The addition of an interdisciplinary approach for holistic learning

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Abstract. Teaching today is undergoing many changes. Education according to the STE(A)M principle and interdisciplinary approaches contribute to the fact that pupils' knowledge and competences are comprehensive and useful, as this allows students to acquire knowledge more independently and connect different fields. But if we work in class according to such concept, the amount of processed material would consequently be smaller. To avoid this, we want to do both in a way. I`ll present how students can use knowledge from the regular curriculum by participating in projects and elective courses operating on the principle of STE(A)M, while developing this knowledge holistically

Introduction

Interdisciplinary approaches to learning and experiential learning are active forms that make sense, as the individual comes to knowing himself. However, when dealing with learning material in the classroom, the problem arises that, due to a different way of acquisition of learning material, processing of learning content is slower and not all areas of physics could be dealt with in this way within the timeframe of high school.
For experiential learning, individual involvement in experience and thinking is important [1] According to [2], experiential learning results are a set of quality experiences coupled with significant reflection.

The lessons, which are intended to inspire experiential learning, usually refer to the past experiences of individuals, which are re-examined, mirrored and linked in a group to the cognition of others. On the other hand, we can also talk about the planned activity, which should encourage direct experience in lectures to occur. Taking into account the students themselves, their personal experience introduces new values to group learning [1]. Active learning or learning through experience takes more time, affects the changed roles of all those involved in the learning process: the teacher's role changes from one who gives, explains and does everything to one who prepares learning conditions, directs, advises, supports and gives feedback; The students are not only a listeners and observers, but are at the heart of what is happening: They have clear goals ahead of them, learn to develop their ideas, ask valid questions, test new possibilities, participate, perform and listen to others, assess the quality of their knowledge, skills and achievements and improve it [3].

Implementation

I started searching for the answer to the question of how to combine both ways of working, i.e. frontal teaching and experiential learning, by analyzing the currently used situation at the school. The system I use or develop is such that I generally work frontally in classroom classes, but with a large amount of interaction with students, where I encourage them to invoke their prior knowledge and connect the contents with other subjects. For example: We associate air heating, thinning, lifting with knowledge of winds in geography ...

In the second step, the turn comes to an interdisciplinary approach, where students mostly use experiential learning in an elective course or when participating in interdisciplinary sections to

connect previously acquired knowledge, and in science subjects also according to the principle of STE(A)M. Since these courses are optional, this contributes to a greater motivation of individuals to take an active approach, as they choose their own fields. In addition to formal learning at school, we also offer students at the school the opportunity to participate in projects (for example, the European project 6CliPs [4]) and activities that further emphasize students' initiative. According to the principle of STE(A)M, with an experiential approach, and above all interdisciplinary at the school, we carry out elective courses of physics, chemistry, informatics, biology, geography ... At the same time, we also offer an interdisciplinary section of FIK experiments, where students directly connect knowledge of physics, chemistry and informatics in the creation of a chain experiment.

Results

When I made a surwey among students, they confirm my throught about this way of working. The survey included 54 students, of which 16 were representatives of the 2nd year and 38 were 1st year students.

Inquiry based learning was identified in science courses, excursions and participation in projects. Learning according to the STE(A)M principle, however, was primarily recognized in natural science subjects, in second grade studets it was also indentefied in the interdisciplinary optional subjects of FIK (physics, computer science, chemistry). In the project, the work on this principle was recognized by students who worked in the E+ project 6CliPs, which is exactly what it is intended for.

The survey showed that although students believe in the quality of work according to the STE(A)M principle and in the way of inquiry based learning, they are aware that this way of working requires more time and independent activities, and therefore a large proportion of students do not believe that everyone would be active. When asked what kind of work motivates them the most at school, the students answered that the opportunity to discuss with professors means a lot to them. As the next option, however, they marked a working in groups with unlimited resources. Least of all, they would be motivated by frontal work without discussion and independent work with limited resources. When analysing the results, I realised that students aknowledge connections from the regular curriculum in elective courses and projects.

To sum up, both teachers and students are aware that this way of learning has a lot of pluses and minuses. It is closer to students who are more science-oriented, so an active approach to learning makes sense for narrower groups who choose such ways of working themselves, and therefore elective subjects and European projects such as 6CliPs are excellent.

Reference

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[4] E+ 6 CliPs project: https://www.youtube.com/@6CliPs_Eplus?app=desktop, 20. 02. 2024.