

## Projecting Facilities for Power Exercise Teaching System

**Rustam A. Aydarov\***

Kazan Federal University, Russia

**Irina G. Kalina**

Kazan Federal University, Russia

**Nuriya Kh. Gzhemskaya**

Kazan Federal University, Russia

### Abstract

In the context of modern educational conditions, it becomes actual to solve the problem of preparation of such teaching aids that would act as an integral tool of the pedagogical technology of effective training in power exercises. The aim of the article is to present the results of the analysis of modern requirements for the didactic projection of teaching aids, to justify the demand for their design and to present a project for the integrated use of didactic tools in the training of power exercises. The study used a method of theoretical analysis and generalization of scientific and methodological literature on the issues reflecting the state of the problem of the didactic facilities projection, the theoretical foundations of training motor activities, the problems of creating and using didactic means for teaching motor activities. To determine the efficiency of the traditional methods of teaching power exercises a pedagogical experiment was established. 34 girls and 47 boys participated in the experiment. The results which showed the quality of learning the orienting basis for motor actions were obtained by testing. Results of the study. The modern requirements of the theory of projecting teaching aids indicate the need for a comprehensive design and reflection of the components of the implemented didactic system in the teaching facilities, namely: the purpose of training, the content of training, the learning process itself and organizational forms of education. Projecting these elements in accordance with the requirements presented in the theory makes it possible to implement a pre-designed didactic system in practice. The analysis of the theoretical bases of teaching motor actions shows that the process of mastering knowledge of motor actions as an indicative basis for carrying out these actions is of primary importance for developing motor skills and abilities. The obtained results of power exercises training system according to the traditional method showed the following: 70.2% of young men and 84.3% of girls reached the first level of learning the orienting basis of motor actions in power training. Indicators of the second level of learning were extremely low: only 5% of boys and 18.7% of girls reached it. The project has been created for training motor activities using such didactic facilities as an electronic educational resource and instruction cards. Each facility has its own functions in providing the stages of the educational and cognitive cycle, the use of which is designed depending on the way the group of students are organized, the forms of the educational process organization.

**Keywords:** Didactic projecting; Teaching facilities; Motor actions; Power training; Students.



CC BY: [Creative Commons Attribution License 4.0](https://creativecommons.org/licenses/by/4.0/)

### 1. Introduction

In the conditions of modern education, the role of a teacher as the main source of educational information should shift to the role of learning information mastering organizer. This task is achieved by modern training tools (Crespo *et al.*, 2016). The lack of training tools prepared with the consideration of the current requirements for their design does not allow to realize their value fully for improving the effectiveness of strength exercise teaching. In this regard, there is a need to solve the problem of such teaching aid preparation that would act as an integral tool of an effective training pedagogical technology for strength exercises (Aidarov and Kalina, 2017; Petrov, 2003).

The goal is to present the results of modern requirement analysis for the didactic design of teaching aids, to justify the demand for creation and to present a project for the integrated use of didactic tools for strength exercise teaching.

Discussions about practical ways of improving the teaching of physical education in schools or providing a better and more effective learning platform for it have always been discussed by field experts (Balchirbay, 2018). The teacher must, by providing a special program for sports-related students, train them in other sports lessons for the next week, and have a regular, common, and programmed training for any student. Unfortunately, there is no definite pattern for raising the quality of physical education and the exercise of students in schools or districts, and they are only taken into consideration during these competitions. By developing a suitable model for development, it is possible to maintain readiness for students. Accordingly, the current research has been done.

## 2. Literature Review

Performing regular exercise activities can play an important role in educating people who are physically and mentally healthy. People who suffer from premature diseases due to motor deprivation or physical inactivity, cost a lot to the family and the community (Bartoll *et al.*, 2016). Participating in regular physical activity will increase the useful life and efficiency of people. Unfortunately, the research shows that students are not in favorable condition for physical fitness. In addition, a high percentage of students each suffer from some form of physical abnormality due to lack of movement and wrong habits when walking, sitting, standing and carrying things. Which can be controlled and corrected through general exercises and corrective actions. Therefore, eliminating or reducing these defects using physical exercises is a legitimate requirement for students (Whitehead and Murdoch, 2006).

### 2.1. Physical Education

Today, societies need people who understand the meaning of collective work and effort to achieve common goals, and, to achieve such goals, pass and sacrifice others and obey the law and regulations (Tobalino-López, 2017). Physical education courses and sports fields can be effective in this regard and will develop these characteristics in students. Students who are in need, healthy and in terms of the general fitness of the body, are ready to be able to properly fulfill their daily routines, and can face the worries and psychological pressures that arise from current and future life issues (Moya-Mata and Ros, 2018). Physical fitness also helps them stay healthy from some physical damage that occurs due to lack of these abilities. Also, students gaining sports skills at different times of their lives can use such skills that do not require very intensive activities in their spare time. In addition, the seedlings, adolescents and young people by participating in healthy competitions can benefit from this way, they will satisfy their sense of struggle and supremacy. Hence, participation in these healthy competitions is a good place to focus on the surplus energy of students (Whitehead, 2010).

With the participation of students in sports teams, they can be members of a team or team and feel belonging to the group. As a result of which their classmates have special privilege. The student also experiences victory and defeat by participating in sports competitions. Which teaches such experiences that they can withstand and learn from defeat, and do not descend from proud victory. Also, physical activity requires self-esteem, in which students gain self-esteem by acquiring sporting skills and physical fitness. Movement is the basis of physical education. And physical education means the movement of knowledge through movement. The physical education course has a direct relation with other sciences, especially the educational sciences and the empirical sciences. The meanings and the information that completes physical education come from the two disciplines of science and experimental sciences. The part of physical education that involves biological aspects mainly acquires information from empirical sciences (Longmuir *et al.*, 2016).

Exercise physiological science brings the effects of movement and activity on the vital and life-giving effects of human beings more or less day by day. Exercise Physiology, by examining the effects of exercises in the human body, provides principles and approaches that can be used to raise awareness about the health of students and the community. Biomechanics also helps in the application of principled mechanics to physical activity and the correct performance of motor skills. By knowing the various devices of the human body by anatomy, the instructors can design and implement their own knowledge and programs. Sporty pathological information, in the field of sport, provides new findings to the sports community. Measurement and evaluation also allow physical education instructors and supervisors to measure the capabilities of students, and to mitigate their deficiencies (Applebee *et al.*, 2007).

### 2.2. Physical Education Teaching Strategies

1. Integrating Physical Education Courses: Combining physical education with the subjects of the subject, regardless of the extent of learning, will give students, teachers and schoolgirls an opportunity to work together in teams and teams, and to recognize the effectiveness and effectiveness of the program. They do not regard physical education and sports as games, but consider it a real lesson. Perceptual-motor skills, motor skills, non-motor skills and manipulative skills constitute the four main pillars of motor skills that can enhance the learning of other lessons and sciences in addition to upgrading sports skills.
2. Attention to Physical Education Classroom: Teacher Training Classroom is another opportunity in which, subject to the requirements contained in the guidebook content, you can create conditions for the development of student literacy. In elementary school students, in addition to physical fitness, get acquainted with basic motor skills and basic skills. Teachers with happy, entertaining and active hours of schooling are able to provide conditions for the development of basic motor skills and sports and enhance the vitality and happiness of students. They do. They are expected to provide students with motoring skills in their home-classroom by providing a pedagogical training course.
3. Exercise superconducting activities: In-school sporting Olympiads, morning exercise and sports halls are among the activities that students can attend.
4. Camping and recreational activities: Providing opportunities for gaming and camping and recreational activities and adventure activities in open and fun spaces, providing personal, social and emotional skills (improving body health and well-being, increasing key skills such as thinking and communication), Motivation and interest of all students and empowering students to take responsibility for them.
5. School driving dynamics: Drawing geometric shapes and images in the courtyard and school walls will provide students with the opportunity to engage in motor activities. These shapes and images must be such

that they can create a way of thinking and movement in a way that stimulates the movement and encouragement of the students so that their adventurous spirit and thinking can be developed (Raffone, 2002).

### 2.3. Educational Content of Physical Education

In choosing the type of exercise in the elementary period, emphasis is placed on swimming and this sport is more preferable than other sports. School parents and students' parents pay a lot of attention to the fact that students learn to master swimming skills at the end of their elementary school. In the primary school, swimming is more than any other sport to learn from swimming. The overall educational content of the Physical Education course is divided into six main areas as follows (Ross, 2010).

- 1 - Games (Playing Games)
- 2 - Gymnastics (smooth movements)
- 3 - Rhythmic movements (dance)
- 4 - running, jumping, throwing (basic movements)
- 5 - Moving, Falling, Driving (Basic Gestures)
- 6 - swimming

In all of the above topics, students try to work independently with one or more games; organize independently in a game and play sports with team, team and team; comply with regulations and instructions; perform the tasks performed in addition to the above, students should be familiar with a variety of sports. The topics offered by the Ministry of Education are 13 cases where physical education is one of them, which pays a lot of attention and is one of the seven core courses, which is part of the curriculum for compulsory education. Essential subjects are taught in each province. Reading, writing, and mathematical skills are one of the core competencies of the elementary period (Ross, 2010).

### 2.4. Educational Content, Educational Assistance and Assessment of Physical Education

It is the responsibility of the Education Directorate of each province to determine and provide educational equipment and textbooks. Educational equipment is usually produced and produced by the private sector, and then the educational authorities will approve them. The authorities buy the equipment at the lowest price. In this way, the competition between the manufacturer's publishers to sell their products will make sure prices are fair. By the way, kids can bring their belongings from home (Webb and Pearson, 2008).

In evaluating other lessons, written examinations as well as observation of student behavior during practical and group work are used. Assignments and group activities are explicitly considered together with others. In addition, it is important to note the extent to which the students apply theoretical content to the practical stage. All of the above is considered in determining the student's final grade. There is no formal evaluation of physical education. Even in the province there is no global evaluation. But the barbing system and scoring scale have 5 values with a score of one to six which is one of the best scores.

- Run higher than standard (excellent)
- Run to standard (good)
- Run close to Standard (Medium)
- Run below standard (Low)
- To an executive that is not standard, does not meet the standard (disproved)

The grade of physical education course is relative to other lessons. The progress of each student is considered for the grade of the physical education course. The scoring method is unique and not in addition. In other words, the score of each person is given in comparison with himself and not in comparison with others (Drake and Burn, 2004).

## 3. Methods

The study used the method of scientific and methodological literature theoretical analysis and generalization to study the state of the modern theory of teaching aid didactic design, the basics of motor action teaching, the problem of didactic tool creation and application for motor action teaching.

In order to determine the effectiveness of the traditional methods of power exercise teaching, the ascertaining pedagogical experiment was used. The experimental results showing the quality of the approximate basis of motor action learning were obtained by the method of testing. Tests included the issues on the name of exercises, their purpose, classification, the composition of exercises by motor operations, the rules of performance, the requirements for efficient performance, etc.

## 4. Results and Discussion

The analysis of scientific papers on the problem of didactic design of teaching tools allowed us to identify the modern scientific basis for its solution. It is the modern theory of a textbook creation and application (Bespalko, 2008;2009). The study of the author's works, based on years of research, allowed us to summarize this theory and present it in the form of the table number 1.

**Table-1.** The generalized model of the structure and the content concerning the didactic design of training tools

Components of projection	Contents of projection procedures
<b>DIDACTICTASK</b>	
Purpose of training	Setting a diagnostic (measurable) goal using certain parameters that allow to carry out an objective control of its achievement.
Contents	Selection and description of the content of training in accordance with the goal and didactic principles (scientific, non-redundancy, visibility, consistency and accessibility). In accordance with the activity approach, the content of training reflects the approximate basis of the mastered activity (methods, algorithms, principles, rules, etc.)
<b>DIDACTIC PROCESS</b>	
Motivational stage	Preparation of motivational material, facts that contribute to the formation of a motivational-value relationship and conviction of the usefulness of the material under study
Algorithm of training	Definition and choice of learning theory. The construction of a system of tasks in accordance with the algorithm of educational and cognitive activity
Algorithm for controlling the training	Setting the way of management of educational and cognitive activity (feedback). Compiling and including tests in accordance with levels of mastering to determine the level of achievement of the goal
Organizational forms	Choice of organizational forms of training, in which the learning facility will be used

As we can see a fully designed didactic tool (Table 1) is a comprehensive information model adopted for the implementation of the pedagogical system. Design includes the preparation of four components: learning objectives, learning content, the learning process itself, and the determination of learning process organizational forms on which the learning tool will be used. A competent design of the didactic system components in accordance with the presented theory makes it possible to put it into practice. If a didactic tool is created to achieve the diagnostic goal achieved with the help of an established teaching methodology, for certain forms of the educational process organization, then it will be used as the tool of educational technology indeed. It is another matter when it is prepared only with the emphasis on the information function (an indicative stage provision), without defining what, when and how it will be used. This reduces the potential of its practical use and the achievement of specifically set goals, does not facilitate a teacher's and a student's work, does not contribute to the intensification and the quality of the educational process.

Teaching aids should not only be the carriers of training content, but also ensure the organization of educational material assimilation in accordance with a particular technology and control the assimilation of knowledge and skills. It is indicated that the textbooks of the new generation provide a complete learning process: from the setting of its goals to the reflection of the results (Gimaliev *et al.*, 2016). In other words, teaching aids should be prepared to "lead" the trainee through all stages of educational and cognitive activity: motivational, indicative, performing on the assimilation of educational material, control and correction (Ivanova and Osmolovskaya, 2016; Kmecová and Bajtoš, 2010).

For the design of modern didactic means of strength exercise system teaching, let us justify how much the solution to this problem is demanded.

It should be noted first that the system of strength exercises for boys and girls was used as the training material in the most backward tests. This is a pull-up from hanging on a high crossbar for boys and flexion-extension of arms in the rest position for girls. 26 different exercises for boys and 30 for girls were included in the systems of strength exercises for the development of the power potential of muscles participating in the tests (Korol, 2005).

The analysis of the problem state concerning the motor action teaching determined that the assimilation of the orientation basis of motor actions and the provision of this process with training tools prepared on the basis of modern information technology means is required to solve the problem of training. This ensures the minimization of time, a sufficient and a necessary completeness of motor action assimilation, a conscious and a competent execution of the movements being learned (Gaverdovsky, 2007; Kalina and Aidarov, 2017).

The results of the ascertaining experiment conducted by us allowed us to obtain valuable information that allows us to comprehend the level of motor action assimilation in strength training. These results show the quality of the approximate basis of action learning that were obtained by the method of theoretical testing. The subjects were 34 girls and 47 young men who completed the strength training program consisting of 22 training sessions. The first level of motor action assimilation (i.e., the activities performed with prompting) was reached by 70.2% of boys and 84.3% of girls. The indicators of the second assimilation level (independent performance of activities) were extremely low: only 5% of boys and 18.7% of girls reached it (Khramov, 2010).

The analysis of the obtained data, in accordance with the theory of the phased formation of knowledge and actions, indicates the following. The formation of the approximate basis of actions remains only at the stage of the material form of assimilation and is not brought to the mental one, i.e. a conscious and an independent execution. In other words, only mechanical skills are formed that are performed without a proper awareness of the entire system of conditions for the qualitative performance of motor actions. This means that a student with such a level of mastering

is not able to execute correctly the training program given to him in speech or oral form independently (without additional instructions from a teacher). Thus, the emphasis in traditional training only on the performing part of the exercises without a proper attention to mastering the orientation part did not allow to form the basis of a sufficiently conscious, technically competent performance of motor action system (Talyzina, 1999).

Without assuming an exhaustive disclosure of the design problem for the didactic structure and the content of modern teaching tools to teach the system of motor actions, let us designate some of its important points. In our opinion, in the mass practice of physical education of students the most optimal solution to this problem is the design and the application of training tools based on an integrated approach. Promising in our opinion The creation and the use of an electronic educational resource and special instructional cards (on paper), each of which has its own functionality in the provision of different stages of motor action learning cycle. They provide the process of learning the system of physical exercises in strength training, depending on the stage of educational and cognitive process, the way a group is organized during training and the forms of the educational process organization (educational and extracurricular ones).

**Table-2.** The project of training tool functionality use, at the stages of training the system of strength exercises

<b>Forms of organization</b>	<b>Within curriculum</b>		<b>Extra-curricular</b>
Types of teaching facilities	Electronic educational resource	Instruction cards	Electronic educational resource
Stages of the didactic process realized with the help of a learning facility	1. Motivational stage 2. Preliminary stage of activity 4. Control and correction stage	3. Activity performing stage aimed at mastering motor actions 4. Control and correction stage	1. Motivational stage 2. Preliminary stage of activity 3. Activity performing stage aimed at mastering motor actions 4. Control and correction stage
Ways of training stages organization	Front	Group	Individual
Types of control used	Pedagogical control of the results of automated testing for the level of mastering the preliminaries of motor skills and abilities.	Mutual control with the partner, pedagogical control over the level of mastering motor skills and abilities	Self-control through computer testing, mirror self-control of imitative exercises, pedagogical control of the results of automated testing (off-campus)

## 5. Conclusions

The design of learning tools, in its most general form, is carried out by the design of the implemented didactic system components in the learning tool: the measurable learning goal and diagnostic tools to achieve it, the didactically developed learning content, the learning process itself, implemented under certain organizational forms of learning. The functionality of the training tools should ensure the implementation of the educational-cognitive cycle stages to achieve the diagnostically set goal: motivational, indicative, performing on the assimilation of educational material, control and correction.

The analysis of the theoretical foundations of motor action development shows that the process of learning is of the key importance for their formation. A full implementation of this process contributes to the effective assimilation of motor actions, helps to avoid learning by trial and error, with unnecessary time and effort costs.

According to the traditional method, the obtained experimental results of strength exercise training system indicate a low efficiency of strength exercise learning process. The level of independent competent performance of strength exercises is reached only by 5% of boys and 18.7% of girls.

The created project of strength exercise training using an electronic educational resource and instructional cards allows to ensure the passage of educational-cognitive cycle stages, depending on the stage, the method of student organization and the forms of strength exercise training organization.

## 5. Summary

In the course of the study, the important study results were obtained concerning the issue of didactic tool development for strength exercise teaching. They reflect the general requirements for the implementation of teaching aid didactic design, the level of mastering the orienting basis of motor actions for strength training by students in the process of traditional training, the project of comprehensive provision of learning stages for strength exercise training for students under different conditions of the educational process organization.

## Acknowledgements

The work is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University.

## References

- Aidarov, R. and Kalina, I. (2017). Didactic approaches to the projection of teaching facilities: The state of the problem and the ways of solution. *Modern Journal of Language Teaching Methods*, 7(9): 343-47.
- Applebee, A. N., Adler, M. and Flihan, S. H. (2007). Interdisciplinary curricula in middle and high school classrooms: Case study of approaches to curricula and instruction. *American Education Research. Washington*, 44(4): 100-38.
- Balchirbay, M. (2018). Tourism and sport orienteering as a national-regional component in the children physical education. *Opción, Año*, 34(14): 711-32.
- Bartoll, O., García, C. and Isidori, E. (2016). The pedagogy of sport from an agonal philosophical-hermeneutic interpretation. *Opción, Año*, 32(18): 213-37.
- Bespalko, V. P. (2008). *Natural pedagogy*. Public education: Moscow. 512.
- Bespalko, V. P. (2009). *Textbook. Theory of creation and application*. Institute of School Technologies.
- Crespo, P., Ayuso, A. and Gil Madrona, P. (2016). Diagnostic evaluation in the joint teaching of social and motor skills in Early Childhood Education. *Opción, Año*, 32(7): 505 – 25.
- Drake, S. M. and Burn, R. C. (2004). *Meeting standards through integrated curriculum*. Association for Supervision and Curriculum Development: Alexandria, Virginia USA.
- Gavardovsky, Y. K. (2007). *Training in sports exercises. Biomechanics. Methodology. Didactics*. Physical Culture and Sport: Moscow. 259-776.
- Gimaliev, V. G., Kryukova, N. I., Fatkhutdinova, A. M., Shagiev, B. V., Krasnenkova, E. V. and Goncharuk, A. J. (2016). Scientific-methodical priorities of university educational process: Didactic prototype of the electronic textbook. *Man in India*, 97(3): 1-138.
- Ivanova, E. O. and Osmolovskaya, I. M., 2016. "Electronic textbooks: Didactic aspect." In *SHS Web of Conferences* 29, 01055.
- Kalina, I. and Aidarov, R. (2017). Differentiation of students' physical load in group health-improving classes. *Journal of History of Culture and Art Research*, 6(4): 673-79.
- Khramov, V. V. (2010). Theoretical foundations and the review of the electronic teaching and methodological manual possibilities on basketball. *Physical Culture and Health*, (2): 50-57.
- Kmecová, I. and Bajtoš, J., 2010. "Didactic efficiency of the textbooks of technical education." In *Joint International IGIP-SEFI Annual Conference 2010, 19th - 22nd September, Trnava, Slovakia*.
- Korol, A. D. (2005). The dialogue-based principles of a textbook projection in a Higher School Distance Learning, *Roczniki Akademii Medycznej w Białymstoku. Annales Academiae Medicae Bialostocensis*, 50(Suppl. 2): 48-50.
- Longmuir, P. E., Boyer, C., Lloyd, M., Yang, Y., Boiarskaia, E., Zhu, W. and Tremblay, M. S. (2016). The Canadian assessment of physical literacy: Methods for children in grades 4 to 6 (8 to 12 years). *BMC Public Health*, 15(1): 767.
- Moya-Mata, I. and Ros, R. C. (2018). The image of the physical education teacher in textbooks. *Opción, Año*, 31(5): 625-41.
- Petrov, P. K. (2003). *Theoretical and methodological foundations of physical culture and sport expert training using modern information and communication technologies: monograph*. Udmurt University Publishing House: Izhevsk. 447.
- Raffone, J. (2002). *Integration the craft of writing in to physical Education*. Yale-New Haven teachers Institute. <http://www.yale.edu/ynhti/curriculum/units/2002/4/02.04.05.x.html>
- Ross, J. T. (2010). *Curriculum integration, Learning in a changing world*. ACER Press, An imprint of Australian Council for Educational Research Ltd.
- Talyzina, N. F. (1999). *Pedagogical psychology: Textbook for pedagogical institutions*. 3rd edn: The Publishing Center "Akademiya": Moscow. 288.
- Tobalino-López, D. (2017). Bullying and self-esteem in students of primary education in Peru. *Opción, Año*, 33(84): 359-77.
- Webb, P. and Pearson, P., 2008. "An Integrated Approach to teaching Games for understanding (TGfU)." In *1 st Asia pacific sport in Education conference: Ngnyawaiendiyerthoappendi play to Educate. A delaide. 21 January 2008*.
- Whitehead, M. (2010). *Physical literacy: Throughout the life course*. Routledge.
- Whitehead, M. and Murdoch, E. (2006). Physical literacy and physical education: Conceptual mapping. *Physical Education Matters*, 1(1): 6-9.