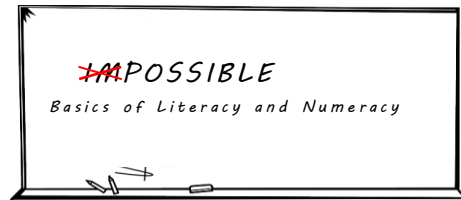




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## Content-based methods

**Content-based methods is a way of improving general thinking skills while teaching subject matter knowledge. Content-based methods should be so seamlessly integrated into the regular school instruction that ultimately the regular school instruction itself should be functioning as such 'teaching thinking skills'.**

When we develop a subject matter course or a curriculum that contains 'infused' or 'embedded' opportunities for training thinking skills, we face difficulties caused by the constraints of the content which we are supposed to use. We may ask the question: „Why should we put forth so much effort to include the training in the established curricular disciplines, when there would be fewer constraints if we devised a separate course?“ The first and most trivial answer to the question is: because the subject matter knowledge is there and the students are required to deal with it and finally to master it anyway. Students spend thousands of hours studying the content of several subjects. Why not better utilise this time by also improving thinking?

Thinking always needs a content, we think about something. The 'empty thinking' or 'thinking about nothing' does not exist. Separate courses for teaching thinking often use exercises with abstract content without any concret meaning in the hope that the thinking processes acquired in this way do not stick to some specific concrete situations so they transfer well to any other domain of thinking. However, there is little evidence that these programmes have long-term effects on intellectual development. If the training of thinking is integrated into the curriculum, the information given there can be used to process, by the skills to be practised.

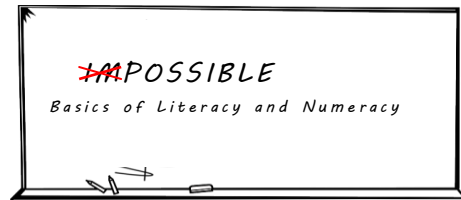
The goals of improving thinking abilities are much less articulated and their position is rather weak when competing for instructional time. Thus, methods must be found for transmitting subject matter knowledge and improving thinking that do not compete but rather cooperate.

**Thinking is not only a goal of instruction, a desired outcome that finally appears as a result of specific teaching thinking skills, but it is a means of learning that has to be practised throughout the entire learning process.** One of the most common experiences of researchers and practitioners alike is that **learning is possible without intensive thinking, but if students spare thinking, simple memorisation or rote learning results in inert knowledge that can be used for a little.** Some main problems frequently mentioned in this context are:

- Since students are not able to mobilise their knowledge in contexts other than in which they learned, their knowledge cannot provide a firm basis for further learning. Thus students' knowledge falls into separated, isolated segments.



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- Students are not able to apply their knowledge in real life situations.
- School learning does not affect students' naive theories and misconceptions, even if they learn the content of the subject matter and are able to recite it. Therefore their misconceptions are more likely to influence them than is their science knowledge when they make decision.

In contrast, meaningful learning results in coherent understanding of content. Understanding requires active processing of the material, following the inherent logic of the subject matter, organising the concepts and facts, drawing conclusions from the information given, and building relationship between already existing knowledge and newly acquired information. In summary, **practising thinking in the framework of teaching the subject matter knowledge is necessary not only for improving the quality of thinking but also for improving the quality, accessibility and applicability of knowledge as well.**

Several innovations and reforms in education indicate that **significant improvements cannot be expected without significant additional efforts**. This is so with improving thinking skills as well; no short-cuts or quick fixes exist. Although modification of already existing courses, practices and teaching methods in order to foster thinking is more conceivable than introducing new courses and producing totally new materials. Furthermore, school curricula are already full and new programmes can be added only if others are eliminated.

**Productive thinking more likely means mobilising previous experiences and existing knowledge rather than pure, computation-like reasoning.** Human cognition is much less rational than was generally believed in the past. Content of the problems often plays a more important role than its structure. Learning certain skills in a specific domain provides little chance to use these skills in a new, unfamiliar context. In other words, we have little natural ability to decontextualize our thinking skills which are acquired in a specific content.