

# Activation of Students in Lectures

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**Dr. sc. Rainer Baumann**

Computer Engineering and Networks Laboratory  
ETH Zurich, Switzerland  
baumann@tik.ee.ethz.ch

**Abstract – For many years, lectures have been a monologue with almost no student activities. Today, it is well known that the student activation in lectures significantly increases the learning outcome. In this article, an overview about the most common techniques for student activation is given. For all of these activations, concrete learning objectives and areas of applications are presented together with hands-on hints for the accomplishment.**

## 1. Introduction

In larger universities, lectures with hundreds of students are common. Such lectures are often a single monologue given by the lecturer. He or she presents the curriculum without any activation of the students. As a consequence many students get tired and can hardly follow the lecture. Many scientific studies have shown that student activations significantly increase the outcome of their learning [VD01, TT79, Du06]. As a consequence, student participation should be included in every single lecture. Although many lecturers know about this issue, not many take it into account. They often argue that they do not have concrete ideas for such activations. In this article, several proven ideas of student activations are presented. In addition, hands-on details are presented for the accomplishment of these activations.

A student activation can be divided into three parts. The instruction phase, the activity phase and the termination phase. In the instruction phase, the lecturer presents the activation task to the students. On one side, for short activations like asking a question, the instruction phase may be very brief and informal. On the other side, for more extensive activations like small group work, the instruction phase should be rather extended and formal. Such extended task instruction should follow a simple scheme presented in Section 3. The activity phase is the time for the students to get active. In Section 2, a collection of different student activations is presented. And finally, the termination phase is the time for collecting the results of the activity phase and to find a smooth end of the activity. Because of the high dependency between the termination phase and the activity phase, they are both discussed together in Section 2.

However before starting the discussion of the different activations, it is important to shift the focus on the learning target. Every single student activation requires a well defined learning target because a student activation is not an end in itself. It must be chosen very carefully to fit a lecture properly. The most common learning objectives are the following:

- Application of the presented curriculum
- Self assessments of students, which enable them to determine if they do well or if they should spend more time on the subject
- Discovering new things
- Training of higher cognitive levels
- Highlighting of important aspects of the curriculum
- Increasing the attention of the student for a certain topic
- Relaxing the students

## 2. Activations

In this section, a collection of proven student activations is presented. All of these activations are known to have a positive impact on the learning outcome of students.

### 2.1 Asking Questions

Asking questions to the students during lectures is the most popular and well known activation but it is also the most dangerous one. A lecturer might tend towards asking many, spontaneous, simple questions about pure knowledge and developing the curriculum based on these questions. Such a behavior is well known to have a negative effect on the learning outcome of students [Di82, FF01].

When questions are well prepared and carefully placed at strategic positions in the curriculum, then they are a very powerful instrument. Asking questions can be used for several different purposes [Be68, GP94]:

- A very promising purpose is the training of higher cognitive levels. Higher cognitive levels are the analysis, the synthesis, and the evaluation [BD56]. In contrast to the lower cognitive levels, the higher levels require proper thinking and are not based on reproducing and applying knowledge. This training can be achieved by asking open questions, which cannot be straightforwardly answered. Such questions can typically not be answered by yes, no or a keyword. Thus such questions can also be used to let the students discover new things on their own. The termination phase of such questions always requires a minimal discussion of the students' findings in the class.
- Another purpose is the application of the presented curriculum as an exercise. It is well known that trainings are an important key factor for success. Thus a lecturer can ask the students to apply the newly learned things to a concrete example. The results are then presented in a similar way to formative test, which are presented later on in Subsection 2.5a. The major difference to formative tests is the purpose of the questions and the time when they are presented. Exercises should be presented straight after the new learning matter while formative tests should be used at the end of a topic.
- The last purpose presented in this article is the highlighting of important aspects of the curriculum and the increase of the students' attention for a certain topic. This kind of questions should be used very carefully because they often do not fit very well and do not contribute to the learning outcome.

## 2.2 Reading

The word lecture already indicates the word "reading". But why not give short readings directly to the students? For complex and new things it is a promising approach to give the students a short reader [Du95]. With this the students might concentrate on the most important points or discover new things. But for the success of this activation, the lecturer has to state his or her expectations very clearly. In addition, a formal termination phase is required as for example a discussion in the plenum or presentations of the students' findings.

## 2.3 Classroom Debate

On one hand, class room debates tend to be chaotic and to drift away from the major subject of a lecture. On the other hand, they have many positive effects as for example: the students can present their ideas themselves, they can train their debating skills, they can develop proper ideas, and much more [LRJ56]. The major challenge is to give a clear guidance to such classroom debates and to find topics that are well suited for open discussions. Such topics might contradict research results or normative questions. Usually, it is very hard to find a suitable end for such classroom debates. Thus it is very useful to put them at the end of a lecture or to give a hard predefined time limit.

## 2.4 Small Groups

Small groups are a promising option for dipping into complex problems or discussing controversial points [TT79, Co94, JJ97]. Usually, such small group tasks require around 5 – 7 minutes and are a very good training for team work. In addition, it offers the students the opportunity to learn from each other and to exchange their opinions. Small groups can be used for different purposes:

- Small groups are optimal for dipping into complex problems. The students can develop and defend their own theses and opinions.
- Small groups are also very suitable for the application of the curriculum, especially in areas where there is no clear answer or where the problem solving methodology is more important than the result itself.

Important for working with small groups is a predefined end of the activation phase and enough time for the termination phase. In the termination phase the lecturer has to give the students the opportunity to present their findings. Even though the first student might already present an optimal solution, the other students should still be given the chance to present their own solutions.

## 2.5 Individual Work

Individual work is appropriate for exercising basic skills or for formative tests [Du06]. In contrast to small groups, the exercises should not be complex and the majority should be able to solve it. Formative tests go a step further. They do not aim at exercising; they aim at giving a feedback on the learning outcome to the students and to the lecturer. A small collection of questions, preferably multiple choice questions, is presented to the students in a written form. The students solve these questions on their own in a predefined time. The termination phase offers space for many variations. The correct results might be presented by the lecturer or by different students. An even more interesting way is to let the students vote for the correct results. This allows everybody to show his or her knowledge and in addition gives a feedback on the learning outcome to the lecturer. Such formative tests have a very positive effect on the learning outcome because they enable the students to judge their own development. Like this, they have a feeling of success or know that they should work harder for this lecture.

### **3. Task Instruction**

When starting an activity independent of a lecturer, it is highly important to give very clear and formal task instructions [FF01]. For a high learning effect, these task instructions should include clear statements about the what, the how and the why of the task. These statements are best structured in the following six points, which will be discussed in more detail later on: Introduction and Context, Task Description, Formal Structure of the Result, Kind of Activity, Available Time and Benchmark.

The task descriptions should be given in a written form on a worksheet, on a board or projected. This ensures that the students know the exact guidelines and may check them whenever they want during the whole task. Without a written task description, the students may not organize themselves accordingly and may be surprised about an early end of the task.

#### **3.1 Introduction and Context**

In the introduction the students should be explained the context of the whole task. It is important that they know why this task is appropriate and what the relation to the topic is. Thus, the introduction should include a kind of motivation for the task.

#### **3.2 Task Description**

The task description should include all necessary information what it is about. The major criterion for a good task description is that the students will understand it already after their first reading or hearing.

#### **3.3 Formal Structure of the Result**

The formal structure of the result should describe how the students have to provide their final product, for example catchwords on a slide or an oral two-minute presentation. It is important to state the lecturer's expectations clearly. The students should know what is important and how they have to deliver the result. Like this the students focus on the relevant parts of the task.

#### **3.4 Kind of Activity**

The kind of activity describes how the students should work. For example, they may work on their own or in small groups. But even discussions in larger groups in a separate room are possible.

#### **3.5 Available Time**

The announcement of a clear time limit is highly critical. Without such a time limit the students won't be able to schedule their activity properly.

#### **3.6 Benchmark**

The benchmark should define the expected quality as well as the quantity of the result. A clear benchmark is a helpful point of orientation for the students and a good motivation to reach the goal.

## 4. Conclusion

There are many possibilities for activations of students in lectures. In this article, five well established methods for activations are presented, namely asking questions, reading, classroom debates, small groups as well as individual work. For these activations hands-on recommendations for when and how to use them are given. In addition, a template for formal task instructions is provided.

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