

THE ALTERNATIVE TASK WITHIN THE COURSE OF DESCRIPTIVE GEOMETRY FOR ARCHITECTS

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Abstract. Free choice (or alternative) task means that a student who solves the exercise can substitute it with any other exercise from obligatory program. The optionally chosen task usually seems easier for solving to the student. The author describes methodology and grading procedure applied within the course of descriptive geometry for architects at the Riga Technical University.

Key Words: Descriptive geometry, alternative exercise.

1. Basic information

Free choice (or alternative) task means that a student who solves this exercise can substitute it with any other exercise from obligatory program. Why is it necessary to exchange the problems and what can be acquired by application of the described procedure? The answers to these questions can be justified based on three factors, which are as follows.

1. The theory of positive psychology.
2. The results of students' questionnaire.
3. The author's experience and the results of the author's research.

Let us begin with the theory. It is a well known phenomenon from the theory of positive psychology that when a person performs the work which he/she likes, then a positive energy and better results are obtained. How can we understand this phenomenon?

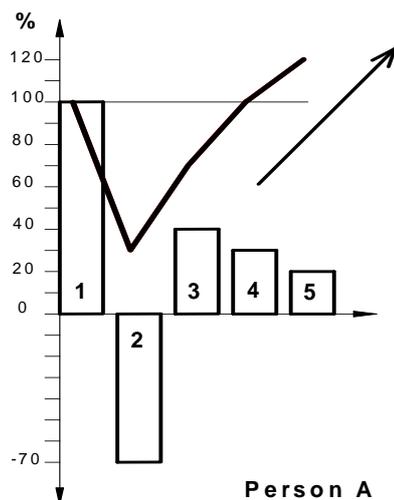


Fig 1

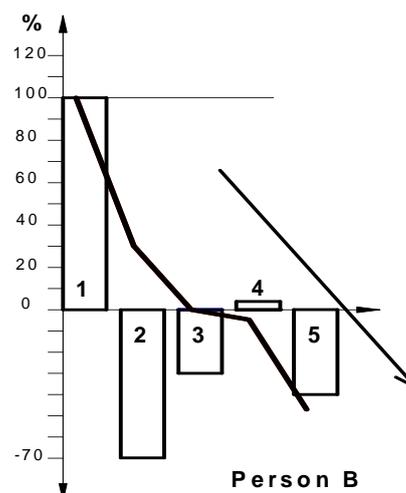


Fig 2

For example, there are two conditionally equal students. Person A (Fig. 1) and person B (Fig. 2) are with conditionally equal quantity of energy from the morning (1) and today

they both will do equal work and will use equal quantity of energy (2). But the difference is that person A likes this work very much while person B dislikes it very much. Already in the course of work person A gets (3) positive emotions (positive energy), because he enjoys this process and after finishing the work he gets one more great volume of positive emotions (4), that is called – satisfaction. The resulting diagram already is increasing and if appears favorable estimation of the result of the work, then this diagram continues to increase also after the work is finished. Such person is ready with pleasure to begin the next work.

Person B performs the same work and uses the same quantity of energy (2), but doing the work he dislikes, he is compelled to use additional energy trying to motivate himself to do that. After the completion of the work he also can get some positive emotions (4), but they qualitatively differ from the satisfaction of the person A. It is rather a kind of relief that unpleasant process is over. But the next thought to him is that ‘tomorrow it will start from the beginning’, so he can loose the last strength (5). Quantity 1 and 2 to both are equal, but quantity 3, 4, and 5 differ principally and as the result person A performs not only the work, but also gains positive charge, which allows to go to ‘next victories’. Person B in his turn has done the work, but is emotionally empty to continue the work the next morning. Person B must gain energy (positive emotions) from other areas: hobby, friends, love, family, amusement, etc., which in turn needs energy, but gives it also back. Practically person B acts as person A, only to the other sphere, no more to the first task. From there we get the great number of discharged students. Discharged students as a rule are not enthusiasts of their chosen profession. The difference of these results is called a subjective factor ‘like’ and ‘dislike’. These factors ‘like’ and ‘dislike’ are possible to be influenced by offering alternative task. But which exercise of the curriculum to substitute?

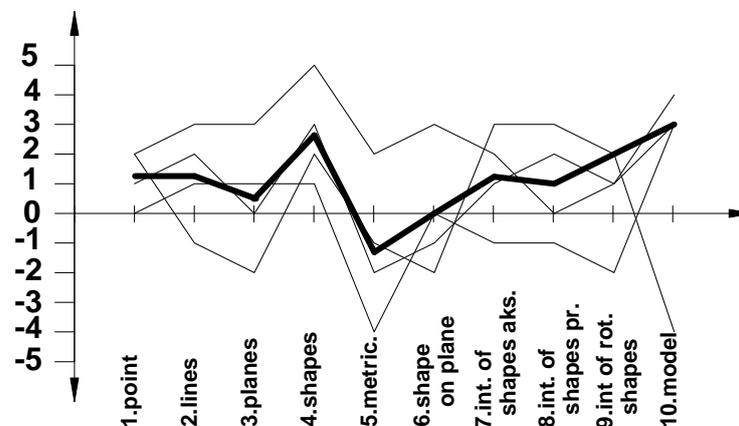


Fig 3

The results of students' questionnaire. In diagram (Fig. 3) students estimated the task of the first term in the system of ten marks according to the principle ‘like’ and ‘dislike’. Mark ‘+5’ means ‘like very much’, but mark ‘-5’ means ‘dislike very much’. If one of the exercises is thoroughly disliked, then it is objective factor and the exercise must be altered. The results of students' questionnaire show that average estimation of the content of the learning curriculum is positive, but each one-task students estimate differently, so objective factors are exhausted. The author of the course offers the students possibility to choose by themselves which task they will substitute according to the principle ‘like’ and ‘dislike’.

The author's experience. I have given as alternative exercise different themes, but last year it was the topic on 'Surfaces'. In reality it could not be called a task in the classic understanding, because there were not given any conditions of the task. A student himself could choose what to do in the framework of this task. The offered variants were the following:

1. To analyze any surface from the viewpoint of surface forming;
2. To create a chosen surface in various manners;
3. To find some examples of realized architectural constructions for different surfaces;
4. To choose any architectural object and to express various versions about the principles of construction of a certain surface;
5. To put forward any other topic from the area of "Surfaces", which the student could find.

Consequently the favorite variant was to find different realized architectural structures for different types of surfaces.

I have also allowed alternative possibilities in the framework of one task. The last task in the first term is to create a model and there are three variants possible:

1. To make a model of three intersecting surfaces or polyhedrons (from the tasks No.7 and No.8);
2. To make a model of three separate surfaces (prism, pyramid, cone), where each of the surfaces has been intersected with three planes (from the task No.4);
3. It is also possible not to make a model in the first term, but to leave this task to the second term. In the second term we shall have the theme 'Roofs', and the students will have to make the model of the roofs where the heights of the basic perimeter are different.

The students usually like modeling but before that, they must do something else: They must construct the intersections and developments of the surfaces. If the task of the intersections of surfaces seems for the student unpleasant and difficult, and solution is not precise, the model will not be good. In that case the best solution is to choose something else, for example, the roofs. The student's choice for the model usually is to divide the offered variants into similar parts.

The students receive the information about alternative task 'Surfaces' very positive and with much of interest. However, this topic has been chosen only by a few of them.

The reasons could be different.

1. There are not so difficult and unpleasant exercises, which they would like to substitute in the standard curriculum;
2. It is always more difficult to work alone;
3. The standard tasks are explained in the books and methodical instructions and etc.;
4. The theme 'Surfaces' is extensive and students must have a good knowledge to select this theme.

It is interesting that there are two target groups of very different interests to the alternative task of free choice. Some of them are those, who have great difficulties with one of the exercises, or those, who dislike some themes. Then they can avoid the problem and search for something more interesting or easier. The others are enthusiasts who always try to learn and do more than it has been included in the standard curriculum.

The alternative task has also a positive 'side effect'. A student who has begun to find and explored some topics from the outside of the obligatory curriculum is usually more enthusiastic and in the second term wishes to continue the exploration. Thus several students come to the Students' Scientific – Technical Conference. What's more, it can be observed

that the positive experience is progressive – in the second term more students are occupied with exploration than in the first term.

The substitution of one exercise does not diminish the quality of the learning curriculum because it is compiled so that the next exercises are based on the previous themes. So if a student does not solve one exercise, it cannot be understood that he does not know the theme. And, of course, there are also tests on the most important themes.

Conclusions. The author is convinced that the experience should be continued because an alternative exercise procedure offers the possibility of choice, even if it is not used.

To students-enthusiasts there are the following possibilities:

- a) to learn more about the themes they are interested in;
- b) to understand, what the work of scientific-research is and not to be frightened of it;
- c) to take part in the students' scientific research conference.

To the unmotivated students there are the following possibilities:

- a) to turn upside down their energy diagram by substituting the exercise;
- b) not to make backlogs by solving one extra exercise;
- c) to understand that there is no exercise which could be too difficult for their studies in the university;
- d) to choose the themes they are interested in and which do not have a negative notion about the subject;
- e) to get interested in the subject and become the student-enthusiast.

All students have the opportunity to make sure that they both master their fate and make the choice themselves. Besides they make the choice from several variants which they themselves can offer.

The author's experience refers to the descriptive geometry course. However, a similar method can be used in other subjects as well.

References

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ALTERNATYWNE ZADANIA W KURSIE GEOMETRII WYKREŚLNEJ DLA ARCHITEKTÓW

Wolny wybór (lub alternatywa) zadania oznacza, że student rozwiązanie danego zadania może zrealizować poprzez zamianę na inne ćwiczenie z programu obowiązkowego, takie które potrafi rozwiązać. Nowa metodyka prowadzenia zajęć dydaktycznych z przedmiotu *Geometria wykreślna* dla studentów Wydziału Architektury Politechniki w Rydze (Łotwa) oparta jest na teorii *pozytywnego myślenia* z dziedziny psychologii. Studenci, którzy wybierają alternatywne zadania rozwiązują je z dokładnością do najdrobniejszych problemów tam występujących.