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Active exploration of mathematical formulae

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As mathematics is said to be "the queen of science" every student has to gain at least a basic knowledge of it. Teaching students how to solve mathematical exercises is a difficult task. The problem itself is quite complicated and requires special skills from the learners (e.g. intelligence, analytical way of thinking).

Pedagogy shows that one of the biggest issues in learning activity is the problem of keeping learners' focus. Teaching by explaining (e.g. lectures, books) is not effective since the knowledge of the learners differs and some of them may prefer more or less detailed explanations. One of the most efficient ways of overcoming this problem is so-called 'learning by doing'. This approach forces students to actively participate in an interactive process which simultaneously increases their overall knowledge. Learning by doing is more adapted to personal skills and keeps learner's focus. This approach allows to adopt the to skills of each student and allows him to build the understanding of the problems himself.

We will present how process of learning mathematics will be enhanced by the proposed methodology. We propose a new approach where student can explore mathematical formulae actively (learning by doing). This approach utilizes templates to find fragments of equation which can be treated separately according to some mathematical rules. This represents the natural manner used by people to solve mathematical problems by decomposition. The recognized fragments of the formula are visually denoted by enclosing them within transparent boxes. Thereby, student can easily see which parts can be further explored and can freely choose among them. This brings interaction into the whole process and makes the learning more entertaining and dynamic. Our methodology requires student to take up the initiative and significantly improves his analytical skills and ability to solve complex mathematical problems.

The presented methodology has a huge impact on the process of learning solving mathematical problems and its efficiency. It not only facilitates the process of learning but also encourages students to actively improve their knowledge through interaction.