PEDAGOGICAL REQUIREMENTS FOR THE DEVELOPMENT OF HIGHER-ORDER COGNITIVE COMPETENCIES IN THE HIGHER-EDUCATION CONTEXT

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The reason we chose the development of cognitive competencies in learners rests on the scale of cognitive operations learners perform in their academic studies. Comparatively, more concentration on learners' standardized achievements in tests raises the question of how deeply it is reflected in their cognitive development. The second question derived from this is whether learners' academic output corresponds to the academic learning requirements. It is necessary to emphasize that the improvement of learners' standardized achievements in tests is often the result of building up subject competencies rather than cognitive skills in learners[54]. This, in turn, means that the main concentration in academic institutions lies on the improvement of the subject knowledge, underestimating the formation and development of refined intelligence.

However, according to E. Hanushek and L. Woessmann, developing cognitive skills in learners is considered to be a state matter, since there is a correlation between educational achievement and Gross Domestic Product. In other words, educational policy that facilitates cognitive competence growth can further find its reflection in economic growth[55]. It is argued that there are large payoffs to such skills, supporting the idea that individuals with higher levels of cognitive skills do better than those with less. According to the data, cognitive skills matter most in several European countries, including the Czech and Irish labor markets[56]. Incidentally, these countries have recently shown remarkable economic growth[57]. The question that arises here is what constitutes economic growth of society, whether to instill in individuals lower-

[54] Finn, A. S., Kraft, M. A., West, M. R., Leonard, J. A., Bish, C. E., Martin, R. E., ... & Gabrieli, J. D. (2014). Cognitive skills, student achievement tests, and schools. *Psychological science*, *25*(3), 736-744.
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order cognitive competencies or higher-order cognitive competencies. In other words, individuals with higher-order cognitive competencies tend to facilitate Gross Domestic Product growth, not just lower-order ones.

Learners' higher-order cognitive skill development can be reflected in innovation and scientific discovery.

The main components of HOCC are seen in learners' critical thinking, problem-solving, creativity, decision-making, innovation, and strategic planning.

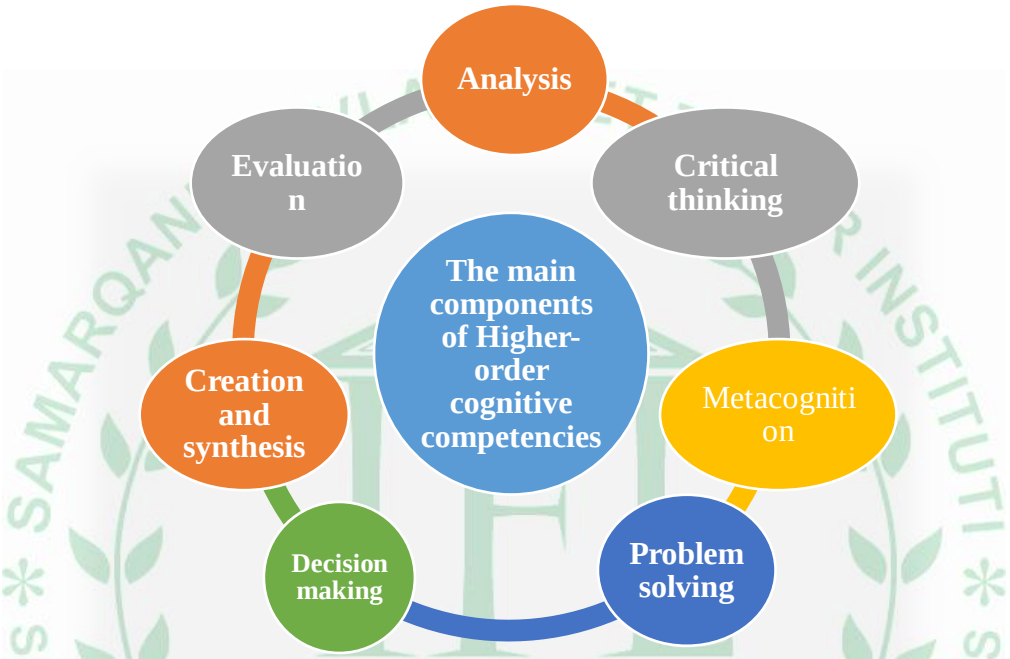


Fig.1.3. The main components of Higher-order Cognitive Competencies.

As the main components of HOCC, A.Lewis and D.Smith include problem-solving, critical thinking, decision-making, and creative thinking skills[58]. While K. Rhashvinder and K. Charanjit maintain that HOCC involves critical, logical, reflective, metacognitive, and creative thinking[59]. The right question appears concerning the time of activation of Higher-order thinking skills. King states that it is activated when a learner faces questionable, unfamiliar problems, uncertainties, and dilemmas[60]. From our view, the approach through which we are going to enhance learners' HOCC can be conducive to a problem-solving environment where learners are introduced to real-world challenges. A.King supports the idea that with appropriate teaching methods and a learning environment, these skills can be developed well, along with students' persistence, self-monitoring, flexibility, and

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open-mindedness[61]. What is the use of HOCC in the education system is another question that matters most. Once J.Dewey stated that if a student cannot generate their own solution and find their way out, they will not learn. Teachers can supply the ready-made ideas by the thousands, but they do not usually take much pains to see that the one learning engages in significant situations where their activities generate, support, and clinch ideas—that is, perceived meanings or connections[62]. From our perspectives, a student with well-developed HOCC can generate new ideas and formulate solutions to the problems through observations and experiences, challenge and test their ideas and solutions to verify their correctness and efficiency.

H.Schulz stated that critical thinking, metacognitive thinking, productive thinking, creative thinking, deep thinking, complex thinking, and logical thinking fall under the term Higher-order Cognitive competencies[63]. While Y. Heong and W. Othman consider that comparing, classifying, inducing, deducing, error analysis, constructing, supporting, analyzing perspectives, decision making, investigation, problem solving, experimental inquiry, and invention are subskills of HOCC and are regarded as the most important priority at Higher Education Institutions and should be integrated in learning and teaching process mostly concentrating on critical and creative thinking[64]. With creative thinking, an individual tends to be more innovative, have good creativity, be ideal, and imaginative. While P. Budsankon, T. Sawangboon maintain the idea that critical, analytical, and creative thinking as the main components of HOCC[65]. They believe that students with HOCC development can create new knowledge from which a logical explanation can be made. They support the idea that HOCC requires complicated thinking, comprising various skills such as analysis, synthesis, comparison, inference, interpretation, assessment, inductive, and deductive reasoning are utilized to solve unfamiliar problems[66].

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Thus, it can be stated that skills demanding complex brain functioning, such as analytical, evaluative, critical thinking, creation and synthesis, problem solving, decision making, and metacognitive are considered the main components of HOCC in our research.

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