

Target-based Reviewing Method

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Abstract

Teaching, practicing, and studying subjects for tests are the foundations of any education, yet there are situations when a student has the finest of experiences but the results aren't as wonderful as they could be. Some students who have completed all of their tasks sometimes complain that they have had no preference in their review time and that they are unsure where to begin. Reviewing is an essential aspect of a student's education and test preparation. As a result, it is critical for students to realize their weaknesses in each subject, especially before the exams, to resolve them. One of the most difficult tasks for each student is to glance through their courses as efficiently as possible in the shortest amount of time before their exams. This paper suggests a novel approach to reviewing the courses named the "target-based reviewing method", a quantitative methodology and also, compares its concept with 3 conventional review methods and finally, compares the results for each method between 4 test groups in a trial national test in Iran named "Ghalamchi". Based on the results of this study on 28 students, it can be determined that this method resulted in an upward trend in students' grades for mathematics, physics, and chemistry and took a lesser amount of time compared to conventional reviewing methods.

Keywords: Quality of learning, Target-based review, Efficiency improvement, High school, Exam performance

1. Introduction

Every grade and field have a nearly similar timeline from the first day of class to the day before the final tests. Students become more familiar with the principles of the courses that their teachers have assigned to them as the semester begins. Teachers go over the details of the subject in each session, and students are expected to study the material or submit homework until the next session. There are quizzes, projects, and tests such as midterm exams in the middle of each semester to evaluate students' knowledge of the courses, and there are also final exams to examine students' understanding of the courses they took that semester [1].

It is often seen that a lot of students argue about the fact that they studied so hard for a test but their results were not as good as they thought they would be. This can be resulted from some reasons such as students' inability to show interest in courses, lack of interest from teachers toward students, families' inability to assist students through studying, students' anxiety in exams, students' inability to understand the questions, and lack of time management skills in exams which most of all are resulted due to technical studying defects [2-6].

The relationship between learning methodologies and academic success has received a great amount of attention in recent years, especially in learning quality linked with different study methods [7]. Also, there have been a large number of research on exams such as exam wrapper[8] and its appliance on different fields of study such as pharmacy[9], psychology [10], and health education [11]. In addition, academic tasks also introduce different variables for students, so it may be efficient for studying the dynamics of their involvement in students [12]. One of these dynamics can be students' ability to correctly review the courses that were learned throughout the semester, and there has not been enough attention toward this matter so far.

Reviewing is one of the most important parts of every student's study-life balance in order to increase students' efficiency during exam time and also, to prevent students from losing grades in questions of which they possess knowledge but vaguely. Based on the authors' personal experience in [9], students are often motivated to participate in review classes not to improve their proficiency in that course, but to become familiar with questions for exam points. Students often have a problem with reviewing their courses before an exam, meaning that they have studied through the semester and understand every sub-problem and concept in different parts of every course but when they want to glance through that course and become prepared for the exam, they become hazy about how to review the subject with the highest productivity, as fast as possible and correctly. In other words, they do not know where to start [13].

In sub-section 2.1, conventional methods for reviewing are mentioned. One of the suggestions for

reviewing is reading the subjects again, which can result in spending a large amount of time with lower efficiency[14]. The second method consists of glancing through the first workbook, reading the parts which were marked as important, and solving the marked questions[15]. Another suggestion about reviewing is using practice tests as a mean to prepare students before the test. This method is based on solving several tests similar to the final exam before the final exam which results in improving students' confidence and preparation for the tests[15].

In this paper and in sub-section 2.2, a novel approach for reviewing the courses named the "target-based reviewing method" is used. The comparison indexes are defined in sub-section 2.3. The case study for the purpose of comparing the results of 28 students who used 4 different reviewing methods is mentioned in sub-section 3.1. This quantitative methodology is used for four different courses such as mathematics, biology, chemistry, and physics and the amount of students' improvement in every group is compared to each other. Their percentage of improvement and the statistical measures are mentioned in subsection 3.2.

2. Methodology

First, the conventional methods for reviewing the courses and their differences with each other are mentioned. Second, the proposed target-based reviewing method, its details and its algorithm are mentioned. Finally, every method must be compared with the conventional methods based on the measures which are reliable.

2.1. Conventional methods

Reviewing the courses is one of the parts which can have a major influence on students' grades. Based on the foundation of the course, meaning whether it is numerical, conceptual, or a combination of both, different methods can be used to review them. The four methods that were studied in this paper for reviewing the courses. The first three methods are conventional methods which are as follows:

- i. The first method consisted of studying the same workbook for the second time (the first time was during the semester) and solving every problem another time in the defined period of time. Studies showed that students who reviewed the course acted better about that concept than when reviewing time was not given to them[14].
- ii. The second method consists of glancing through the first workbook and reading the parts which were marked as important[15].

- iii. The third method consists of solving a large number of practice tests similar to the final exam from previous semesters aiming to become prepared for the test[15].

2.2. Target-based reviewing algorithm

It is essential to benefit from a reviewing method that can result in the improvement of students' grades. The substitute method for the conventional methods must result in less time and more efficiency for students during reviewing their courses.

The fourth technique that was utilized is called "target-based reviewing." An innovative method of scanning the courses, a quantitative methodology, leads to more exam preparation for the students. The uniqueness of this approach is built on identifying and fixing the particular areas where pupils struggle. It is divided into two sections: Recognizing and Resolving.

Recognize: When students wish to study for an exam, they begin on the first page of their textbook and continue until they have finished it. Although the students may believe there are no areas in which they are deficient, there may be certain areas in which they believe they understand the idea but are not proficient. It is important to identify these areas. The recognition phase begins with easy examinations and progresses to difficult assessments to demonstrate a student's mastery of several subject areas. At this level, the student can identify the areas of the topic where he is having difficulty.

Resolve: A summary of the explanation and 10 distinct sample exams have been produced for each section of the topic, and depending on the student's deficiencies in the recognition section, the student can study these sections and fix his issues. The exams consist of formula usage (in mathematics and physics), memorization examinations, and a mix of the two. The distinctive aspect of this approach is that it allows the student to focus on his own issues and find a targeted solution in less time and with more effectiveness.

This method consists of 4 steps which are defined as follows:

Step 1: divide the whole amount of the course into n different parts and prepare the number of tests for each part.

Step 2: assign a specific time for each part and in this time, the student is supposed to follow the steps below:

- i. Each student is supposed to take the first exam.
- ii. After finishing the exam, the student is expected to grade himself with the answer sheet.

- iii. The student supposed to determine which parts of the test he has a problem in.
- iv. A student is expected to resolve the problem that he has by reading the specific part from the workbook that he possessed and solving some questions in this specific subject from the workbook. It is worth mentioning that it is very important that students try to resolve the problems which were found in this exam.
- v. The student must take another exam from this part in an effort to realize whether his problems

were resolved or not. If the problems were resolved, go to the next part. If not, go to 2-3.

Step 3: The student must do step 2 for all the remaining parts. If the parts are finished, he must go to step 4.

Step 4: The student must solve practice tests which are from the total parts of our course, he must try to resolve any flaws which are left, and finally, he must finish the practice tests. The schematic of the algorithm is shown in Figure 1 which is drawn by Visio.

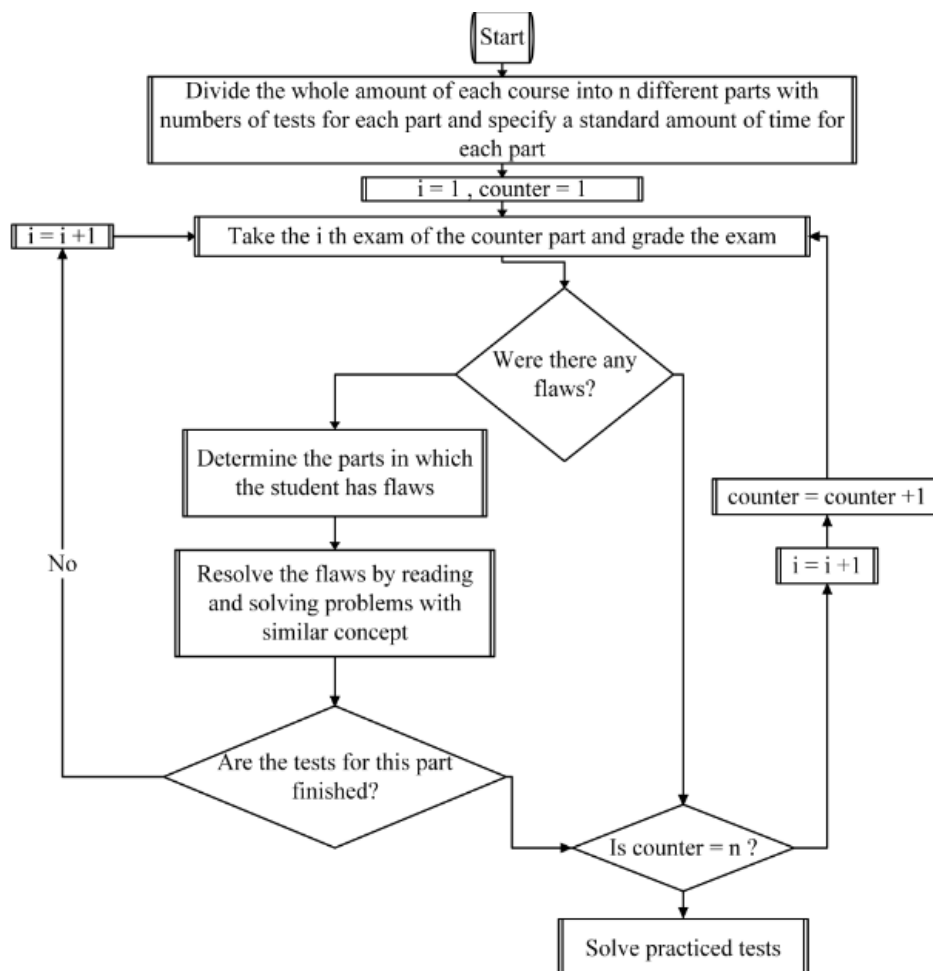


Figure 1. Target-Based Reviewing Algorithm

2.3. Index for comparison

The uniqueness of every reviewing method must be evaluated by the most famous statistical measures and the percentage of improvement in every course for different groups. These indexes must be defined in order to study the effectiveness of a new method compared to the conventional ones.

The percentage of students' improvement in each course was calculated as 1:

% of improvement =

$$\frac{\text{Grade of each course in the exam} - \mu}{\mu} \times 100 \tag{1}$$

Where μ is equal to the mean of grades:

$$\mu = \frac{1}{N} \left(\sum_{i=1}^N x_i \right) \quad (2)$$

Standard deviation(σ) is also another index for determining the amount of effectiveness for each method. The reason for using this index as a parameter for comparing methods is to show that which of the four has the least spread out over a wider range. If σ for one group of data is lower compared to other groups, the method effects all the members in the range.

$$\sigma = \sqrt{\frac{\sum_{i=1}^N (x_i - \mu)^2}{N}} \quad (3)$$

Where N is total number of population in each group.

Range in different group is defined as (4):

$$\eta = \text{max value of each group} \\ - \text{min value of each group} \quad (4)$$

3. Results

A case study based on 21 students in 4 different groups comparing their results using 3 conventional reviewing methods and the proposed reviewing method. Their percentage of improvement and their statistical measures are compared in order to find the best method for each course.

3.1. Case Study

A case study is a detailed study of a group of people or students, which is being used in order to determine the effectiveness of a new method and the comparison between them. An ideal study group consists of identical persons which can show the differences in the results more accurately but since it is impossible to find an identical group of students, the study group can be chosen from people with a similar social aspect such as their grades.

In this paper, a period of 21 days was assigned to 21 students in 3 different groups in order to review their improvement in grades, and another group with 7 students was assigned to study the same courses in 14 days with the “target-based reviewing” method. This clustering of 28 students in four groups were aiming to compare their results in a coordinated test at the same time and same questions. All of the students were picked from two major populated fields in Iran’s educational system which are the mathematical physics field and experimental science field. The test consisted of two paper sheets. One for

general courses: Persian literature, Arabic, Theology and Quran, and English. The other paper sheet involved the main courses for each field. For the experimental science field, the main course paper sheet consisted of 4 courses: Mathematics, Biology, Physics, and Chemistry and for the mathematical physics field, it consisted of 3 courses: Mathematics, Physics, and Chemistry.

The methods were only applied to the main courses. The amount of time and number of questions for each paper sheet is mentioned in Table 1. 4 groups of students were chosen in this paper for reviewing methods. Each group consisted of 7 different students from both the experimental science field and mathematical physics field. The first three groups used conventional methods and group D used the “target-based reviewing method”:

Group A: The first group consisted of 7 students who were supposed to study the same workbook for the second time (the first time was during the semester) and solve every problem another time in 21 days.

Group B: The second group consists of 7 students who were supposed to study the important parts of the first workbook and solve questions that they marked through the semester in that in 21 days.

Group C: The third group consists of 7 students who were supposed to glance through the first workbook, read the parts which they taught were important in the first week, and in the next 2 weeks, solve a large number of practice tests similar to the final exam from last semesters to become prepared for the test. The tests they used were the same tests from previous years with different questions.

Group D: The fourth group consists of 7 students who were supposed to use the “target-based reviewing method”. The period of time which was assigned to them was 14 days. They started their tests without any reviewing. The main idea was to divide the whole amount of their work into 6 smaller parts and each part was supposed to be finished in 2 days. Every student in this group was supposed to take a test, correct the test, understand the flaws, read the part he had a problem in and resolve the flaws by solving only 5 questions from the first workbook in that part and continue taking tests and resolving problems until there were no other defects in that part in the 2 days which were assigned to that part. Finally, they were supposed to spend the remaining 2 days before the exam solving practice tests similar to the group C.

3.2. Percentage of improvement and statistical measures

It is very important to find and establish the effectiveness of a new method based on the statistical measures which they can result for the

students. Since it is impossible to find four identical groups of people, it would be beneficial to compare the percentage of improvement for the students in every group based on their mean grades without each of the reviewing methods.

In this section, students' mean grades for the past 6 exams and their grades for each course in the final exam are stated in Table 2. Also, the percentage of improvement for the grade in each course and in the total grade of main courses are mentioned in Table 3.

Table 1. Number of questions and proposed time for general courses and main courses

	Name of the courses	Number of questions	Time (minutes)
General Courses for experimental science field and mathematical physics field	Persian Literature	25	18
	Arabic	25	20
	Theology and Quran	25	17
	English	25	20
main courses for experimental science field	Mathematics	30	50
	Biology	50	40
	Physics	30	45
	Chemistry	30	30
main courses for mathematical physics field	Mathematics	50	70
	Physics	40	50
	Chemistry	30	30

Table 2. Mean grades of 4 groups in each courses and mean of main courses grade

Group name	Mean of the mean grades for students in this group in previous 6 exams (these grades were out of 9000)	Mean grade of main courses for each group (out of 9000)	Mean grade of mathematics for each group (out of 9000)	Mean grade of physics for each group (out of 9000)	Mean grade of chemistry for each group (out of 9000)	Mean grade of biology for each group (out of 9000)
Group A	6215	6424	5991	6733	6453	6716
Group B	6327	6672	6791	6945	6547	6546
Group C	5822	6246	6189	6700	6021	6962
Group D	5434	6028	6075	6297	6047	5654

Table 3. Percentage of improvement in each course and in main courses

Group name	% of improvement in main courses grade for each group	% of improvement in mathematics grade for each group	% of improvement in physics grade for each group	% of improvement in chemistry grade for each group	% of improvement in biology grade for each group
Group A	3.27	-4	8.21	4.7	9.5
Group B	5.27	7	9.64	3.3	3.4
Group C	7.21	5.5	15	3.8	2.7
Group D	11.32	12.4	16.58	11.0	6.2

4. Discussion

Using the index for the percentage of improvement between students in every group and statistical measures can result in understanding the benefits of every reviewing method and their comparison with each other. The Figure 2 shows the percentage of improvement in all the courses which

were targeted in this study and Table 3 shows the amount of improvement in main course grades, mathematics grade, physics grade, and chemistry grade is higher than three other groups. The biology grade using the target-based reviewing method is in second ranking in the four groups of reviewing techniques that were used and the reason for the achievement of the first group is the basics of this

field which has a large number of different parts that require memorizing work and can be achieved through the multiple numbers of studying the course.

In Table 4, the amount of range and standard deviation for mathematics, physics, chemistry, and biology is calculated for all four groups.

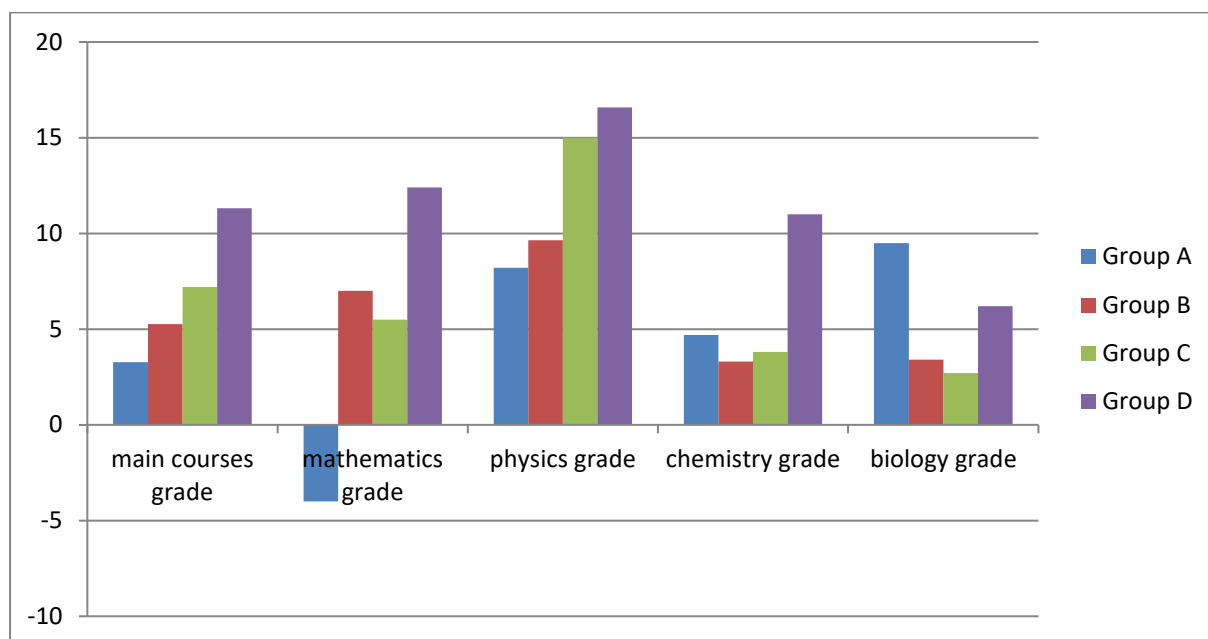


Figure 2. Comparison of improvement percentage between four methods in main courses grade and in each course

Table 4. Range and standard deviation in grades for the study groups

Group name	Range In mathematics grades	Standard deviation In mathematics grades	Range In physics grades	Standard deviation In physics grades	Range In chemistry grades	Standard deviation In chemistry grades	Range In biology grades	Standard deviation In biology grades
Group A	2712	930.7676	3166	1036.470	2117	733.7140	322	3591.4496
Group B	2299	907.5052	1997	708.4028	2255	815.7632	2056	2553.3671
Group C	2931	1252.5742	2717	927.6481	1867	627.0345	499	3400.4046
Group D	1662	590.6999	1744	677.5417	2818	979.2166	734	3034.2421

Figure 3 illustrates the amount of range for physics and mathematics for group D is significantly lower than other study groups which shows that the difference between the lowest grade and the highest grade is resulted by the fact that these courses are mainly related to understanding the concepts. As it is comprehended from Figure 3, the target-based reviewing method is mostly sufficient for courses that are not dependable on memorizing skills. If a student wants to be successful in courses such as mathematics and physics, he needs to first, understand the concept of the subject and then solve a large number of examples related to the subject. Therefore, this glancing method is suitable for students to use in these two courses and the numerical parts of chemistry.

The standard deviation(σ) factor is a statistical factor that shows the amount of spread of grades. If σ for one group is lower than the others, this means that the action did not have an extreme effect on one student and no effect on other students. Based on Figure 4, the result is so acceptable due to the fact that the target-based reviewing method is affecting all the students' proficiency in physics and in mathematics in the same range. Although σ for biology is lower for group D compared to other groups, it cannot be concluded that this method has a major impact on this course as well as mathematics and physics because other factors such as improvement in students' grades and range in biology are not good compared to the other groups.

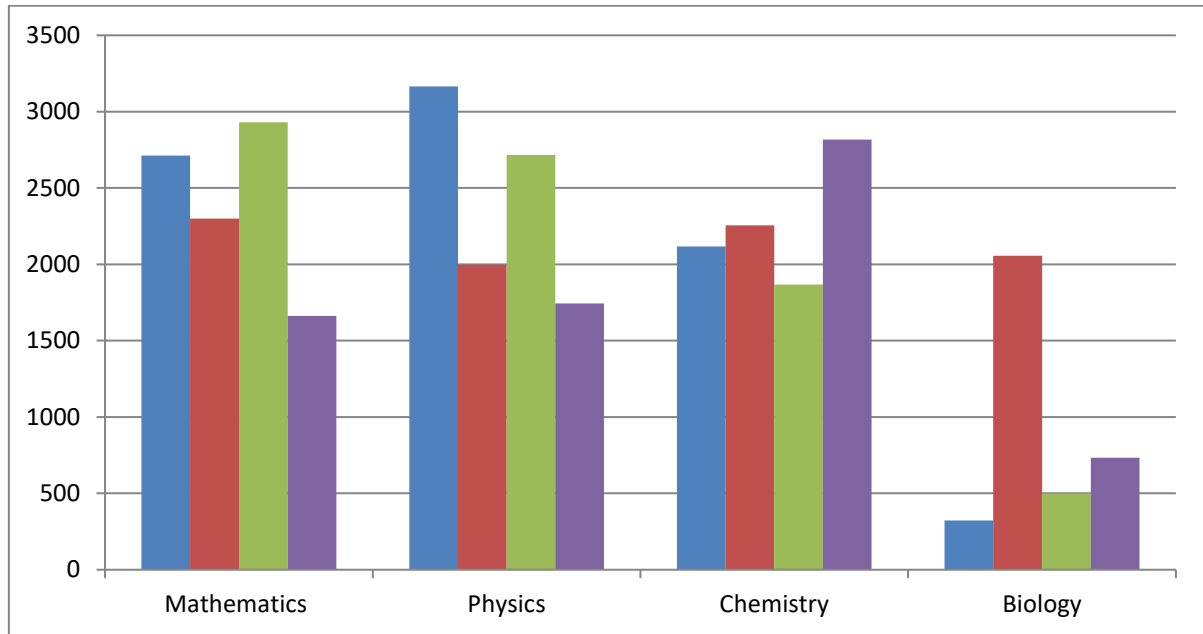


Figure 3. The comparison of Range in each course for all the four groups

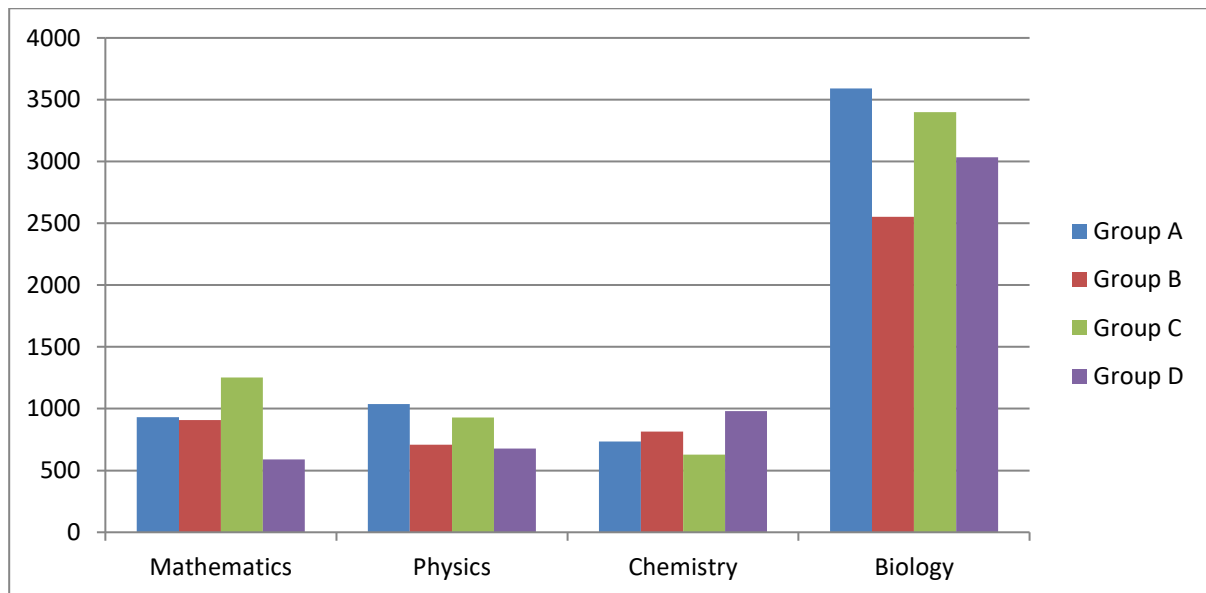


Figure 4. The comparison of standard deviation in each course for all the four groups

5. Conclusion

Reviewing the courses for exams is one of the most important parts of every studying routine and as a result, it can have a major impact on students' grades. The "target-based reviewing method" can determine students' defects and flaws in every part of the studied course such as mathematics and physics and numerical parts of chemistry faster than conventional methods and also, needs less amount of

time compared to conventional methods.

It was noted that students' ability to improve their mathematics and physics grades can improve highly through the target-based reviewing technique. The effect of this method on chemistry is highly related to the quality of the subject and exam. If the exam has more numerical questions compared to mnemonic questions, this method has a good impact on the results, but if the exam consists of mnemonic questions, this method is not going to be very

suitable for this exam. The effect of this method on students' grades is high in chemistry but since the amount of range and the standard deviation is also higher than other methods, this method could have had a perfect impact on one student but not on the majority of them. Although in the biology course, this reviewing technique did not have the highest quality and the highest success, it can be realized that still, it improved students' grades more than the two other conventional groups. Most of the biology course consists of mnemonic parts, the first method for glancing through seems to have the highest efficiency in this course. It is also noted that the technique was not suitable for just biology, in future work, one other reviewing technique can be applied to biology as a mean to increase its efficiency covering a combination of the first browsing technique and the target-based reviewing technique.

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