need to strain and draw them in.

The 2nd way (active exhalation). During exhalation abdominal muscles contract, front abdominal wall contracts inside toward the spinal column with tension. During such kind of exhalation abdominal muscles work, general blood circulation of an organism increases, through the capillaries of lungs system blood circulation increases, the massage of lungs takes place; lungs are affectively ventilated through the capillaries during breathing, alveolar ventilation and blood flow improve. In this connection blood flow is created in alveoli and an optimal ratio of ventilation conditions is achieved for the best gas exchange in lungs. Quick use of this respiratory training simulator belongs to axiological potential of the complex of simple respiratory training devices. They form the main features of nervous system. The complex is necessary for health improvement and preservation in personality's self-development and professional self-realization [2,6,8,10].

At the stage of respiratory system mastering and further improvement we used the 7th training simulator – "Medical mask". It is a health-improving means, it functionally influences respiratory system, trains organism for hypoxia resistance, includes natural evolution reactions, physiological mechanisms of struggle for oxygen. At a present stage

of world society development more than 2,5 years population of the whole world uses medical masks, including athletes in the training process. "Medical mask" training simulator is serves to increase conditional abilities of an organism. It effectively protects from cold streams of a freezing air of the environment, helps to fulfill several times different special respiratory exercises standing, sitting, while walking and running. Inhalation and exhalation, where waste air (carbon dioxide) is formed, stays and then its concentration increases and we have hypercapnic respiration. This device helps to protect the functions of respiratory system from carbonic oxide, bacteria, viruses, allergens, helps to avoid harmful smoke and dust and small mixtures. They are dangerous for an organism, smog after the fire, COVID-19, gas car mixtures of different consistency and etc. Repeated respiration into medical mask reflects psychic feature in overcoming external and internal difficult respiration, forms strong-willed character of personality' self-development in the realized regulation of own behavior and activity, cognitive motives and emotional processes [2,4,5,7,9].

The 8th simplest respiratory training device is a "Paper bag". For the work with it we created the complex of special respiratory exercises. The training simulator is closely pressed to the face with the hands. It helps to fulfill respiration for several times with the handled respiratory air. With every inhalation and exhalation the training respiration helps to increase CO<sub>2</sub> concentration. It goes to alveoli of the lungs and arterial blood; hypoxia is trained. It further transforms into a steady hypoxia- hypercapnic respiration. The training respiratory device "Paper bag" develops lungs and is a powerful means of immune system strengthening. "Paper bag" device helps to achieve good results of respiratory system work, high hypoxia and hypercapnia resistance, increases endurance of respiratory muscles. The training device "Paper bag" forms such qualities, as will, hypoxia and hypercapnia resistance, here the "temperament" is seen. It characterizes inborn natural features of a self-developing personality – intensity and speed of reaction, the degree of emotional sensibility and balance in the ability to adapt to internal and external respiration in the environment [1,3,4,6,10].

#### Conclusion

We introduced into pedagogical process created by us innovative original complex of the simplest respiratory devices. It forms "Health-protecting respiratory technology". The technology includes "the stage of a gradual process of teaching respiratory actions", during which we used the training complex (included three devices). At the second stage of deep, detailed respiration we presented three more

difficult training respiratory devices. At the third stage of respiratory system mastering and further improvement, we used two training devices. They during the lessons train the process of external respiration and increase hypoxic and hypercapnic respiration in personality's self-development.

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**Author's information:**

**Svetlana A. Fazleeva** – Coach-Lecturer, Perm National Research Polytechnic University, 614990, Russia, Perm, Komsomolski ave., House 29, e-mail: [fasleeva.svetlana@yandex.ru](mailto:fasleeva.svetlana@yandex.ru)

**Anatolij A. Opletin** – Candidate of Pedagogics, Associate Professor, Perm National Research Polytechnic University, 614990, Russia, Perm, Komsomolski ave., House 29, e-mail: [opletin.a@pstu.ru](mailto:opletin.a@pstu.ru)

**Valerij D. Panachev** – Doctor of Sociological Sciences, Professor, Perm National Research Polytechnic University, 614990, Russia, Perm, Komsomolski ave., House 29, e-mail: [panachev@patu.ru](mailto:panachev@patu.ru)

**Leonid A. Zelenin** – Doctor of Pedagogics, Associate Professor, Perm National Research Polytechnic University, 614990, Russia, Perm, Komsomolski ave., House 29, e-mail: [zelenindo48@mail.ru](mailto:zelenindo48@mail.ru)

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