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The use of new media in the process of learning and teaching in higher and highest education

Introduction

Teaching and learning are two separate processes. In the process of education both methods must meet each other as the effectiveness of education depends on it. If the process of learning and teaching is to be effective, there must be good communication between the teacher and the student. In education it is important to be able to:

- establish contact,
- support contact,
- give feedback,
- receive feedback.

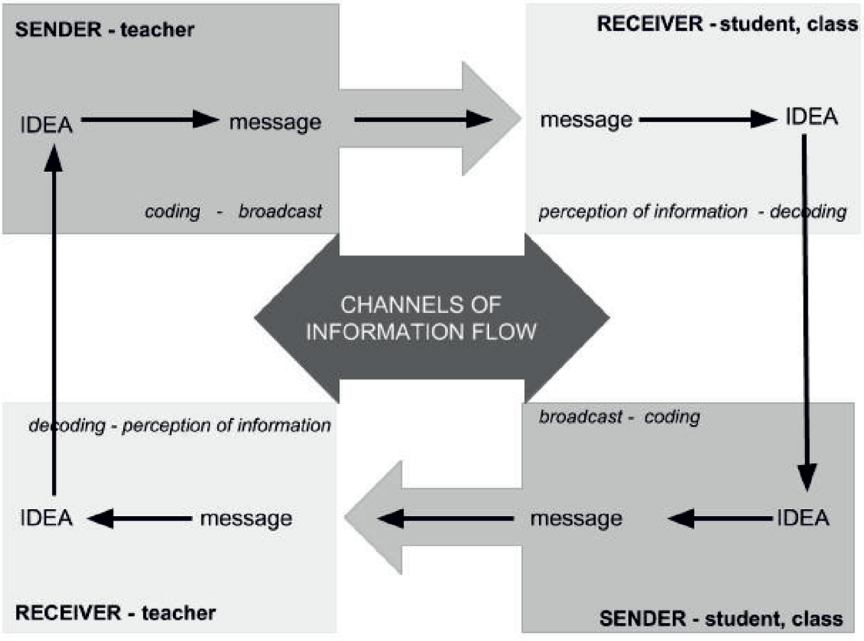

Fig. 1. Scheme of teacher – student communication (source: Fornalski, 2011).

During the typical lesson or lecture, the activities of the teacher and student are different. Mostly the teacher is active and the student is passive. This means that the teacher: encodes the information and sends this information to the student. The student should receive this information and decode it. However, at this stage of the learning process, the teacher does not know what the student is doing. The student may:

- not listen to the teacher (not receive information),
- not think (not decode the information).

The information given by the teacher to the student is encoded but also distorted. Therefore, the further decoding of information (by the student) causes that the teacher's idea may not to be identical with the student's ideas.

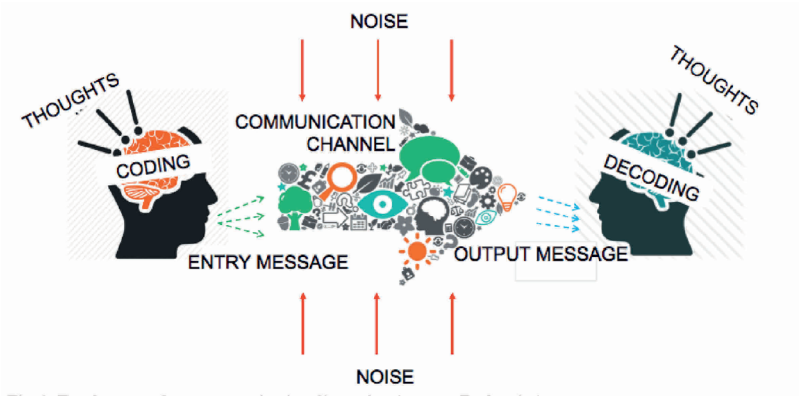

Fig. 2. Teacher – student communication disruption (source: Zychowicz, 2012)

During typical lesson or lectures there is no place and no time for the student to give feedback to the teacher. Therefore, the teacher does not know what information has reached the student and what ideas have made their way into his mind (wrong or correct). We can say that the processes described in the lower half of Figure 1 do not work during a typical lesson or lecture.

Tab 1. The table shows the teacher and student activities during a typical lesson or lecture.

Teacher:	**Student:**
• speaks • explains • displays presentations / writes on the blackboard • asks students – rhetorical questions	• listens • sometimes asks questions
• can use the whole time of the lesson or lecture, • devotes his time to students.	• has as much time as the teacher devotes to him, • must share that time with other students[1]
• does not know what the students understood	• there is no way/time for student to reaffirm his understanding of the subject

[1] Typical lesson has 45 minutes, if we have 20 students it means about 2 minutes for each student!

During a typical lesson or lecture, there is no time and place for feedback: from student to teacher. Therefore, it was decided to change the course of typical lectures/ lessons and apply new media and computer technology for communication between teacher and learner.

Background

In the past 2 years, the typical plan of lectures has been modified – by introducing new technologies to communicate teacher with students. These changes were possible due to the decrease in the number of students so each student had access to his or her computer. These modifications have been introduced, among others, in lectures on "general chemistry" – for students of biology with teaching chemistry and of geography with teaching science. The following article will discuss the research results for geography students.

It was decided to investigate whether the new form of teaching is attractive to students and whether it is effective (whether it affects the level of learning).

Changes to lesson plan

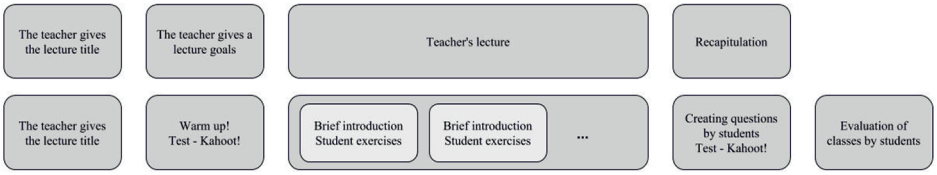

Fig. 3. Changed lecture plan: at the top typical lecture plan (passive students), at the bottom: lecture plan after the change (active students – they give feedback to the teacher).

GOALS

First changed "introduction to the lecture", i.e. the purpose of the course. In a traditional lecture, the teacher gives the students what the objectives of the lesson or lecture are, but this is not always motivating and the student may not identify with these goals. In the changed lecture we changed this part to "warm up". During this warm-up, the students solved a short on-line test (on a computer or mobile phone). For this purpose Kahoot![2] tool was used. The test results allow you to determine what students already know about a topic and what else they should know.

This exchange brings advantages for the teacher:

- quick feedback on how many students can answer a question and how many cannot,
- swift assessment:

[2] Kahoot! is a free game-based learning platform, as educational technology. Kahoot! is now played by over 50 million people in 180 countries. Created for use in classrooms and other learning environments, Kahoot!'s learning games ("kahoots") are multiple-choice quizzes that can be created by anyone and are not restricted as to age level or subject matter. As Kahoot may be played using any device, desktop, laptop or mobile phone with a web browser, it is popular in classes with "bring your own device" policies.

– what students already know,
– what are the shortcomings.

After answering the questions, the teacher briefly explains why this answer should be chosen and not different answer. As a result, there are no "misconceptions" in the students' minds.

In addition, during the lecture the teacher can:

- deduct and make up for the shortcomings of students from lower education degrees,
- skip those elements that students already know,
- spend more time on information that pupils do not know.

We can say that the student finds internal motivation to learn.

This exchange also brings advantages for the student:

- after answering each question, he gets a feedback whether he answered correctly or not,
- what is the scope of the material for that particular lesson or lecture,
- what do I know and what do I need to learn,
- element of play/competition.

LECTURE – main part

In this part of the traditional lesson only the teacher is active – he/she gives the lecture. This changed to 2–3 learning objects (depending on the length of classes: 90 or 135 minutes). Each of these elements consists of 2 parts: short theoretical introduction and on-line exercises.

Short theoretical introduction include lectures, screenings, films or animations. On-line exercises[3] for students are divided into 3 groups of tasks:

1. basic level – average,
2. difficulty level from medium to hard,
3. apps in life, extension, trivia.

Looking at what level the student solves the task the teacher immediately sees at what level the given student is.

Students work independently, each student solves as many tasks as he/she can, everyone solves at his/her own pace. The advantages, of this solution for students is that they have immediate feedback from the application whether their answer is CORRECT or WRONG.

Students can communicate with each other and seek help from other students and also they can communicate with the teacher and seek help from him.

The teacher does not need to check the work of all students (because the correctness of resolved tasks is examined by the computer software). So he has the possibility to help those who need it, for example talented pupils or students who have difficulties with completing assignments. We can say that individualization of teaching is present because there is direct communication with students who need it – more time for them!

[3] On-line exercises are prepared using the tools of Learning-Apps, Hot-Potatoes, Moodle platform tools, Google Forms.

Recapitulation

Recapitulation of the lecture consists of 2 parts.

In the first part students on the basis of the presentation (presented in short theoretical introduction[4]) create a database of questions for the lecture. Each student must write 10 questions to the lecture[5]. The teacher constantly checks the correctness of the students' questions, discusses errors.

For a teacher, this approach has the advantage of a quick feedback – students can choose the most important information from the lecture. Whereas advantages for the student are the opportunity to review the lecture again – immediately after the exercise, to think about what is most important – to organize information. In addition, after the lesson, the teacher can analyze questions, to consider whether the most important elements of the lecture are sufficiently emphasized in the presentation. He has the answer to the question: *Do students understand them well?*

The second part of the recapitulation is an on-line test. It contains of similar questions as the initial test (other tasks but the same type).

After students choose an answer for each question, the teacher once again explains, why they should choose that particular one and not any other answer. Again, student's misconceptions are indicated.

This solution has two advantages for students:

- after answering each question they get a reply whether they answered correctly or not,
- they know whether they have learned or not – and what he still has to practice.

The advantage of this solution for the teacher is quick feedback on how many students can answer a question and how many cannot. After the lectures (at home) teacher can compare results in detail and he see what students have learned (increased their knowledge) and what they did not!

Evaluation

The last part of lecture is evaluation. It also consists of two parts. The first part of the recapitulation is included in the on-line test. Kahoot contains 4 closed questions:

- how do you rate the lesson (scale 1–5),
- did you learn something new (yes/no),
- do you recommend lessons to other students (yes/no),
- how are you feeling (scale 1–3).

The second part of the recapitulation is prepared in Google Forms and contains seven open questions:

- The **hardest thing** for me in the classroom…
- The **easiest** for me in the class…
- In class I **liked** the most…
- In class I **disliked** the most…
- I rate my activities in class as…

[4] Prepared in Prezi or Google Slides (each student had a presentation available – he could use it on his own computer).

[5] To do this, we use Google Sheets (all students worked together on the same file in the cloud).

- The pace of work in class was…
- The amount of exercise in the class was…

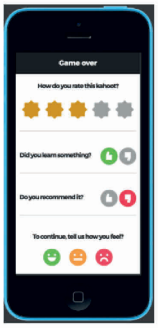

Fig. 4. Evaluation included in Kahoot

Evaluation of each activity allows students to anonymously evaluate both lecture and teacher. Advantages for the teacher is the ability to modify activities to the preferences of a group.

Research methods & Results

At the end of a series of lectures we conducted a test that evaluated the new method of teaching. 72 students of geography took part in the on-line test – the lecture covered the basics of chemistry. The test was conducted between 2015/2016 and 2016/2017 and it was attended by students of full-time and part-time studies. On-line test was prepared in Google Forms and contains nine questions, six closed questions (Likert's scale) and three open question.

The first closed question was about the level of the class:

The classes were for me…

too easy	1	2	3	4	5	too difficult

Percentage of responses

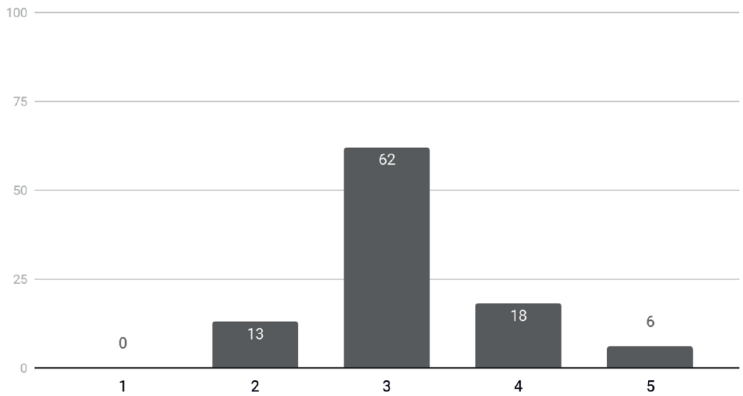

Fig. 5. Percentage of students' answers to the first question

It can therefore be concluded that the difficulty of the course was appropriate to the level of students.

The second question concerned the pace of the lectures:

The classes were for me…

too fast	1	2	3	4	5	too slow

Percentage of responses

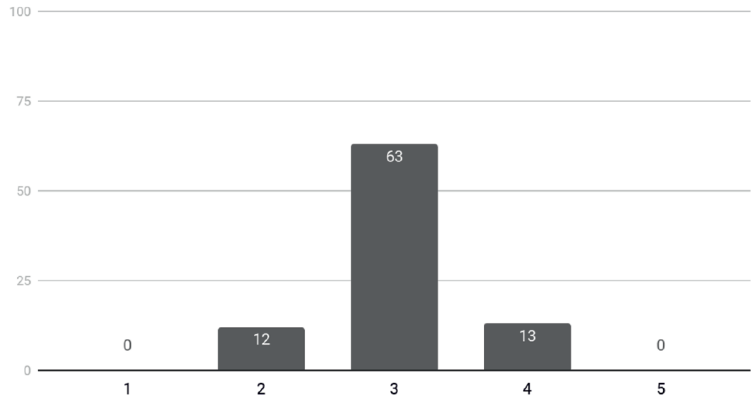

Fig. 6. Percentage of students' answers to the second question

A decisive majority of students (over 60%) believe that the classes were at the right pace.

The third question was whether the lecture was understandable for students.

The classes were for me…

I did not understand anything	1	2	3	4	5	I understood everything

Percentage of responses

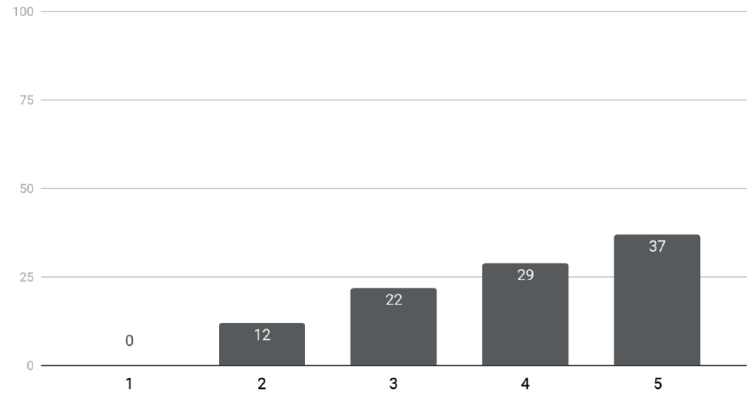

Fig. 7. Percentage of students' answers to the third question

The chart shows that more than 35 percent of respondents said "I understood everything". None of the respondents answered "I did not understand anything".

We can therefore assume that this form of teaching is appropriate and students understand the content transferred.

The fifth and sixth questions concerned the comparison of the traditional lecture to the modernized lecture.

The fifth question was:

Applying activation techniques (Learning Apps, Hot potatoes, Kahoot!...) in lectures:

I do not like it at all	1	2	3	4	5	I like it very much

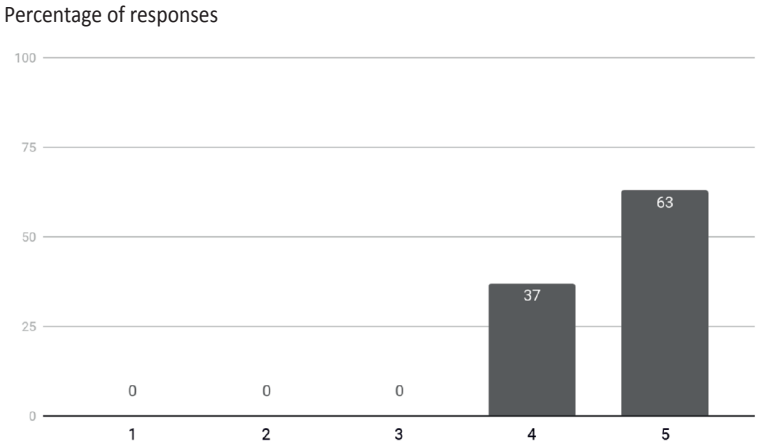

Fig. 8. Percentage of students' answers to the fourth question

The results show that all respondents liked the use of activation methods during the lecture.

The sixth question was:

I prefer classic lectures rather than activation techniques

I do not agree with this statement	1	2	3	4	5	I agree with this statement

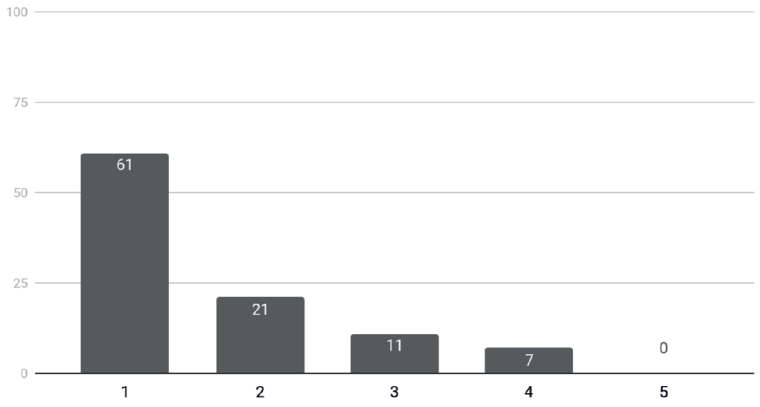

Fig. 9. Percentage of students' answers to the fifth question

The majority of respondents (over 80%) prefer a lecture with activating elements.

Lectures received high marks from students (in question seven). On a scale of 5 gradual overall assessment of the lectures is 4.25.

The last three questions were open questions. Students did not have to answer these questions.

They answer the question: *In the classes I liked the most...* the students wrote:

- Learning through fun, fun approach – 12%,
- Simulations! – 9%,
- Modern and surprising approach to learning – 8%,
- It was that we were able to keep up with what we were talking about – 33%,
- Explanation, based on examples from everyday life – 16%
- Good attitude to the student and nice atmosphere, pleasant atmosphere – 13%,
- Feeling that we can ask about everything without any problems – 9%.

These answers can be grouped into 4 categories:

- learning through games and fun – 29%,
- the ability to practice theories – 33%,
- examples from everyday life – 16%,
- atmosphere in the classroom – 22%.

For the respondents the most important thing was the possibility of exercising the acquired competences "at once", i.e. during the lecture. It is assumed that the ability to check in practice whether the theory is understood, coupled with the ability to ask the teacher has caused the minds of students not to form false ideas (misconceptions).

It can be assumed that point 4 (atmosphere in the classroom) at least partially depends on points 1 and 3 and not just on the personality of the lecturer.

They answer the question: *In the classes I disliked the most...* the students wrote:

- Speed of the lectures (too fast) – 12%,
- Where are the notes? – 13%,
- What will be on the exam? I know we write questions ourselves, but we do not even know what to ask – 24%,
- I liked everything – 51%.

The results are very good: as much as 50% of respondents have no reservations about the new method of lecturing. 37% of respondents were not sure whether *this form of teaching would be effective*. They were worried about the results of the final exam (it turned out that the fears were unfounded).

The last question is: What are your *own suggestions on how to conduct classes...* Only 24% of students answered this question. They found that: *As is currently being conducted this suits me very well*. It is therefore possible to think that such a form of lecturing is appropriate for students

Conclusions and implications

Based on the results of the questionnaire, it can be said that the way of lecturing was liked by students. However, the basic task of the lectures is to prepare students for the exam. This goal was achieved, all students who took part in lectures using

activating techniques, passed the exam. In the previous years (when traditional lectures were used) 10–15% of students did not. Also, the final exam grades (with upgraded lectures) were higher – on average by 0.75 degree.

Summary

The use of new media in the traditional lecture gives us:

- Individualization of teaching,
- Immediate feedback for students,
- Better communication between teacher and student,
- More time for teachers to work with students,
- Information that teacher can use to assess his occupation.

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The use of new media in the process of learning and teaching in higher & highest education

Abstract

The article describes the innovative use of new media in the teaching of students. The difference between traditional lectures and lectures using new media has been described. The activities of the teacher and students were compared during traditional lectures and "modern" lectures. The level of students' satisfaction with lectures in which modern media were used was examined.

Key words: new media, teaching, highest education

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