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LEGAL FRAMEWORK FOR PUPILS' RESEARCH ACTIVITY IN SCHOOL EDUCATION: EUROPEAN COMMISSION, REPUBLIC OF MOLDOVA AND GERMANY (SAXONY)

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Abstract. *To find the answers to questions nobody knows about yet, we need competences in our young generation that enable them to overcome future global problems. Research competences are considered to be a key to solving many unexpected problems. It is very important that authorities provide educational institutions with a legal framework that enables them to develop research competences in the young generation. Schools' activities can provide a good start to develop these competences by offering the students different chances to learn all the necessary skills and abilities. The article presents the legal framework that offers the possibility to carry out pupils' research activities in school education from the perspective of the European Commission, the Republic of Moldova and Germany (Saxony).*

Key-words*: legal framework, research activity, school education, curriculum, competencies, competitions.*

CADRUL LEGAL PENTRU ACTIVITATEA DE CERCETARE A ELEVILOR ÎN CADRUL ÎNVĂȚĂMÂNTULUI GENERAL: COMISIA EUROPEANĂ, REPUBLICA MOLDOVA, GERMANIA (SAXONIA)

Rezumat. *Pentru ca tânăra generație să poată găsi răspunsuri la diverse întrebări, sunt necesare competențe care să le permită să depășească în viitor situațiile generate de problemele globale. Competențele de cercetare sunt considerate a fi cheie pentru rezolvarea multor probleme. Este foarte important ca autoritățile să ofere instituțiilor de învățământ un cadru legal care să permită dezvoltarea la tineri a competențelor de cercetare. Instituțiile de învățământ pot oferi un stimul bun pentru dezvoltarea acestor competențe, creând elevilor șanse de a-și dezvolta abilitățile necesare. În articol este prezentat cadrul legal ce oferă posibilitatea de a realiza activități de cercetare cu elevii, în cadrul învățământului general, din perspectiva Comisiei Europene, Republicii Moldova și a Germaniei (Saxonia).*

Cuvinte-cheie: *cadru legal, activitate de cercetare, învățământ general, curriculum, competențe, concursuri.*

In a world of change, we need skills to help us build the new on the old foundation, which would allow us to adapt to new conditions that would facilitate the connection between different areas to find solutions for various issues, which would help to facilitate finding orientation. We believe that one of these skills that would meet the challenges of the future is research competence. Research is not only a privilege of universities, but also a basic characteristic of all human beings. Its manifestations can be observed through the skills formed during the child's development: from birth, the child shows curiosity to discover the world through senses, later through questions. Then children discover how things work around with the help of scientific knowledge, experiment to find arguments, investigate concrete cases to discover the truth, study to know and understand, inform themselves from different sources to make a complex impression on reality, research to find an answer to a question or a problem. All these activities become more complex with age and the peculiarities of age allow the choice of appropriate activities for each stage of schooling.

The importance of research activities for stu-

dents in general education derives from the principle of continuity in education, according to which the learning process is carried out at different stages, gradually, between which there is a link both from the perspective of scientific knowledge and skills formed or developed.

An education system is responsible for the development of natural human abilities, one of them being researching, which manifests itself in various forms throughout life: observation, questioning, studying (primary education), experimentation, information, investigation, discovery (education gymnasium), research (high school education). We need to pay attention to these skills and their complexity over time.

Methodology. In this article we aim to analyze whether in our countries there is interest and context for conducting research activities in the school education system. For this purpose, we have the following objectives:

1) To determine the international context that provides premises for carrying out research activities with pupils. For this we will use the method of analyzing documents issued by the EU.
2) To describe the national legal framework currently existing in the Republic of Moldova we will analyze and present aspects that refer to research activities in school education.
3) To describe the national legal framework currently existing in Germany/ Saxony (a federal state of Germany) we will analyze and present aspects that refer to research activities in school education.
4) To appreciate educational practices performed in our countries that support the research activities of pupils. For this we will briefly describe the projects carried out, the strategies used, etc.

1. European Commission

In 2015, the 2030 Agenda for Sustainable Development was adopted by 193 member states, and includes 17 objectives. Objective 4 refers to Quality Education and the promotion of lifelong learning opportunities for all [13]. To achieve this goal it is necessary to develop such skills that make it possible to learn throughout life. After this year, at European and national level, educational policies have included ways to achieve quality education from the perspective of lifelong learning. Next, we aim to pursue in various policy documents the interest in research competence.

The Official Journal of the European Union (2017) specifies the area for "school development and excellence in teaching" the following priority action: "enriching learning experiences while supporting effective use of digital technologies and encouraging activities that link learning with real-life experience, for instance through project- and problem-based learning, on-the-job experiences or involvement in local community activities" [9]. Thus, we can mention the interest for learning related to real life experience, as well as for the accomplishing of projects and problem solving.

In 2019 the European Commission identifies 8 key competences needed for lifelong learning [p.5, 7]: 1) literacy competence, 2) multilingual competence, 3) mathematical competence (a) and competence in science, technology and engineering (b), 4) digital competence, 5) personal, social and learning to learn, 6) citizenship competence, 7) entrepreneurship competence, 8) cultural awareness and expression competence. Each of these key competencies consists of knowledge, skills and attitudes. Research competence is not directly included in this list, we can see that its list of skills is complemented by the abilities of several key competences. Here are some specific skills for these competencies related to a research process:

- Literacy competence (1) involves such skills as recognizing and using different sources of information, searching for, collecting and processing information, making arguments, including critical thinking and the ability to evaluate and work with information [p.6, 7].
- Competence in science, technology and engineering (3b) requires the ability to understand science as a process of investigation with specific methodology, but also skills to formulate and verify hypotheses, experiment, use technological tools, formulate scientific reasoning [p. 9, 7].
- The fifth key competence (5, personal, social competence and learning to learn) involves skills for reflection and decision-making, collaborative and individual learning, persevering and organizing one's own learning, evaluating and sharing it [p. 11, 7].
- Entrepreneurship competence (7) is based on creativity, strategic thinking, problem solving, critical and constructive reflection, innovation [p.13, 7].

Thus, we notice that the list of skills specific to key competencies includes skills specific to research competence. We could say that a research involves

the combination of several aspects, derived from key competencies:

- ✓ sources of information and arguments;
- ✓ science and reasoning;
- ✓ own learning and reflection, self-organization;
- ✓ actions and creativity, innovation.

But this does not mean that we will develop the research competence together with the key competences nominated, because research knowledge is specific and is learned in a research process and cannot be acquired through other competences.

In order to develop research competence, it is necessary to create favorable educational contexts, programmes aimed at learning science as a process of investigation and innovation, a legal context for carrying out research-based activities. At European level, we have identified programmes supported by appropriate funding, which provide a legal framework for carrying out actions aimed at scientific education through research. We will further identify the opportunities offered by these programmes.

The European Union's interest in education is manifested through the Erasmus + Programme, through which innovative approaches to education are produced and good practices are exchanged. The actions of this programme are aimed at recovery and innovation in the fields of education, training, youth and sport. Since 2014, this programme has provided co-financing for the eTwinning platform, which was launched in 2005 as a key action of the European Commission's eLearning Programme. The eTwinning platform is aimed at strengthening a learning community in Europe made up of school staff (teachers, principals, librarians, etc.), in order to establish collaborative relationships, develop projects and share experiences. Collaboration between schools is ensured by a secure platform – Twin Space, which is only visible to teachers and students participating in a joint project [2]. There is the eTwinning programme for European countries, but also eTwinning Plus, which is the same programme, extended, for neighboring countries (of which the Republic of Moldova is part).

Another Erasmus + funded online platform for school education is the School Education Gateway, which informs schools about European education policies and provides resources for teachers [10].

The European Commission, within the Science and Society Programme, organizes an annual Competition for Young Scientists – EUCYS, which aims for cooperation and exchange of information between young scientists, aged between 14 and 20 years. This competition accepts projects from any scientific field, which are nominated by the national organizer. Participants present both the written project and a result of the project that can be exhibited at the public exhibition during the competition. The jury consists of 18-20 internationally renowned members, who are responsible for evaluating projects. The criteria for project evaluation are as follows [5]:

- originality and creativity in the identification of and the approach to the basic problem;
- skill, care and thoroughness in designing and carrying out the study;
- following through of the study from conception to conclusion;
- reasoning and clarity in the interpretation of the results;
- quality of written presentation and ability to discuss the project with the jury members.

The written project submitted to the contest contains 5 elements [5]:

1. Text:
   The written text must describe the project;
   Maximum 10 typed pages of written text (size 10 points);
   Maximum 10 pages Annexes with illustrations: graphics, drawings, photographs;
   The text can be written in any official language of the community, but the working language of the commission is English.
2. Scientific summary:
   A one-page scientific summary containing: the purpose of the project, methods, materials, observations and conclusions.

2. Title:
   A clear and concise title in English;
   Full original scientific title in the original language.

3. Description:
   A simple description of the project in no more than 10 lines.

4. Project display:
   Display of the project on a stand with side walls (dimensions: 203 * 103 * 175).

To present the project: an illustration of the performed experiment is displayed (using materials that respect the safety of others), the screen or a support on which the essential parts of the project are displayed (working methods, demonstration materials).

The Member States and the European schools participating in the organization and conduct of

this competition are: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and European Schools (represented by Brian Goggins). The countries associated with this competition are: Belarus, Egypt, Georgia, Iceland, Israel, Norway, Serbia, Switzerland, Tunisia, Turkey, United Kingdom, Ukraine. The invited countries (2021) were: Canada, China, Japan, New Zealand, Russia, South Korea, USA [5].

Respectively, 43 countries around the world are working on research projects with students aged between 14 and 20 years, or at least these countries are involved in promoting research conducted by young people. This age category generally corresponds to the age of pupils in grades 8-12 and students in the first 2 years of college. According to research by J. Piaget, the way of thinking abstract is formed at the age of 12. And at the age of 17-18, "the highest level of functioning of mental operating structures and the manifestation of human intelligence is reached" and "adolescents are able to combine operations in different ways." J. Piaget argues that adolescents are able to combine operations in a variety of ways and reach a kind of combinatorics, specific to formal thinking, which facilitates the transition from the possible to the real [19].

The European Commission's HORIZON 2020 programme is the SCIENTIX 4 project, coordinated by European Schoolnet (a consortium of 30 Brussels-based Ministries of Education), which "promotes and supports pan-European collaboration between teachers, researchers in the field of education, decision-making and professionals in the field of science, technology, engineering and mathematics (STEM)" [12]. SCIENTIX is a multidimensional educational tool that helps to spread STEM practices, being oriented towards "a better understanding of the relationship between science and technology in practical terms'', and the activities proposed for implementation "must be implemented as research and innovation" [3].

To promote and popularize SCIENTIX among science and mathematics teachers in Europe, but also in neighboring countries, National Contact Points have been created, which are responsible for promoting ways to get involved in European collaboration activities in the field of STEM. In the Republic of Moldova the contact point for 2020-2022 is the Technical University of Moldova [11]. So, at European level, measures are being taken to promote science, promote scientific methods and research in the field of Science, Technology, Engineering and Mathematics (STEM).

Another promotional tool is the BRITEC MOOC (Bringing Research Into The Classroom) "A roadmap to citizen science education", starting with March 22, 2021, which is a course for teachers who "Provides guidelines for designing the necessary instructions and resources so that teachers can develop their own learning scenario", "to provide instructional design guidelines and the necessary resources so that teachers can develop a learning scenario of their own" [1].

The EU Commission also supports citizen science or community science through the online platform EU-Citizen.Science, launched in 2020 for the exchange of tools and resources, for the sharing of science projects for citizens in order to learn, collaborate or participate [8].

The EU Commission's programme to unite science with society is called Science with and for Science (Swafs) under the Horizon 2020 programme, launched from 2014 until now. The aim of the programme is to "make science more attractive, support society's interest in innovation and open additional research and innovation activities'', and the areas of interest are: ethics, science education, open science, public involvement in responsible research and innovation, promotion of gender equality in research and innovation [6]. This programme aims to integrate the social sciences and humanities (SSH) into Horizon 2020.

In December 2021, information campaigns are carried out on a new Horizon Europe Cluster 2 project (Culture, creativity and inclusive society), and future projects will be carried out in 3 areas: 1) democracy and governance; 2) cultural heritage; 3) social and economic transformations. All topics in this Cluster must integrate the social sciences and humanities [4].

In conclusion, we can highlight some aspects in the promotion of research activities by the European Commission:

- The legislative framework is given by the eLearning, Erasmus + and Horizon 2020 programmes;
- In order to carry out the research activity in general education, education projects are promoted within the research programmes;
- Programmes and projects are based on actions to bring science in the form of a research process in the educational environment;
- Each programme is developed through proj-

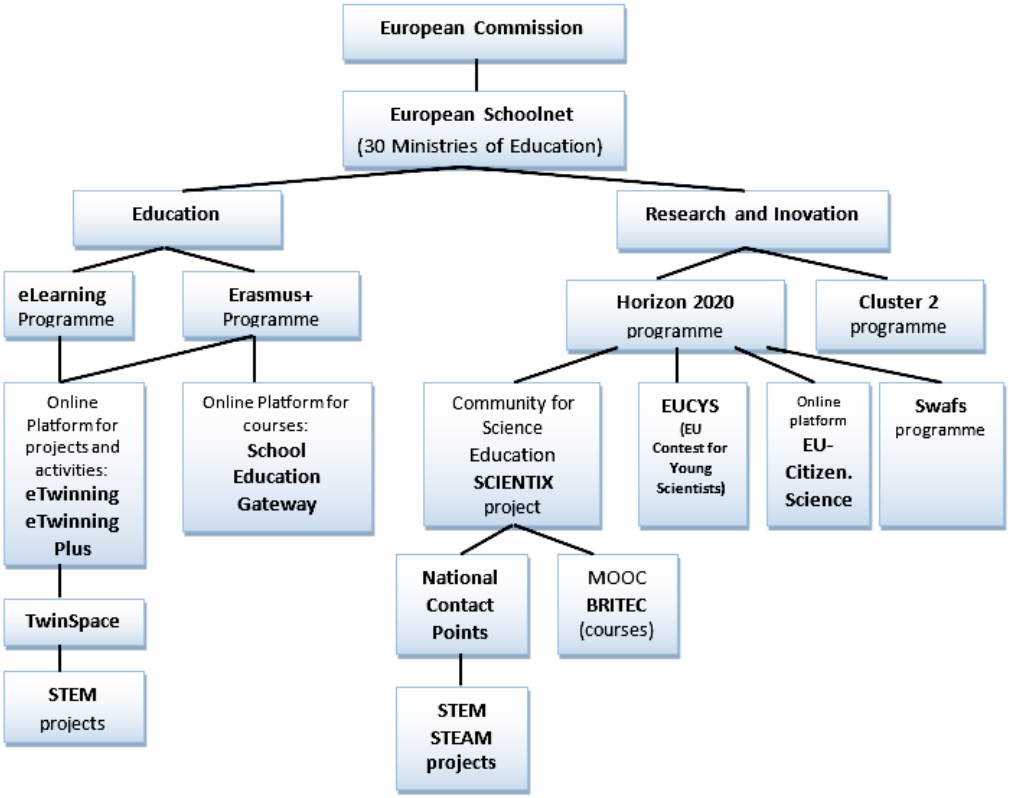


Figure 1: The legal framework of European Commission's Programme that refers to research activity

ects on online platforms, intended for educational activities and training courses for teachers;

- Priority is given to STEM (or STEAM) projects;
- Dissemination of research results by students is done in the EUCYS Contest;
- The integration of social and humanities is promoted through the Swafs and Cluster 2 programmes.

We present below the Map of programs and projects of the European Commission that orient education towards a process of scientific research.

The Cluster 2 program opens the doors for research and innovation in the fields of social sciences and humanities, which will also have an impact in the field of education. European programmes usually disseminate the results of scientific research and the successful practices of their application for mass implementation. But we can note that the EUCYS Competition encourages research projects in all scientific fields. Respectively, this competition assumes that there are already some practices at the level of educational institutions that encourage research not only in the STEM disciplines, but in all fields, including those in the social sciences and humanities.

We will further present the experience of the Republic of Moldova and Germany (Federal state of Saxony) in promoting research in the context of school education.

2. *Education in the Republic of Moldova from the perspective of opportunities to carry out pupil's research in school education.*

We will further present the documents related to the field of education in the Republic of Moldova in which we find mentions about the research activity of pupils in school education.

The National Education Development Strategy for 2014-2020 "Education 2020" states that one of the priority actions to ensure the relevance of studies is to focus on curricula on life skills, and one of them is the ability to research [p. 44, 22].

In the Education Code, which is the basic law in the field of education in the Republic of Moldova, we find a presentation of the educational ideal, which is a personality for which is specific the "spirit of initiative", "self-development" and "employabili-

ty" [14]. The application of the basic law is done through the State Educational Standards.

The document "Competence standards – a tool for implementing educational policies" lists "the competencies of training that are pursued in high school". From the listed competencies, we can distinguish those that refer directly to the pupil's research activity [p.106-107, 21]:

1) at the end of the primary stage (grades 1-4) the pupil can: "organize his/her actions learning independently";
2) at the end of the gymnasium (secondary school) stage (grades 5-9) the pupil can: "argue and support a point of view" and "use the rules of elaboration of simple research and development projects";
3) at the end of the high school stage (grades 9-12) the pupil can: "elaborate research papers and projects and present them" and "has a scientific conception of the world".

And the document "Quality standards for primary and secondary general education institutions from the perspective of child-friendly schooling" specifies a quality criterion, which stipulates that at the level of educational institution a Curriculum can be developed and implemented at the school's decision depending on the profile and its specific orientation [20]. This means that an institution has the right and freedom to develop a *Curriculum in an optional subject* that could develop skills that draw less attention to the core subjects. Each pupil must study an optional subject [p.11, 15].

An integral part of the National Curriculum is the "Framework Plan for Primary, Secondary and High School Education", a document that regulates the implementation of state education policies. It is updated every year and offers schools the opportunity to choose one of the educational models proposed in this document. We mention that the educational models, proposed in the plans, differ in the list of compulsory and optional subjects, but also in the number of hours per week reserved for each subject. Common to all models is that they contain compulsory subjects, and the competencies formed in the compulsory subjects are assessed by national examinations at each level of education.

We will mention only a few details regarding the high school graduation exams which together are called baccalaureate exams (called BAC for short), which is the last step in school education. This final exam contains 2 compulsory subjects for all types of institutions, one subject for the chosen study profile and one subject that the pupil can choose from the list of those proposed for the state exam, depending on the branch and profile of the institution.

The Education Code specifies the division of high schools into 2 categories [14]:

a) theoretical branch, which is of 2 types: with humanistic profile (which has in the BAC exams the profile discipline History) and with scientific profile (which has in the BAC exams the mathematics profile discipline);
b) vocational branch, with the following profiles: art, sports, theological, military.

In the national exams in theoretical gymnasiums and high schools, written tests are proposed, based on the curricular contents read by the pupils, both for the compulsory and for the optional subjects.

Curriculum proposes through its models a concrete list of disciplines both for the block of compulsory subjects and for the block of optional subjects. This document also specifies the organization of several types of extracurricular activities (choir, dance, painting, decorative art, etc.), among which are provided "research activities in the disciplines of study" [17].

This type of activity is proposed since the academic year 2013-2014 and does not provide an age limit. The number of hours provided for carrying out extracurricular activities is 4 hours per week for each complete class of the 10th-12th grades and 8 hours per week for each cycle of grades I-IX.

In July 2021, the National Council for Curriculum approved the Curriculum for extracurricular education, which provides for a division of extracurricular activities in the following areas: Arts; Culture and Society; Science and Technology; Sports, Tourism and Leisure. Each field is divided into specific profiles, and each profile provides a list of activities or types of circles, which can be completed at the school's decision. Research activities are included in the field of Science and Technology and refer to the profile of real scientific disciplines; they focus on experiments, the use of information technology, the written or oral communication of the results of their own investigations. In the field of Culture and Society, the research activity is not directly specified, but some types of activities presented in the curriculum are focused on independent work and information activities [16]. It is important to mention that any of the 4 areas can be covered by new activities, at the decision of the institution.

For the future, the Republic of Moldova has formulated 10 long-term objectives in the National Development Strategy "Moldova 2030", one of these objectives refers to education: "Equal op-

portunities for relevant and quality education throughout life" [23].

2.1. Competition for young researchers in the Republic of Moldova

In order to capitalize on the research activity of pupils in the Republic of Moldova, the National Science and Engineering Fair is organized in 3 thematic categories: Sciences, Applied Sciences, Information Technology for 9th to 12th grade. The criteria for assessing the projects are: applicability and economic benefit; creative approach, scientific approach to the project theme; the complexity of the study; topicality, novelty of the topic; clarity of presentation [18].

Another activity to capitalize on the research activity of pupils is the Young Researcher Contest, held during the Conference with international participation organized by the Faculty of Biology and Chemistry of Tiraspol State University. The purpose of the competition is to motivate pupils to get involved in research activities. The written research project must have a volume of 3 pages with the following structure: project title, content, keywords, introduction, topicality, purpose, object, research objectives, material used, methods used, activities performed, results obtained, innovative aspect, the elaborated product, conclusions, bibliography. Evaluation criteria are formulated for each component of the structure. The organizers attach the template for the project to the contest rules. Pupils are rewarded. The competition is open to pupils from school education or first-year college students. The theme of the projects must be in the field of Natural Sciences / STEM disciplines [24].

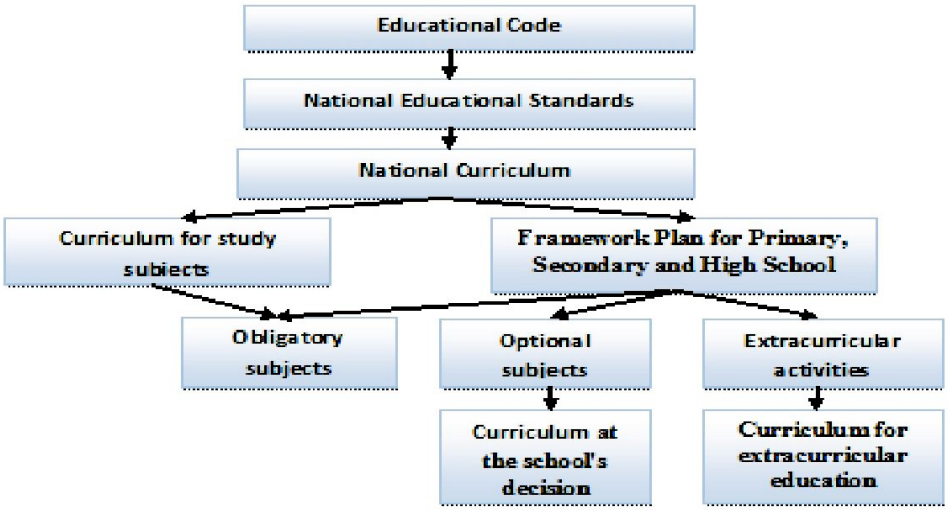
Conclusion for education system in the Republic of Moldova:

- The legal framework that offers perspectives for conducting research with pupils in school education in the Republic of Moldova is based on the Education Development Strategy for 2014-2020 "Education 2020", Education Code, State Education Standards, National Curriculum, Framework Plan of Education.
- A favorable educational context for pupils' research activity can serve as a Curriculum based on the decision of the school for optional subjects and Curriculum for the extracurricular education.
- There are references in the official state documents to the possibility of carrying out the research activity, but no document formulates this activity in terms of competence.
- Existing competitions further promote research projects in the field of Exact Sciences (STEM concept).

We further present schematically the legal framework for carrying out pupil's research activities in school education in the Republic of Moldova.

3. Education in Germany, Saxony from the perspective of opportunities to carry out pupil's research in school education

In Germany, the education is regulated by the individual federal state. Due to this fact each federal state for instance develops individual curricula for



2. The legal framework for carrying out pupils' research activities in Republic of Moldova

its schools and even the structure of the education system might differ from federal state to federal state. So we can take the federal state of Saxony as one example to describe the educational system in Germany.

3.1. The Saxonian educational laws

On the basis of the Saxonian constitution there are two educational laws that cover the educational system: the Saxonian school law [p.648, 32] and the Saxonian school law for private schools that are run by different school authorities [p.434, 35]. Both documents form the legislative basis of school organization.

Next to these legal documents there are several school regulations for the different school types (primary school, secondary school, gymnasium etc.) which provide the legal framework for all state funded schools and in parts for all privately funded schools as well. The gymnasium provides pupils with appropriate performance, talents and educational intentions with an in-depth school education, which is a prerequisite for studying at universities and at the vocational academy; it also creates the conditions for vocational training outside the university [p.348, 36]. In the 10th, 11th or 12th grade, every pupil achieves at least one complex learning achievement with presentation. The pupil chooses the subject in which he wants to achieve the complex learning achievement (**KOL** = **Ko**mplexe **L**ernleistung). Usually pupils achieve this KOL in the 10th grade.

The administrative regulations provide information on several topics for instance the lesson tables for each school type. For the Gymnasium [p.347, 37] the lesson tables provide the pupils with two weekly lessons for self-organized learning, which are to be distributed from the 8th to 10th grade. These lessons are to be used by pupils as individual learning time for the preparation of complex learning achievements, for example, so during this time the pupils work without a teacher. In the table of lessons there are also five hours of lessons for individual support given, which are to be divided from the 5th to the 10th grade. Lots of gymnasiums in Saxony use some of these teacher instructed lessons to support pupils in the 10th grade to prepare their first complex learning achievement (KOL). The form and criteria of the KOL are specified by each gymnasium individually, but the formal requirements for the written documentation are based on the standards of scientific work. Some gymnasiums also demand an oral presentation of the work results.

3.2. The final examinations in Saxony

In Saxony each school type follows a specific legal framework which is approved by the Saxonian Ministry of Education. For Gymnasium it is the SOGYA which is the school law for Gymnasium [p.348, 36]. When passing all exams at the Gymnasium the pupils in Germany get the Abitur which is similar to the Baccalaureate in the Republic of Moldova. For this certificate the pupils have to reach good results in their chosen subjects in the 11th and 12th grades. They form the first part of qualification for the Abitur. In the second part the pupils have to pass two written and three oral examinations: the subjects of the examinations depend on the pupils' choices but must include both the subjects of Mathematics and German language and literature [p.348, 36].

There is one exception from the number of examinations which is described in §47 of the Saxonian school law for the Gymnasium. Pupils in class 11 and 12 may work on a BELL – "**Be**sondere **L**ern**l**eistung" (English version of BELL = special learning achievement) with which they can work on an individually chosen topic that fits their interests and provides them more freedom to show individual research competences [p.348, 36]. The BELL is a written paper that the pupil must defend in a colloquium.

The form and criteria of the BELL are specified in a 'Handout for school administrators, teachers and students at Saxon grammar schools' [31]. The written documentation of the BELL, the size of which is at least 15 pages and a maximum of 60 pages per student, must be presented in an appealing form. A list of sources, a declaration in which the pupils declare that they have worked on their achievement independently and a possible appendix as well as an abstract conclude the work.

The formal requirements for the written documentation are based on the standards of scientific work. For instance, specifications for this can be a part of the own concept of the school for dealing with special learning achievements. These formal requirements relate, among other things, to the title page, the text design, the table of contents, the text structure, the reproduction true to the source, quotations and comments, the bibliography, the appendix with list of figures and abbreviations, copyright issues and a declaration in which the pupils declare that they have worked on their achievement independently [31].

The second part of the BELL is a colloquium in the examination period of the second semester in the 12th form. The colloquium includes the presentation

Anlage 4a
(zu Ziffer VI Nummer 1)

Stundentafel für das Gymnasium
Sekundarstufe I

Klassenstufe	**5**	**6**	**7**	**8**	**9**	**10**
Pflichtbereich						
Deutsch	5	4	4	4	4	4
Englisch	5[a]	4	4	3	3	3
2. Fremdsprache	-[a]	3	4	3	3	3
Mathematik	4	4	4	4	4	4
Biologie	2	2	1	1	2	2
Chemie	-	-	1	2	2	2
Physik	-	2	2	2	2	2
Geschichte	1	2	2	2	2	2
Gemeinschaftskunde/Rechtserziehung/Wirtschaft	-	-	1	1	2	2
Geographie	2	2	2	1	1	2
Sport	3	3	2	2	2	2
Evangelische Religion[b]	2	2	2	2	2	2
Katholische Religion[b]	2	2	2	2	2	2
Ethik[b]	2	2	2	2	2	2
Kunst	2	1	1	1	1	1
Musik	2	1	1	1	1	1
Technik/Computer	1	1	-	-	-	-
Informatik	-	-	1	1	1	1
Wahlpflichtbereich						
schulspezifisches Profil	-	-	-	2	2	2
3. Fremdsprache[c]	-	-	-	3	3	3
	29	**31**	**32**	**32 + 1[d]**	**34 + 1[d]**	**35 + 1[d]**
Individuelle Förderung[e]				5		
Selbstorganisiertes Lernen[f]					2	

Figure 3: ***Distribution of subjects in the 5th-10th grades in the gymnasium***

of the work results by the student and a subsequent discussion in the form of a scientific dispute on the topic. The pupil demonstrates a sound knowledge of goals, methods, content-related details and results as well as his ability to face a discussion on the topic. The duration of the colloquium is 20 to 30 minutes for individual work and a maximum of 60 minutes for group work. The requirements for the design of the colloquium correspond to those for an oral "Abitur" examination (the final examinations at German gymnasiums). In the first part, the pupil presents the results of his/ her work in the form of a lecture. In the second part, it is important to reflect on the long-term work process and to question work results in the form of a defense. This requires specific preparation from the supervising specialist teacher. The focus can be inquiries about the content or the methodical approach, a scientific debate with theses and antitheses, an outlook on sustainability or continuation of the topic and also a reflection of the pupil's own work [31].

3.3. Competition for young researchers in Germany (Jugend forscht)

The "Jugend forscht" foundation (foundation for young researchers) regards the training and promotion of young people in mathematics, computer science, natural sciences and technology (MINT) as a crucial task for ensuring the future viability of Ger-

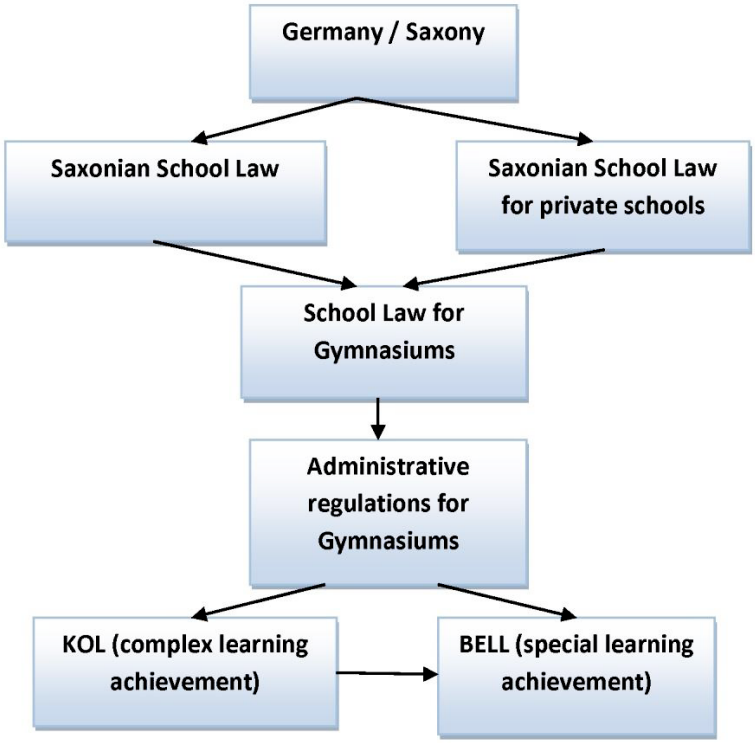


Figure 4: The legal framework for carrying out pupils' research activities in Germany (Saxony)

man society. The most famous MINT competition of Germany arouses and consolidates young people's long-term interest in mathematics, computer science, natural sciences and technology. Young people between the ages of 15 and 21 start in the "Jugend forscht" division. Younger pupils up to 14 years of age compete in the junior section "Schüler experimentieren" (pupils experiment). You have to attend at least the 4th grade.

Decisive for the evaluation in the competition both the written work as well as the lecture, the jury discussion and the stand design place are firstly, the own contribution of the pupil, characterized by: self-propulsion, penetration of the topic, identification with the topic, motivation and learning growth, secondly, the scientific excellence and thirdly, the presentation of the results [33].

Young researchers can register their competition projects in seven subject areas: world of work; biology; chemistry; earth and spatial sciences; mathematics and computer science; physics and technology.

All young researchers initially compete in a regional competition. The regional winners qualify for the state competitions that take place in all federal states. All "Jugend forscht" winners start at the grand finale, the national competition. In contrast, the age category of "Schüler experimentieren" ends at the regional or state level.

Participants and winners of the "Jugend forscht" competition are awarded in international competitions as well, e.g. the "European Union Contest for Young Scientists" (EUCYS) which proves the successful German way to develop research competences in young people [27].

Further, we present schematically the Legal educational framework for carrying out research activities in Germany (Saxony).

4. Self-regulated learning

Strategies of successful learning are of great importance for autonomous learning which is the basis of lifelong learning and thus can be understood as interdisciplinary competence [25]. Self-regulated learning is the ability of a person to manage and control their learning individually and without any help.

Strategies of self-regulated learning based on the three-layer model of self-regulated learning by Boekaerts can be differentiated into [26]: 1) *Cognitive strategies of information processing*, which can be further subdivided into more general learning strat-

egies (e.g. reading strategies) and more area-specific strategies (e.g. spelling strategies), 2) *Metacognitive strategies of self-control* (e.g. time management), 3) *Motivational-volitional strategies of achievement motivation* (e.g. formation of interests). Weinstein / Mayer similarly differentiate between *cognitive primary strategies* (e.g. repetition strategies, elaboration strategies, organizational strategies), *metacognitive control strategies* and *motivational-emotional support strategies*. For these authors, learning strategies encompass all internal and external behavior with which learners try to influence various aspects of their own learning [38].

The global Covid-crisis has put pupils throughout the world under new conditions of learning as they were taught online, if they were taught at all. This online learning has illustrated that students need specific skills to organize themselves and to learn on their own by setting their own goals, by planning and organizing their tasks and by reflecting on their learning process - all of which is based on the use of strategies of self-regulated learning.

Several primary schools (in the 4th grade) and gymnasiums (starting from the 6th grade) in Germany offer a specific training for their pupils ("Forder-Förder-Projekt" = a project in which the pupils are challenged but also supported) to learn strategies of self-regulated learning based on a project by Prof. Dr. Christian Fischer at the University in Muenster [29]. By choosing an individual topic of interest each pupil works on a learning achievement by acquiring strategies of self-regulated learning during the process. For a successful pupils' training an attitude of respect and the appreciation of the participating children is required, discovering the students' strengths requires attention supported by the confidence that every child will achieve their goals and develop their strengths. The role of the teacher or student teacher in the training is more of a learning counselor who is at the side of the learners when necessary and supports them in their project.

Conclusion on the German education system:

A) The German educational legal framework provides young people in school different ways to develop research competences.
B) The pupils are already challenged in the 9th and 10th grades to develop their research competences.
C) A special learning achievement in the 12th grade can replace one oral examination of the final examinations.
D) Special trainings on strategies of self-regulated learning help younger pupils gain the skills and abilities for future scientific research. Therefore a new perspective on the role of teachers is necessary.

6. General conclusion:

A) Research competence of young people is developed on the basis of a legal framework at the European level and at the national level (Germany & Moldova).
B) Competition is one way to appreciate and to evaluate pupils' development of research competences in a specific field of interest (science, social studies and humanities). In both countries there are competitions that encourage young researchers.
C) The educational legal framework in Germany provides schools the opportunity to give pupils the chance to do research in their individual field of interest (KOL).
D) The development of research competences can also be appreciated and evaluated in the pupils' final examinations in gymnasiums (the 12th grade) in Germany (BELL).
E) There are some opportunities for countries to encourage research in humanities and social fields through the Cluster II Programme and Swafs Programme by the European Commission. The states can contribute to these programmes with their own expertise in those fields and actively participate.

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