

History at School – a Prerequisite for Understanding Engineering

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Abstract— The study of young people's knowledge of history and ways of learning is relevant because there is currently a subject "History and Social Studies I", where such subjects as economics, politics, social studies, geography and history must be taught at the same time. This is the year when the subject "History I" will be separated from it in the autumn, while the others will continue to remain combined. The idea of teaching a combined subject was presented in 2017 as part of the school reform "School 2030". Understanding the history of technological discovery is important in absolutely every industry. In the past, this task was partially fulfilled by the history subject in the school. This article will analyze the acquisition of historical knowledge in schools. The aim of the research is to find out what secondary school students know about history in the 20th-century context, as well as the ability to see regularities in relation to European and world events. 20th century the middle and the end are chosen because it is a hot topic these days in connection with the war in Europe and the flow of various information / misinformation. In this study, the in-depth interview method was used, when the most active leading experts in the history of the Latvian state – the chairman of the Association of History and Social Science Teachers, the most active members of the association in society, one of whom is also a historian, who is also the author of several history textbooks and a history specialist of the State Education Development Agency – were asked about issues of Latvian history. This study would serve as a basis for further work by surveying both teachers and high school students. One of the main conclusions of the study is that the pupils learn alarmingly little, especially about the 20th century events, especially the last third of the century. The number of hours allocated for this is often made up of reviews, which unfortunately do not look at the issues of technological development at all, when compared to the time before the reform. It should be noted that often the combined subject is taught only by a specialist in one field, who may

also be a political scientist or a social science specialist, paying less attention to other subjects accordingly.

Keywords—education, knowledge of history, history of technology.

INTRODUCTION

On September 25, 2017, the document "Education for Modern Competence: a Description of the Curriculum and Approach" [1] was submitted for public consultation in Latvia, which actually started an ambitious school reform – School 2030, the aim of which was to improve high school students' knowledge with the help of new teaching methods, i.e. with the 'competency approach' based on the belief that pupils should be able to significantly better connect existing knowledge across in different learning areas, i.e. must be able to make inter-subject connections. Although it was officially possible to express proposals and evaluations about this project on the state website for four months, it is not clear to the author from the VISIC (National Education Content Center) materials what the real involvement of teachers was in discussing the project during this time period. Although many meetings with educators were organized, the project implementers were only able to argue the necessity of the new reform among teachers very conditionally.

The official justification states that "the creators of the content have relied on the Latvian Sustainable Development Strategy "Latvija2030", which stipulates that education should be of high quality, accessible throughout life and oriented towards creativity in order to respond to the challenges of global competition and demographics." [2] As a result of the reform, school programs and teaching approaches were also changed.

However, the reform was also accompanied by extensive debates, first among teachers, about the new requirements and the insufficient explanation from the implementers of SKOLA 2030, because in all subjects the

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teachers were not sufficiently informed about the goals to be achieved, and proposed teaching materials – textbooks and other materials – were not prepared. This was also the case with regard to the subject of history, which in previous years was created in primary school as "Latvian History" and "World History", and in secondary school as "Latvian and World History". In these subjects, the history of technology also had a certain role, because the development, starting from the 19th century, significantly influenced the course of history.

The consequences of the reform were visible at every step, in the form of so-called study baskets, where the pupil had to choose one of the study directions when starting studies in secondary school. As a result, the subject "History and Social Studies I" was created, where earlier subjects such as economics, history, geography, social studies, cultural history, and politics are to be taught at the same time. [3]

In the opinion of the author, whether attention was paid to history at all depends solely on the personal desire and ability of the teacher of the relevant school subject to include the entire learning complex homogeneously in the learning process. A serious obstacle was that this subject was taught by a wide variety of teachers who were not prepared for this kind of work, but additionally, as the author believes, history was often included less by teachers because other they regarded other sections as "more important" – for example, economics or politics. Understanding the problems of the situation, in some schools the new subject was still divided into several parts, usually economics and the other parts, which were taught by specialists of the former subjects.

After completing this combined subject, the pupils could choose which subject he would study in depth. As a result, in the opinion of the author, there were not many pupils who chose to study "History II" in depth. And this is a big problem, because without knowing history, we "don't understand today" [4], as the professor of history Ēriks Jēkabsons has pointed out, meaning wider developments. Unfortunately, it has not been possible to find out exactly how many pupils in Latvia have chosen to study "History II" in depth. Judging by the number of pupils who have chosen to take the "History II" exam in the last two years, the number of such pupils is not large. At the same time, it should be pointed out that in changing conditions with so many changes, even teachers do not want to force their pupils to take an exam in history when the conditions of the exam are not known or fully understood.

It should be emphasized that without knowledge of history it is impossible to understand the regularities of many things. This undoubtedly applies to the history of the development of various, even the most modern, technologies. All "leaps" in technological development have a basis in history, and just like every field of technology, historical studies have been devoted, incl. also in Latvia, for example, the history of the State Electrotechnical Factory (VEF), to which even a museum is dedicated [5], the history of telecommunications [6] or the history of industry [7], etc. These studies create a chain

of regularities needed everywhere, but especially in STEM subjects. The statement that, for example, extensive knowledge in natural sciences helps to achieve success in engineering sciences is also historically well-founded. History plays a significant role in building knowledge about this.

Unfortunately, after the school reform, one of its actual results is that the history exam was abolished in elementary schools, which in practice meant that many elementary school pupils were not able to concentrate and focus their knowledge anyway. This problem has been pointed out by many high school teachers in mutual conversations both at the summer days of History and Social Studies teachers and at the conferences that are held every year in January. In addition to this problem, there are also consequences of the remote learning process during Covid-19, which has certainly not benefited young people in acquiring knowledge. [8]

These factors also undoubtedly affect high school history classes, where it is first necessary to be able to recover the delayed learning process in the acquisition of basic knowledge. This, in turn, prevents focusing on in-depth knowledge acquisition and competence acquisition. As a result, young people's knowledge is increasingly narrowing and decreasing, which university lecturers have already noticed. Undoubtedly, the war started by Russia in Ukraine also contributes to the overall understanding of the problem. [9]

II. MATERIALS AND METHODS

The study basically uses the in-depth survey method with open-ended questions, where the respondent had the opportunity to express himself in more detail. Since the survey was conducted in person, interview elements were also used during it, asking the respondents some additional questions.

The length of the survey was planned to be thirty minutes, but in practice it lasted a little more than forty minutes. At the beginning of the study, a descriptive method was used to outline the research field and general issues as precisely as possible. During the study, special attention was paid to school programs. The study does not include, but considers, the study of the content of school history textbooks that relate to the topic under study.

III. RESULTS AND DISCUSSION

All the above factors prompted the author to conduct in-depth research to find out the real situation. For this purpose, an in-depth focused survey was chosen – conversations with history specialists in Latvia who not only teach history in one or a couple of schools, but for various reasons have worked on solving issues related to history teaching at the national level or even internationally. Four well-known specialists in the field of history recognized in schools in Latvia were interviewed - Baiba Atmane, currently the leading specialist of the State Education Development Agency (VIAA) at the Ministry of Culture of Latvia; Roberts Ķipurs, the chairman of the Society of History and Social Studies Teachers; Jānis

Arājs, a history teacher of Riga State 2nd Gymnasium and a socially active member of VSSB; and Valdis Klišāns, who is not only a history teacher at Teika Secondary School, but also the author of many history textbooks.

Research on the historical knowledge and learning methods of young people in 2025 is relevant for several reasons. First of all, this is the year in which, starting in September, the subject "History I" will be introduced in schools. Secondly, it is necessary to identify the current situation in history learning before/after the changes that started in 2017, within the School 2030 project. The aim of the study is to understand what, according to specialists, Latvian secondary schools youth really know about the history of the 20th century, in the context of the occupation of Latvia, and what is the basis for this situation is. Also, one of the tasks is to understand whether the pupils are able to connect the existing knowledge with the events of European history. According to the information available to the author, different studies of this type have been conducted in the past, [10] but currently there are none.

Latvian 20th century the development of the second half (the period of the Soviet and Nazi German occupations of Latvia) was chosen because nowadays it is a topical topic in connection with the war in Ukraine and the flow of various information (or disinformation) about issues of Latvian history. Among other things, a very important aspect of this stream is precisely the history of the development of technology. Thus, the study of the issue is closely related to media-literacy. It is also important to find out the family, internet environment, etc. impact on the formation of understanding of historical issues. Due to the proposed focus, the Latvian Occupation Museum is also interested in learning the results of the study.

The study is also expected to be expanded by conducting surveys among both teachers and pupils in September this year. In the in-depth and focused survey, specialists were asked seven basic questions, but specialists could also give more extensive answers. The interview time was supposed to be half an hour, but in reality, it was at least 40 minutes.

The questions were put to the experts, allowing them to speak freely and expand if they felt it was necessary. The questions are made broad so that the experts can expand their thoughts. The responses were audio-recorded for later analysis. Since the responses were extensive, they have been used in this study, reflecting only the main thoughts and ideas. The interviewed specialists answered all the questions, however, the answers varied both in terms of volume and depth.

1. question. What is the pupils' knowledge about Latvia's 20th century. middle/end period and whether the pupils are able to connect this knowledge with the European 20th century. historical events?

The first question was intended to be a question of ascertaining the general situation, where the experts also gave the most comprehensive answers. Three out of four experts indicated that the lack of prior knowledge of pupils

in understanding various historical events has a major impact. They connected this with the fact that in elementary school in the 20th century history, including periods of occupation, is the last topic that is looked at, and often teachers in the 9th grade simply—"don't manage" to consider all the topics in a sufficient amount, sometimes only mentioning the events as such, but not creating an understanding of them in any way. According to R. K., such a situation has "if not killed, then devalued" the interest in history in young people. According to him, under such conditions, it is difficult for pupils to connect the events of Latvian history with European history, which was also agreed by other experts.

B. A. additionally stated that before the school reform SKOLA 2030, the amount of history lessons in both primary and secondary schools was significantly larger. As an example, the Second World War was mentioned, which used to be devoted to at least four hours of study in elementary school, whereas now it is only 20 minutes. In addition, the absence of a history exam does not force young people to make a wider study of history. This missed learning process has to be recovered in high school. On the other hand, V. K. emphasized that it was precisely in the 20th century historical processes are of interest to the pupils, but he also noticed that the opinion of the pupils has remained too vague in recent years and the knowledge of the pupils has become weaker. J. A. also agrees with the last statement, which, in turn, highlighted that by emphasizing skills, we have lost the pupils' real knowledge, without which understanding cannot be formed. As an argument, the situation was invoked when at the national level, pupils have considerable difficulty in grouping events in historical order, which in earlier years was one of the easiest tasks, where students "collected" the most points.

2. question. How does the knowledge learned at school fit in with the knowledge gained in the family or society? Is the pupils' nationality important and does it affect the work in the classroom?

When answering the second question about the acceptance of the knowledge to be learned among pupils, especially those pupils whose native language is not Latvian, the answers were given in a very thoughtful way. The answers varied because, for example, J. A. stated that he works in a school where mostly all are Latvians, and the existing non-Latvian pupils are well integrated. Also V. K. stated that the situation at the school where he teaches is calm, and the events of recent years can be safely discussed, including war in Ukraine. However, at the same time, there are pupils for whom the world's turn against Russia creates internal psychological stress.

At the same time, V. K. but emphasized that in 2022, he heard from teachers in various teacher courses that some history teachers chose not to talk about the war in Ukraine in order to avoid a potential conflict. In the lessons, the teachers have emphasized that "we are for peace", without indicating in any way what has destroyed this peace. B. A. also indicated that special materials have been prepared for

learning the history of Latvia in minority classes, which would also show the belonging of these groups of people to the history of Latvia.

Although B. A. stated that there were no conflicts, however, it was felt that the non-Latvian pupils agreed only externally. B. A. stressed with concern that the practice of not talking about problems, incl. about the war on the territory of Ukraine, is a bad practice, because in this way we will not even know what the student really thinks, even though these same pupils were born in Latvia after 2004 – that is, in the European Union. B. A. especially highlighted that Latvia's desire to prepare the best possible natural science specialists does not lead to citizens who feel their belonging to the Latvian state. In addition, young people who are well prepared in the field of natural sciences also leave Latvia more easily after their studies, which is fundamentally wrong. Finally, R. K. admitted that after 2022, the topic of war is completely uncomfortable, because even within the same family there are cases when opinions do not coincide.

3. question. What is the pupils' knowledge about the period of occupation of Nazi Germany (1941-1945)? Which topic are students most knowledgeable about, why do you think that is? What does it relate to?

In answer to the question about the amount of knowledge during the occupation period of Nazi Germany, all respondents agreed that this period is relatively still able to appeal to young people, but here too the knowledge of young people is only about certain topics. According to R. K., even the holocaust topic is gradually turning into a topic that pupils know less and are less interested in, even though the situation was different 10 years ago. It is similar with other topics such as the so-called Latvian Legion, etc.

This opinion was partly agreed with by V. K., who pointed out that the pupils had heard the most about the topic of the Holocaust, because a lot of funds were invested in it in various projects. Undoubtedly, it is also an emotionally heavy topic that sticks in memory. J. A. outlined the situation, clearly highlighting that general knowledge about the time of German occupation is very weak, where, for example, there is no understanding of the economic policy of Nazi Germany. This opinion was joined by B. A., who emphasized that it is possible to expand knowledge and there would be interest, but it requires a lot of teacher's investment.

V. K. highlighted the impact of cultural phenomena, such as the impact of new films released, which affect society only for some time - about five years. According to the author, one must agree with this idea, because the influence of films, series and documentaries is undeniable in various fields, including in medicine, engineering, etc.

4. question. What is the pupils knowledge about the occupation of 1940–1941 and post-war occupied Latvia? Which topics are students most knowledgeable about, why do you think that is? What does it relate to?

Specialists answered the question about pupils' knowledge about the Soviet era quite similarly, emphasizing common trends in knowledge. On the one hand, all the Soviet times, which have been 46 years, being perceived as one common event in which there are really

no periods and changes. There are still various myths that teachers have to dispel. For example, the myth that it was not possible to speak Latvian during this period, or that there was a famine during the Soviet occupation, or vice versa - there were good times, when everyone had a job, etc.

V.K. pointed out that pupils find the period of Soviet occupation interesting in its own way as a "kingdom of crooked mirrors", where many things are not as they initially appear. As an example, V.K. invoked the one-party system, where pupils automatically associate it with the party system when they hear the words "political party". R. K. pointed out that there are students who know a relatively much about Soviet times, but mainly because of deportations, when relatives were deported. On the other hand, pupils from Russian-speaking families basically know the general "truths" that everything was in order during the Soviet era, factories worked and generally lived well.

Although certain symbols of the ideology are recognized as pioneers, emblems, there is no longer a deeper understanding of what this ideology did and why it was like that. Worst case scenario, according to J. A., is the fact that young people perceive what is written directly, and the hidden thoughts contained are difficult for pupils to recognize. In addition, pupils actually have no knowledge of the economic policy and economic development of the USSR.

5. question. What are the key concepts when teaching about the time(s) of occupation in schools? How many such concepts are there?

When answering the question about the concepts, the experts all agreed that the existing set of materials is completely sufficient, as long as it is used wisely. As an example, the collection of terms used in history was mentioned, but the most serious problem was the lack of familiarity with various abbreviations, which also causes problems for adults.

6. question. What is the importance of modern technologies in the learning process and the real possibilities of using them during lessons and for tasks outside them?

On this issue, the opinions of experts differed quite significantly, putting emphasis. V. K. pointed out the various possibilities and emphasized that they are mainly important for the teacher, not the pupil. The use of opportunities is wide, however, not all types have proven themselves over a long period of time. There have also been projects that have not been able to prove themselves over the years. At the end of the 1990s video lectures of university lecturers were made, nowadays they are no longer really usable due to the volume.

Regarding artificial intelligence, experts believed that it is not capable of giving full-fledged answers in the history of Latvia, at least for now. In addition, pupils are led to believe that this is some kind of "intelligence", not realizing that it is just programmed responses that someone has programmed. Also, all the respondents agreed that there is technical equipment – a projector or a TV screen – for visualization purposes. Only J. A. pointed out that the old methods with the blackboard as an

additional option also work well. Absolutely all experts pointed out the lack of a textbook in the learning process. On the other hand, V. K. emphasized the huge importance of technology in working with foreign students, translating content and comparing situations.

7. question. What are the elements that you think are missing or could be improved? How to do it? How do pupils see it?

Unexpectedly for the author, experts analyzed this issue more thoroughly than expected. Opinions were divided when R. K. stated that there must be textbooks and methodical instructions. V. K. more emphasis was placed on thematically organized photo and video collections, which the teacher could freely use, for example, when talking about the development of the construction field or railway infrastructure, which is important nowadays due to the construction of Rail Baltica.

On the other hand, J. A. rightly pointed out that in his case all the most important museums are within reach and there is no need to look for new approaches in a situation where the old methods work well. However, what has been said applies only to teachers of schools in the center of Riga. Also B. A. emphasized the greater importance of extracurricular activities, analyzing and comparing the offers of different museums. All those surveyed indicated that with such a small number of school hours, many museums such as the Motor Museum, Art Nouveau Museum, etc. visit is not possible at all.

CONCLUSIONS

In secondary schools, teachers often have to work on improving the general knowledge level of students, as a result of which there is no time left to delve into specific areas. This is also related to the lack of a history final exam in primary schools.

Due to the inertia of some teachers, working with the earlier chronological approach to historical processes, they present more the events of the earlier centuries, devoting less attention to the 20th century. second-hand history questions. This also means such an important topic as industrial development as a whole, but separately railway, energy, etc. misunderstanding of aspects, due to lack of knowledge. One of the explanations for this is the lack of textbooks. As a result, pupils have very fragmented knowledge.

In the conditions of the lack of textbooks, even though there is a variety of different materials in the modern world, teachers still must invest a huge amount of work to prepare the thematic development of individual lessons, etc.

In schools, the combined subject "History and Social Sciences I" is taught by teachers who have not been prepared for it, as a result of which the set of knowledge acquired by students may differ significantly in each school.

The teachers also found that the mass of actual knowledge has significantly decreased both due to the priorities of the school reform SCHOOL 2030 and due to the sum total of other circumstances.

Finally, it must be concluded that the combined subject "History and Social Studies I" no longer teaches about the development of technology and its importance in practice. Although some teachers pay attention to it, it is no longer a requirement that everyone must follow, unlike the time before the reform.

As a result of the research, the author has come up with several proposals, which have already been presented to the leadership of the Association of History and Social Science Teachers. One of the proposals is to obtain more accurate data from the Ministry of Culture on the number of history teachers. As a second proposal, when creating the curriculum, prepare specific proposals so that the history of technology is also included in the program, which can also be done by attracting museum specialists to schools. Such a practice exists, for example, at the Museum of the Occupation of Latvia. Finally, to address history teachers in a more targeted manner in order to create common guidelines for the creation of priorities for the history subject.

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