

Analyzing the Curriculum: The Relationship Between Rote-Based Education and Laboratory Course Hours in Public Anatolian High Schools in Bursa, Turkey

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ARTICLE INFO

Keywords:

*anatolian high schools,
rote-based education,
laboratory, memorization,
experimentation*

ABSTRACT

This study is a qualitative design that investigates the relationship between the rote-based education and the laboratory lesson hours in public Anatolian high schools located in Bursa, Turkey. Additionally, this investigation is carried out by personal surveys which were asked to high school students who are currently studying at public high schools in Bursa. Particularly, this research focuses on the Anatolian high schools which were located in three different districts of Bursa because the presence of Anatolian high schools within those regions is much more frequent than in some other districts. The main focus is to find a relationship between the laboratory hours in public Anatolian high schools in Bursa and correlate it with the rote-based education. While obtaining the data, students who are studying at public Anatolian high schools from different districts of Bursa were asked questions about the laboratory course hours within the school's curriculum, availability of equipped laboratories, and the presence of experimentation methods in science lessons. The responses to the questions from the students indicated that a relationship between the rote-based education can be related to the observed lab hours in public Anatolian high schools in Bursa, Turkey. After processing the data, it was found that there is a correlation between the rote education and lab hours where schools design their curricula based on the methods of scoring high in the national university entrance exam.

1. Introduction

High school and high school years is the most important period where the individuals gain both academic and social acquisitions that they are going to be using throughout their life journey. High schools are considered as the last stop before stepping into the real world, and equipping oneself in high school is one of the pluses that will count towards in the future life. Apart from choosing a higher education related to which profession, the individual can gain much more than this in high school. In addition, acquiring interpersonal skills in high school will make it

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Cite this article as:

Yılmaz, D. (2023). Analyzing the Curriculum: The Relationship Between Rote-Based Education and Laboratory Course Hours in Public Anatolian High Schools in Bursa, Turkey. *European Journal of Teaching and Education*, 5(1): 18-33. <https://doi.org/10.33422/ejte.v5i1.856>

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much easier to climb the academic career steps in the future. Skills such as presentation management, being able to use academic language, being cooperative and working as a team during high school are skills that will make professional life much easier. Therefore, the passing from high school to university is an important transitional stage. When looked at, the transition from high school to university differs from country to country. While some countries follow a holistic approach that evaluates students on both an academic and social basis, in some countries this may be more straightforward and academically (grade or exam) based.

Such student admission approaches allow for the creation of specific methods specialized in education. To give an example, it can be seen that in education systems that progress with holistic application, club or volunteer hours can be inserted in school lesson hours. Or, on the contrary, in a system where students are admitted to universities according to a more specific academic factor (e.g. “Central University Admission Test”), the intensity of test-solving or practical hours may stand out.

Related to this, the shaping of curriculum and lesson planning may show linkage through teaching and learning methods.

1.1. High schools and their system & structure in Turkey

High school, in the Turkish education system, is the name given to the secondary education institution that prepares students aged 14 to 18 who have completed eight years of primary and secondary school for higher education with at least for years of high school (Özden, 2007). All educational institutions in Turkey, including high schools, are supervised by the Ministry of National Education (MEB). High schools in Turkey can be sorted into two classes in the simplest way: Private High Schools and Public High Schools. Regarding this separation, there are differences in both qualities and education. Private high schools require a certain amount of tuition fee. Or this price might be waived or reduced with merit-based or need-based scholarships. For this reason, private schools tend to have fewer students per class. The curriculum in public schools is determined by the Ministry of National Education (MEB), but private schools can adapt their implementation methods to the curriculum. Parallel to this occasion, students studying in public high schools have more control over the national university entrance exam (YKS). Private schools, on the other hand, aim to provide education under their own regulations which justifies that some diploma or international programs such as Advanced Placement, International Baccalaureate, IGCSE, etc. can be offered usually in private schools.

1.2. How high schools in Turkey are categorized

It is possible to categorize high schools into several specializations without considering if the school is public or private.

1.2.1. Science high schools

Science high schools prepare students with high abilities in science and mathematics for higher education in a field such as Medicine, Engineering, Dentistry, and Architecture. It is a source for training highly qualified scientists needed in the fields of mathematics and science. Science high schools can be both public and private.

1.2.2. Social sciences high schools

These schools aim to train qualified people needed in the field of Social Sciences and Literature, to prepare students with high intelligence levels, interests and abilities in the fields of literature and, social sciences, for higher education in this field. Students graduating from

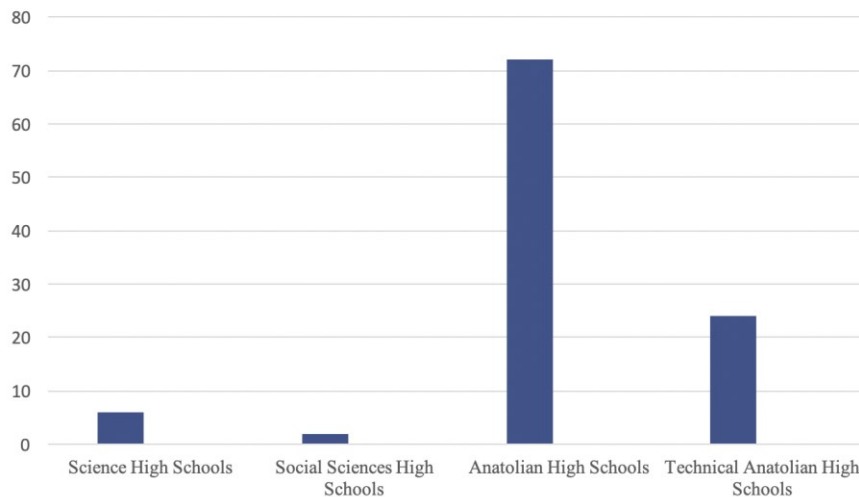
these high schools can pursue a possible career pathway in the fields of Turkish Language and Literature, Law, History, Geography, Journalism, and Culinary Arts. Most of the social sciences high schools are public.

1.2.3. Anatolian high schools

Anatolian High Schools' motive is to ensure that students are prepared for higher education programs according to their interests, abilities, and achievements, and to learn foreign languages at a level that can follow scientific and technological developments in the world. An Anatolian high school graduate student is the most flexible student when it comes to choose his/her career pathway. And these students are free to choose a path chosen by a science high school or a social sciences high school student such as Medicine, Psychology, Law, or Education.

1.2.4. Vocational and technical anatolian high schools and multi-program high schools

This title includes many different types of schools. Such as Health Vocational High Schools, Commerce Vocational High Schools, Tourism Vocational High Schools, Fine Arts High Schools, and Sports High Schools. In these schools, besides the basic high school education, vocational training is given for the profession that the student aims to specialize in the future. Such as compulsory internships and being graded on occupation-based subjects.



Column 1: Number of High Schools in Bursa by Their Types

1.3. Higher education institutions entrance exam (YKS)

YKS is the exam that everyone who has completed high school education must take in order to go to university. It is carried out in order to ensure that students to be admitted to higher education programs are selected and placed according to their preferences. YKS is carried out by ÖSYM (Assessment, Selection and Placement Center) in June of each year. YKS consists of 3 sessions and candidates are asked questions from the high school curriculum and the courses they have taken in high school.

1.3.1. Basic proficiency test (TYT)

The name of the exam in the first step is TYT (Basic Proficiency Test). Within the scope of the courses, logical thinking, thinking-based problem-solving skills, and reasoning skills are tested. Anyone who takes the YKS exam is supposed to take the TYT (no matter what their specialization is).

1.3.2. Field proficiency test (AYT)

For university exams, the exam session held one day after the TYT exam is AYT. AYT, which is the Field Proficiency Exam, measures the degree of suitability of the students for the department they want to study. The types of courses that students need to solve at AYT vary according to the undergraduate degree they want to study.

In AYT, there are tracks that the student needs to solve according to the profession they want. There are; Mathematics-Science track, Turkish Mathematics track or Turkish-Social track sections.

Students wishing to study medicine, engineering, architecture and natural sciences, should solve the questions in the Mathematics-Science section of AYT. This section includes math, physics, chemistry and biology questions. This track is highly chosen by Science and Anatolian high school students.

If a student wants to study psychology, law, business administration, international relations and etc.; the student should stick on the Turkish-Mathematics section of AYT. This section includes Turkish Language, Math and Social sciences (History, Geography, Philosophy) questions to be solved. Students from Anatolian high schools highly and students from Science high schools partly prefer this track.

Besides these, a student might want to pursue a career in the fields of Social Studies, Communications, Journalism and etc. Then, Turkish-Social track is the one which needs to be chosen. This track includes questions from Turkish Language, History, Geography, Philosophy, Psychology and Sociology. This specialization is highly chosen by Social Sciences high schools and partly Anatolian high schools.

1.3.3. Foreign language test (YDT)

YDT is a compulsory language exam for prospective students who are wishing to study at the language departments in the country. Another feature of this exam is that students who have formerly taken AYT are also eligible to register this exam.

With the ranking and score you obtain from YDT and TYT who can study in the majors such as Foreign Language and Literature, English Language Teaching, Translation Studies, Linguistics and Interpretation. Any student who is from any sort of high school might prefer taking this test.

1.4. Rote-based education

Rote learning is a memorization technique based on repetition. (Hoque, 2018). The method rests on the premise that the recall of repeated material becomes faster the more one repeats it. Which is about learning a topic to be able to repeat it from memory rather than learning it in order to understand it.

As (Mayer, 2002) exemplifies this with the following lines in his study, “Becky reads the same chapter on electrical circuits. She reads carefully, making sure she reads every word. She goes over the material, memorizing the key facts. When she is asked to recall the material, she can remember almost all of the important terms and facts in the lesson. Unlike Amy, she is able to list the major components in an electrical circuit. However, when Becky is asked to use the information to solve problems, she cannot.

Like Amy, she cannot answer the essay question requiring her to diagnose a problem in an electrical circuit. In this scenario, Becky possesses relevant knowledge but is unable to use that knowledge to solve problems. She cannot transfer this knowledge to a new situation. Becky

has attended to relevant information but has not understood it and, therefore, cannot use it. The resulting learning out- come can be called rote learning.’’ It is a method in which transferring to long-term memory is not at the forefront. The relationship can be seen as;

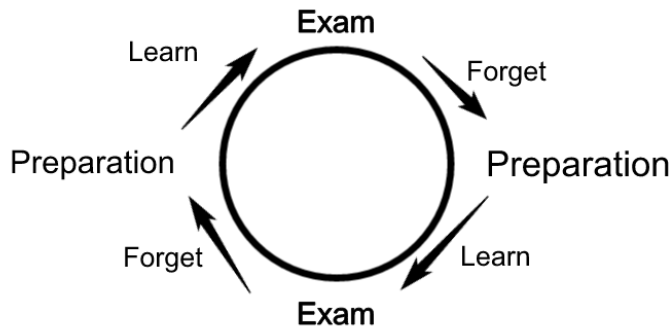


Figure 1: The cyclic demonstration of the rote loop in education

As it was referred, a student's placement in which department at which university is determined by a central university entrance exam called YKS held right after the 12th grade. With the minor help of the overall high school GPA, students' chances of getting into the programs in universities are assessed by the YKS rankings. As the research paper title includes the word 'Rote-Based' might be justified by this occasion. By definition, Rote-learning based education is known as the learning or memorization by repetition, but mainly without the deeper understanding of the reasoning and the relationships involved in the concept material that is learned during class hours. This method can be considered as useful in some countries based on their education system. Because the key concept in this educational method is memorization. (Karpicke, 2016). Students are supposed to solve the given questions within a limited time interval. In order to proceed and answer the questions during the exam, being able to solve the questions swiftly is crucial. Because in this central exam (YKS) time management is one of the most important components of getting a competitive ranking.

For this reason, most of the high schools in Turkey intend to lead students by creating them more opportunities to solve more preparation tests (exam-based) during school hours. Although, one of the most major aspects that can be seen in the curriculum is prepared in public high schools, could be related with this occasion.

Especially for the science subjects, experimental learning with the help of the laboratory class hours can be essential for the deeper learning of the concepts within the science subjects' curriculum. However, the rote-based education's methodology is about being able to recall the concepts that they have previously learned. This is the reason why public high schools prefer this sort of educational method. Of course, there is a fact that public high schools are not financially supported as the private schools are. With the lack of the financial stability and support, some public high schools may not have the opportunities such as the equipped lab environments, tools and etc.

This research study aimed to explain the relationship between laboratory course hours in 30 different Anatolian high schools, which are unique educational institutions to Turkey, from the 3 most frequent districts of Bursa and the repetitive learning method called 'rote-based'.

2. Literature review

During the literature review, few articles were found and scanned about the rote-based learning method and its integration into educational sciences. Specifically, there were not many previous studies on rote-based education in high schools. Previous studies have shown that rote-based learning is associated with course-based assessments. Likewise, in previous studies, two situations (2 courses, learning methods, countries, educational institutions, etc.) were compared (Samian & Tavakoli (2012)), (Mutlu, 2006). And in certain cases, it was found that the studies were made more quantitative by adding a statistical analysis on top of the qualitative data (like T-test or ANOVA). In addition, in some studies, it was seen that the access to the data held in educational institutions was more open than that and it was seen that the necessary information was obtained definitively without using an unbiased and qualitative research method. There was no previous study on learning methods in the region covered in the study, so there was no other helpful source to compare the results. Despite of this ambiguity again during the literature review, certain studies that can be described as the body of the research were found. The first article is the resource named '*Reasons of Rote Learning in Turkey*'. While the education, academic and curriculum development of Turkey, which is frequently mentioned in the article, is discussed throughout the historical processes, the rote learning method is constantly referred to. The basics of rote education mentioned by author (Sekin, 2008) in his research article overlap with the concept of rote learning in this study. This resource, which frequently refers to points such as rapid learning in a short time, academic advantages and memorization methods, prepared the background for the research. This study, which covers especially the same country (Turkey), proves the basics of general rote education and university entrance system in Turkey mentioned in this research. Specific points in that study (such as Curriculum Objectives, Curriculum and Textbooks) emphasized the position of rote education in the early 2000s and the uniformity of educational curricula.

During the process phase, an article was found. It was about Iran, which is geographically located close to Turkey. This article was reviewed to find out if rote learning could show a geographical similarity. Afterwards, the similar results with this study in that article (even though the main subject is English) can be accepted as a country-based similarity. (Samian & Tavakoli, 2012).

Although a study similar to this study was not found at the end of the literature review, previous studies in Turkey and in other countries show that similar results will be obtained.

3. Aims and methodology

3.1. Aims

In this study, the main focus was to determine the possible relationship(s) between the rote-based education and the laboratory course hours in the Anatolian high schools that have the most frequent in three regions of Bursa. To obtain data, five questions were asked to 30 different high school students from 3 districts about their schools, curricula, labs, weekly schedule and arrangement of courses.

Those questions, their method of asking and the reason why the students were directed to the students are:

Table 1.

Survey Question with Their Method and Reason

Questions	Method	Reason
1) Does your school have equipped laboratory(s)?	The question is directed to the students who participated in the survey.	To determine if the schools have qualified laboratories for an effective experimentation learning environment.
2) Do you have any laboratory course hours in your weekly curriculum?	The question is directed to the students who participated in the survey.	The target question which was essential to find out if the schools include lab lessons into the schedule of curricula.
2.1) If yes, how many hours?	The question is directed to the students who participated in the survey.	A sub-question related to previous question to determine the number of the lab lessons.
3) Are science branch subjects (physics, chemistry and biology) supported by the experimentation method?	The question is directed to the students who participated in the survey.	This specific question asked because the science branch lessons are the subjects that their concepts can be acquired effectively with the help of the experimentation methods.
4) How many points would you give out of 10 for your teachers' allowance & disallowance when you want to go to the lab at your school? (1- Very Reluctant & Not Allowing / 10- Very Supportive & Allowing)	The question is directed to the students who participated in the survey.	The main objective was to observe the intentions and willingness of the teachers in those Anatolian schools. (Mainly, the answers were given based on the science teachers' allowance in those schools)

3.2. Survey

Survey is a common method that can be used in both quantitative and qualitative information collection by asking a set of questions to gather an overall information. A variable is kept constant to obtain more precise results in surveys. For example: The common objective of the questions, the range of the people whom are asked. Before using the survey method, researchers should think about if they can use a more guaranteed method to obtain more accurate data. To obtain the features and qualities based on their curriculum and laboratory hours & development level, it was not eligible to visit every single school and look up their weekly plan and observe their lab rooms. For these reasons, it was decided to ask students who are studying at those high schools about the schools' curricula and equipped / not equipped laboratories. As shown in the introduction part, five questions (4+1) were asked to find out the needed data for the research. In this research, the main focus is to observe the relationship based on laboratory course hours. For this, the third question ***'Do you have any laboratory courses in your school curriculum?'*** was the decisive question for this study. The other questions were asked as side question to have a better understanding of the curriculum structure of the public Anatolian high schools. Because the other questions than 2, were given an additional information about how rote-based education method is applied to schools' system in terms of laboratory development, experimental support, YKS preferences and etc.

3.3. T-test analysis

T-test is a statistical measure that is applied to determine differences between the means of *two* sample groups. As well as this testing method enables to determine the if there is a statistically meaningful expectance among the data sets. Normally, the following formula can be used to determine the t-test outcomes manually;

$$t = \frac{m - \mu}{\sigma/\sqrt{n}}$$

t : Student's t-test

m : Mean

μ : Theoretical Value

σ : Standart Deviation

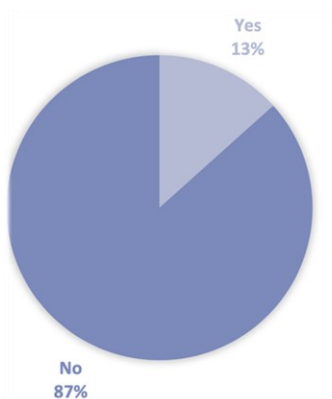
n : Variable Set Size

A student's t-test above is used in conditions where the test size tends to be relatively small (less than approximately 30) and Eckersley, 2019, mentions so.

In this study, the t-test will be applied to the answers received from the quantitative questions obtained from the students (30).

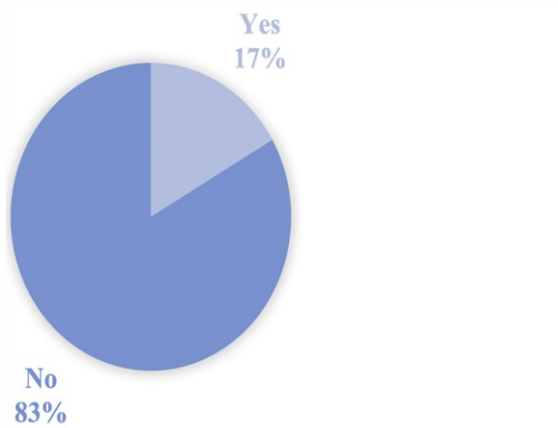
4. Data and research outcomes

1- From the question 1 (*Does your school have equipped laboratory(s)?*), it can be seen that the 26 students out of a group of 30 students gave the answer that their school does not have an equipped lab(s). There are two possible comments that can be said regarding this outcome: The school does not receive the required support from the government which cannot be true because all the high schools are checked by Ministry of National Education (MEB). The second comment would be that the school does not pay attention for the improvement of the lab(s) because of the rote-based education, the experimentation method is not that supported. Where the lab(s) end up being unequipped and undeveloped just can be seen by the 87 percent which equals 26 schools out 30 in four different districts as a result of the question 1.



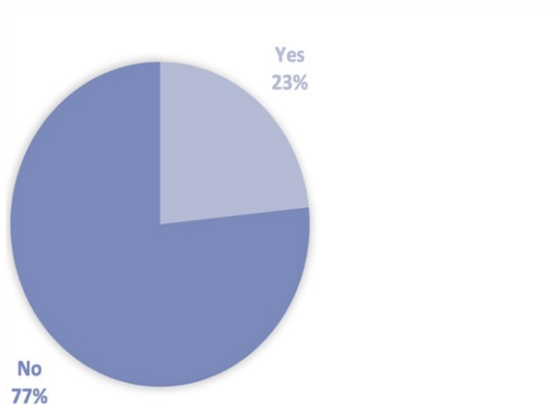
Pie Chart 1: Does your school have equipped laboratory(s)?

2- Question 2, was an actual indicating question between the experimental and rote-based education techniques. Science branch lessons are the subjects that their concepts can be acquired better with the help of the experimentation methods. For example: In a chemistry lesson, a student can understand the 'Acid includes acid in it, a few drops of nitric acid can help to indicate if protein is present in that nutrient. In that case, that sort of experimentation methods helps students for the acquirement of the concept. However, for the YKS in particular, experimentation method can be considered as a lowering factor just because it does not increase students' time management and speed during the long test.



Pie Chart 2: Are science branch lessons supported by the experimentation method?

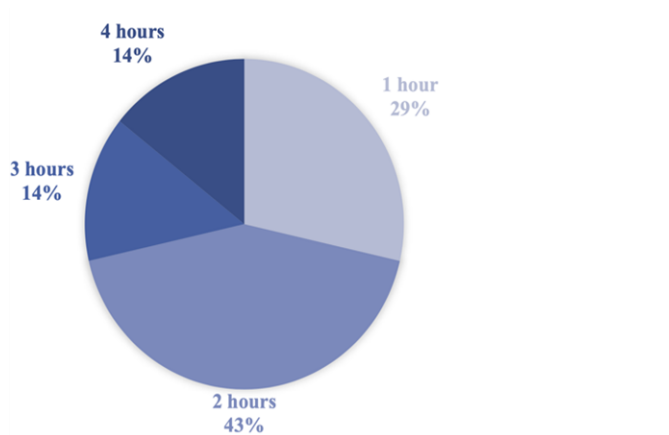
3- After looking at the data which were collected from the question 2 (*Do you have any laboratory course hours in your school curriculum?*), data have shown that the 23 students out of 30 responded that their schools do not insert any laboratory lesson hours within their curricula. With the 77% of 'No' answer, the majority of the students in those schools do not have any regular lab hours. Which justifies that the experimentation method is not fully supported because of the lack of the lab hours and as well as the rote-based education leads schools to make students to study more repetitive & memory-based concepts.



Pie Chart 3: Do you have any laboratory course hours in your school curriculum?

4- Question 3.1 was a sub-question to the Question 2 (*If yes, how many hours?*) where students who have given the answer 'Yes' to the previous question. As can be seen above, students who are from the schools in the percent of 13, have regular lab lessons.

In order to find out the frequency of those lessons in the curriculum, this sub-question is directed to them. In the chart below, the highest number of hours in the curricula in different schools was only up to four hours. The main accumulation was in the range of 1 hour with 29% and 2 hours with 43%. Considering the fact that there are 3 main science subjects within the curriculum, the average is that, there is less than an hour per a science subject in a regular week.

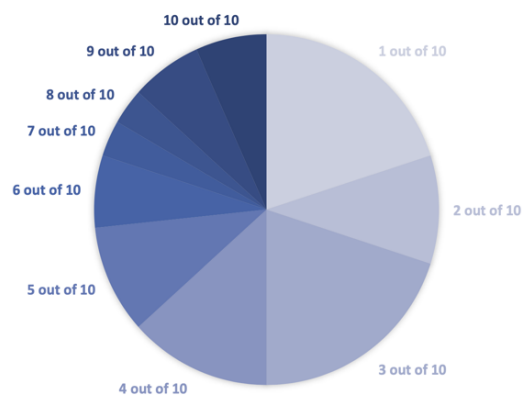


Pie Chart 3.1: If yes, how many hours?

5- The last (fourth) question was a bit different in terms of the focus. The other questions are more related about, curriculum and laboratories itself. This question is more subjective and tends to be a more general and subjective question. The main objective was to observe the intentions of the teachers in those Anatolian schools. In particular, lab lessons are more related with science subjects. For this reason, science teachers are the ones whom are asked (e.g. The chance of to spend history in the lab is significantly smaller than a science lesson).

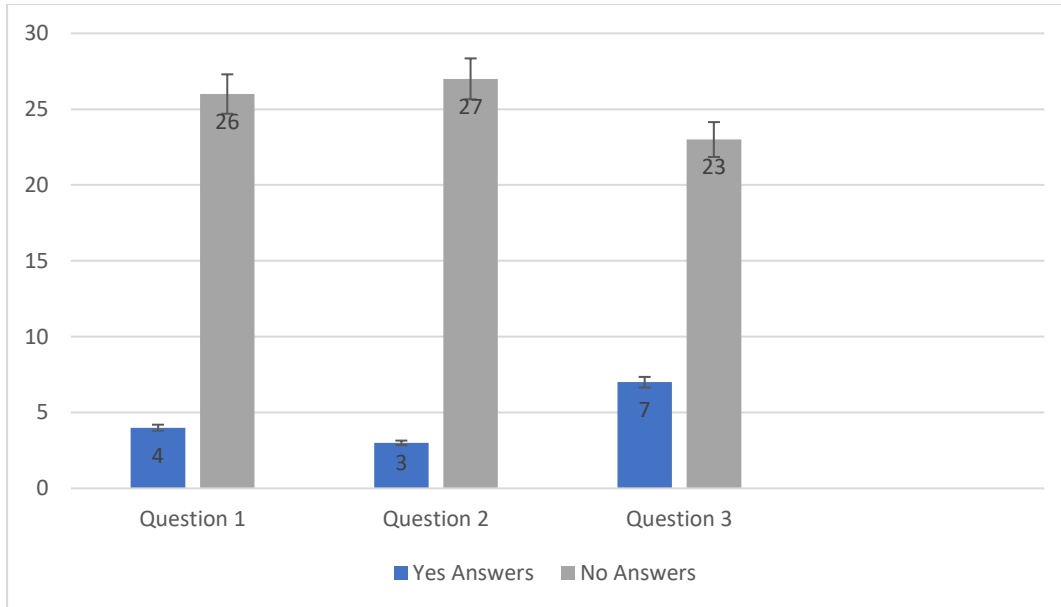
To sum, students in those 30 public Anatolian high schools were asked about their science branch (Physics, Chemistry, Biology) teachers overall eager to allow students to spend the lesson hours in the lab. In this question, it was observed that science teachers are not that interested in spending lesson hours in laboratories. Because they are also aware that laboratory lessons are not compulsory in rote-based education system.

The pie chart below illustrates the interests of teachers, the interest 1 out of 10, 2, 3, 4 and 5 are 20%, 10%, 20%, 13% and 10% respectively. Which indicates that a whole 73% percent fills only a 5/10 question.

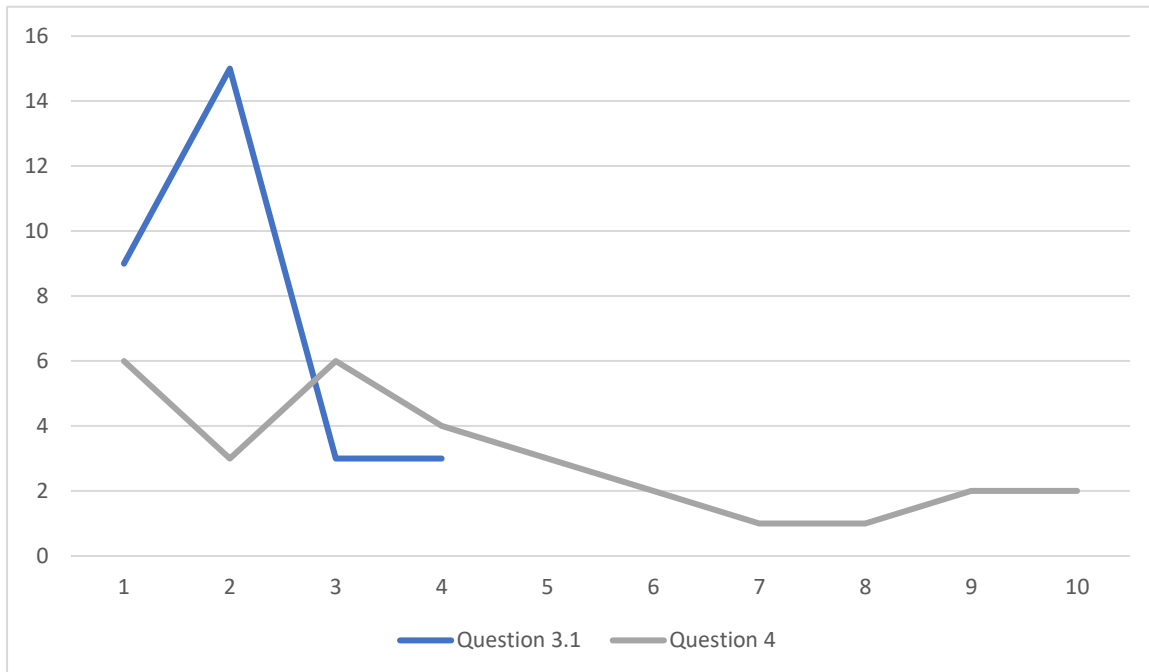


Pie Chart 4: How many points would you give out of 10 for your teachers' allowance & disallowance when you want to go to the lab at your school?

(1- Very Reluctant & Not Allowing / 10- Very Supportive & Allowing)



Graph 1: Qualitative Questions' Answers (1, 2 and 3)



Graph 2: Quantitative Questions' Answers (3.1 and 4)

4.1. Qualitative (personal) observations

Before and during the survey questions, the students were chatted apart from the survey questions. Within the scope of personal information, questions about their schools were also asked. The same level of comments was obtained from certain students. These;

'Teachers want to include more test-solving hours additional to school schedule.' (4 students)

'Teacher do not let us to go to the lab in our school because they say that the experiments won't help you get more points in YKS' (9 Students)

It can be seen that roughly the same mentality is present among the teachers and education system. this non-survey interaction from students supports and illuminates the research in a personal extent.

4.2. Statistical analysis

T-test analysis was applied to quantitative questions (3.1 and 4). For this, the numerical answers of the students were taken as a basis. Which are,

Table 2.

Quantitative Question's Answers Received by Students

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
3.1	2	2	1	2	1	2	2	2	3	1	2	4	2	2	1	4	2	1	2	2	1	1	1	2	3	4	1	2	3	2
4	4	3	2	4	9	1	6	2	8	3	5	1	4	1	3	5	10	1	6	7	5	2	4	3	3	10	9	1	1	3

First of all, hypotheses have to be indicated in order to determine how the T-test is applied.

H₀: There is not a statistical difference between question 3.1 and question 4 answers.

H_a: There is a statistical difference between question 3.1 and question 4 answers.

4.3. Quantitative Interpretation

$P \geq 0,05$ (see Table 3), H_0 is accepted. There isn't any significant difference between question 3.1 and 4 answers. Question 3.1's and 4's mean values are 2 and 4.2 respectively which are close to each other.

Table 3.

T-test results

SUMMARY						
Groups	Count	Sum	Average	Variance		
Question 3.1	30.00	60.00	2	0.827586207		
Question 4	30.00	126.00	4.2	7.889655172		
T-test Results						
Pearson Correlation (P)	df	t Stat	P(T<=t) one-tail	t Crit. one-tail	P(T<=t) two-tail	t. Crit. two-tail
0.080968784	29	4.181711487	0.000121876	1.699127027	0.000243752	2.045229642

Pearson's correlation coefficient (r) is used to demonstrate whether two data sets & variables are correlated to each other. There is no significant relationship when the P value is less than 0.05. As can be seen above, since the Pearson Correlation value is 0.080968784, it proves that there is a significant relationship.

5. Conclusion

5.1. Discussion & evaluation

In this study, the relationship was aimed to figure out between the rote-based education and the laboratory class hours. Throughout the whole process, it was very explicit to find the aspect of how rote-based education affected the lab hours. In the country, it is known that millions of people (including non-high school students) take the national university entrance exam (YKS). The previous opinion about the possible outcome of this study, formed the alternative hypothesis. As mentioned in the introductory background information part, the key to score

high in the YKS, is to be familiar with all sorts of possible questions and manage your time affectively because it is a big chance to face comprehensive questions. By relying on this, education system tends to morph into more memorizing way where memorization gains more importance than the experimentation method & learning. (Feldman, 2020). As in this research, this situation can be perfectly related with this method. The qualitative observation received from student respondents, ***‘Experiments in the labs are not going to boost your overall score in YKS’*** is justified with the data obtained and processed from the questions in the surveys. The following statistical analysis also facilitated the improvement of the topic via including numerical outcomes rather than being limited to survey responses. The first question’s aim to be asked was to see if the public Anatolian high schools’ equipped laboratories as a side question. Which helped to increase the overall information about the public Anatolian high schools. The second question was the exact target question which has given the required information for this research. Unlike other questions, this question helped the most regarding the research question. Additionally, the Question 2.1 was an appendix to have a more exact information about the number of the hour(s) that schools separate for the lab hours within the curriculum which the results illustrated that out of 30 schools in the Bursa, 23 of them do not have lab hours within their curricula. And with the calculation, the remaining 7 schools have approximately ~1.43 hours per week. Considering the fact that there are 5 days of school per week and 9 lessons per week, the average of lab lessons can be calculated with:

$$\text{Average Lab hours per week} = \frac{\text{Approximate value of Lab hours}}{\text{Number of lesson hours in a week}} \times 100$$

After applying this equation, the average laboratory course hours can be found as **3.18%** per week which is a numerical value that justifies the research question. With all those findings, the alternative hypothesis is accepted whereas the null one is rejected. At the end, it can be easily said that there is a correlative relationship between the rote-based education and the laboratory lesson hours in public high schools located in Bursa, Turkey.

Afterwards, a statistical analysis was added to make the qualitative method taken by the questionnaire more quantitative and reliable. Analysis by t-test showed the Pearson Correlation value greater than 0.005. This revealed a significant relationship and actually based the answers received from the students on evidence.

5.2. Limitations

In the study, survey questions were asked to 30 Anatolian high school students in three regions in Bursa, which have the highest number of Anatolian high schools. Although definite answers were obtained from the students, the grade levels of the students may have affected the results. Specifically, students from a specific grade, could not be asked questions due to limited access and resource availability, which may have created inaccuracy. Because there is a possibility that not every school prepares the curriculum for students in all grades (9 to 12) in a same way. For instance, while a school prepares the curriculum of the 12th grade students more strictly and academically, since it is the exam year for them, the committee may prepare the curriculum plan of the new 9th graders in a different way. In addition, the source of the last question, the teachers' allowance to bring students to the laboratory, might not be known exactly. Does the school have the authority that does not allow teachers to teach by experiment in the laboratory? Otherwise, it is up to the teacher and it is unknown whether the teacher gives permission or not. In addition to these, before using the survey method for the data collection, a detailed preliminary research was conducted on the internet in order to learn the weekly lesson plan and curriculum design modules of the Anatolian high schools or to learn the weekly lesson plans,

and when necessary, the authorized people in the schools were called directly. However, it was decided to use the survey method when no response could be received and no result could be obtained from the internet search and calls.

5.3. Recommendations

Recommendations from the research will include a future comparison and further work on the current topic. The first of the recommendations would be to conduct a similar study based on science high schools in the future. As mentioned in the introduction (See Introduction), the preference for the Mathematics-Science track in the AYT section of YKS in Science High Schools is most of the time 100%. Science high schools are high schools that offer numerical and science lessons (mathematics, physics, chemistry and biology). Science lessons are given at least 15 hours per week in the curricula prepared in the high schools. Whereas, it is usually 6 hours per week in Anatolian high schools. For this reason, since it is crucial to learn science lessons effectively, the method of experimentation to support expression and comprehension will probably be seen more frequently, and unlike this study conducted with Anatolian high schools, perhaps completely different results will be obtained. (Colakoglu, 2016)

If it is desired to continue this study with a further study, survey questions should be directed to students of a specific year according to the availability of the source, e.g. (10th grade students) or the question of teachers' allowance to teach in the lab could be re-shaped specifically about a specific science subject teacher's allowance, e.g. (Physics teacher's allowance to-) (Gultepe, 2016).

In addition, high schools in 3 districts were handled in the study. The number of high schools in 3 districts was 30. For a more precise and detailed research, other provinces can be included and a general comment can be made about the educational formation of high schools in Bursa.

5.4. Declarations

Funding: Any sort of funding was not received or used for this research.

Availability of Data and Materials: All data presented in this study can be seen in the data analysis and appendix portion. (See Appendix)

Acknowledgements: I would like to express my sincerest appreciations to Selin Binbaşı. I would not imagine that a chit-chat that we once talked about could morph into a comprehensive research topic. It is because of her that the beginning of this research study began, and I thank her for supporting throughout the process and sharing my journey with me.

In addition, I would like to thank Özlem Bari and Defne Gacal for helping me to contact with the survey respondents required for the research.

I would like to thank my supervisors Christine Elizabeth Yoldaş and Nurdan Özbilici from TED Bursa College, who helped me bring my research questions and ideas to a more academic dimension.

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Appendix

SURVEY PARTICIPANTS' ANSWERS								
QUALITATIVE QUESTIONS' ANSWERS			QUANTITATIVE QUESTIONS' ANSWERS					
	Question 1	Question 2	Question 3	Question 3.1	Question 4	Brach of the science teacher (Question 4 related)	The district of the High School (A, B or C)	Grade of the student
1	No	Yes	No	2	4	Chemistry	A	9
2	No	No	No	2	3	Physics	A	9
3	No	No	No	1	2	Physics	A	11
4	No	Yes	Yes	2	4	Biology	A	10
5	No	No	No	1	9	Chemistry	A	10
6	No	No	No	2	1	Chemistry	A	11
7	No	No	No	2	6	Biology	A	12
8	No	No	Yes	2	2	Physics	A	10
9	Yes	No	Yes	3	8	Biology	A	9
10	No	No	No	1	3	Chemistry	A	9
11	No	No	No	2	5	Physics	A	11
12	Yes	No	Yes	4	1	Physics	A	10
13	No	No	No	2	4	Biology	B	10
14	No	No	No	2	1	Physics	B	9
15	No	No	No	1	3	Chemistry	B	9
16	Yes	Yes	Yes	4	5	Biology	B	9
17	No	No	No	2	10	Chemistry	B	12
18	No	No	No	1	1	Physics	B	12
19	No	No	No	2	6	Physics	B	11
20	No	No	No	2	7	Physics	B	9
21	No	No	No	1	5	Chemistry	B	12
22	No	No	No	1	2	Biology	B	10
23	No	No	No	1	4	Chemistry	C	9
24	No	No	No	2	3	Chemistry	C	9
25	No	No	Yes	3	3	Biology	C	11
26	Yes	Yes	No	4	10	Biology	C	12
27	No	Yes	No	1	9	Biology	C	11
28	No	No	No	2	1	Physics	C	10
29	No	No	Yes	3	1	Chemistry	C	9
30	No	No	No	2	3	Physics	C	12