

session: New Paradigms for Design Education

Exploring the nature of engineering novice's "a-ha" experience: a V-dot framework approach.

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Modifying the epistemological vee (V diagram) of D. Bob Gowin 1981, we developed V-dot (V) diagram as an epistemological model framework for guiding an engineering creativity design and implementation team of novice students. The V-dot diagram has two tapered sidelines representing, respectively, the knowledge and methodology researched, applied, generated, and developed. The knowledge and methodology interact and resonate along the creativity generation and implementation. The process starts wide and broad for creative ideas and concepts at the top of the V. As the creativity goes through engineering design and manufacturing, the brave and daring ideas compromise with reality and the project condenses and focuses into product realization at the bottom tip of the V. The whole process hangs onto and around the creativity, evolving from the top center to the bottom tip. Therefore, we use the dot in the V-dot diagram to emphasize the pivotal role of creativity.

We implemented the V-dot framework into a web-based interface (<http://cedesign.me.ncu.edu.tw/~tka/main.php>). Through this interface, the team members documented 1. their creative idea generations, 2. the knowledge driving their project actions, 3. the methodology and technology they applied, thus 4. the knowledge and know how they acquired and developed, and 5. their creativity products. The documentation served not only as an effective communication among the team members but also a valuable portfolio evidence of the creativity realization process.

Analyzing the portfolio record collected through the V-dot framework, we examined the activities of the team from the top, the formation of creative ideas, to the bottom, the creativity realization products. It was found to be a converging process jolting and bouncing between the knowledge database and the methodological actions, through which the team members obtained new comprehension and awareness - their "a-ha's". To novice members, the "a-ha's" many a times were the recognition of self deficiencies instead of enlightenment and know how. The novices often reacted merely in affordable ways. Namely, they compromised and abandoned original ambitions for easier and readily available amendments. Therefore, the final compromised creativity products fell short of the proclaimed selling points of the original creativity. The reasons and processes of such short falls would be discussed in the paper.

Without the V-dot framework for engineering creativity implementation, the revelation would not have been apparent.