

# ICAP Taxonomy of Modes of Cognitive Engagement: A Learner-Centered Theory Focusing on Observable Engagement Behaviors

*Xiaoqiao Cheng*

*Nanjing Normal University, Nanjing 210024, Jiangsu, China*

*“One of the cardinal features of cognitive therapy is that it stubbornly refuses to buy into your sense of worthlessness.”*

*—David Burns*

**H**ISTORICALLY, there have been a number of impactful education theories that used the taxonomy as a classification device, such as the Bloom taxonomy of educational objectives and Gagne taxonomy of learning outcomes. The Bloom taxonomy of educational objectives was developed in the 1950s by the U.S. Committee of College and University Examiners under the leadership of Dr. Benjamin Bloom, which categorizes educational objectives into three domains: cognitive, affective, and psychomotor. Among them, the cognitive domain (the main concern of their research) contains six major classes: knowledge, comprehension, application, analysis, synthesis, evaluation. They are arranged in a hierarchical order with the objectives in one class built on the behaviors found in the preceding classes. Its primary purpose is to provide classification of goals of the educational system for all teachers, administrators, professional specialists, and research workers who deal with curricular and evaluation problems (Committee of College and University Examiners, 1956). Gagne’s theory approaches learning from the viewpoint of the instruction. Under his taxonomy, the five categories of learning outcomes are verbal information, intellectual skills, cognitive strategies, motor skills, and attitudes, each of which requires necessary conditions to achieve and corresponds to specific principles of instructional events (Gagne, 1984).

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Comparatively, ICAP is a more learner-centered theory as it is about how students engage to learn rather than how instructors teach. It describes learning outcomes as a function of the type of activities undertaken by the learners (Chi, 2009). The ICAP taxonomy differentiates four modes of cognitive engagement based on the overt behaviors displayed by students: passive, active, constructive, and interactive, which correspond to differentiable knowledge-change processes: storing, integrating, inferring, and co-inferring. These cognitive processes elicit different changes in the learner's knowledge, resulting in different cognitive outcomes, such as the abilities to recall, apply, transfer, and co-create. Based on this taxonomy, the ICAP hypothesis is proposed that as students become more engaged with the learning materials, from passive to active to constructive to interactive, their learning increase correspondingly (Chi & Wylie, 2014). The ICAP framework provides concrete, operational definitions of student engagement activities and cognitive processes, thus making it useful to researchers and instructors in their design of activities appropriate for their intended research or instruction (Yang, 2023).

ICAP has been empirically validated by numerous laboratory and classroom studies; however, it has been faced with challenges in authentic classroom settings. In a five-year research project, Chi and her associates attempted to translate the theory into practice in a K-12 education environment. Volunteers of the project (frontline teachers) first received training through the ICAP module and then tried to apply their understanding of ICAP in lesson design and class implementation. Findings of the classroom implementation study revealed that students learned significantly more through constructive than active activities but were not successful in achieving the expected outcomes from interactive activities. The article emphasizes that more research is needed on how to facilitate students to collaborate in a co-generative way (Chi et al., 2018).

Since it was introduced to the Chinese education community, ICAP has been experimented in areas such as adult education, junior secondary physics instruction, senior secondary geography teaching, and physical education. Nonetheless, the existing literature shows that ICAP research in China is relatively insufficient. Practical Validation of the ICAP Theory in China: Holistic Module Learning in Shandong 271 Education Group in this issue gives a brief overview of ICAP and suggests that Chinese teachers and instructional designers can use the ICAP framework in observing and analyzing the modes of engagement behaviors of learners to identify problems with learning activity design, in an effort to maximize students' in-class engagement and interaction as well as enhancing the outcomes of learning activities. The authors argue that instructional strategies such as protocol-guided teaching and collaborative group learning for implementing holistic module learning exhibit compatibility with the ICAP hypothesis (Meng et al., 2023). Schools affiliated to 271 Education Group have had successful practice of the holistic module learning model over the years; Nevertheless, there is a lack of theoretical explanation for why this model is capable of encouraging active learning and stimulating higher-order thinking in students. In this sense, the ICAP theory serves to compensate for the gap. We believe that this study is a meaningful endeavor for advancing ICAP research and application in China.

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**Correspondence to:**

Xiaoqiao Cheng

PhD

Professor

Nanjing Normal University

Nanjing, Jiangsu

China

E-mail: [xqcheng2008@vip.163.com](mailto:xqcheng2008@vip.163.com)

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