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Dr. Tae-Eog Lee currently serves as Dean of Education 3.0 Initiative at KAIST (Korea Advanced Institute of Science and Technology), Korea. Its mission is to transform current lecture-based learning and teaching practices into interactive ones. He has made several invited talks for KAIST's educational transformation strategies and experiences at major Korean universities, International Presidential Forum for Global Research Universities 2012, Asia-Oceania Top Universities League on Engineering 2012, and Asian Engineering Deans' Summit 2013. He is the Chairman for Creative Education Subcommittee for KAIST long-term planning. He is also a Professor and Department Head at Department of Industrial & Systems Engineering at KAIST. He received his B.S. from Seoul National University (1980), his M.S. from KAIST (1982), and his Ph.D. from The Ohio State University (1991), all in industrial engineering. He joined KAIST in 1991. He served for Director of Library and Information Systems at KAIST during 2000-2001. He was a Founding Director of National Digital Science Library in 2001. He also served on the National Presidential Committee for Deregulation during 2010-2011 and University Restructuring Committee for Minister of Education and Science in Korea.

His academic interests include modeling and scheduling of discrete event dynamic systems and robotized manufacturing systems such as cluster tools for semiconductor manufacturing, cyclic scheduling theory, and modeling and simulation of complex engineering systems. He was an Associate Editor of *IEEE Transactions on Automation Science and Engineering* (2004-2008) and an Advisory Board Member for *OR Spectrum* journal, and served as a Vice President, a Journal Editorial Board Member, and a Journal Editor for KIIE and KORMS, and also an Editorial Member for ICASE (Institute for Control, Automation Science and Engineering) journal, Korea. He also served on program committees, as Associate Editor, Track Chairs or Coordinator, or Program Co-chair for International Conferences on Modeling and Analysis of Semiconductor Manufacturing, IEEE ICRA, IEEE CASE, ICARCV (International Conference on Control, Automation, Robotics, and Vision), and CSCWD (Computer Supported Cooperative Work in Design). He serves as Director for two funded multidisciplinary research centers on system modeling and simulation for defense and infrastructure disasters at KAIST. He as also given invited talks at Samsung Electronics, Micron Technologies, and Tokyo Institute of Technology, and a plenary talk in IEEE Conference on Automation Science and Engineering 2012.

Abstract

Education 3.0 for Interactive Teaching & Learning

Conventional lecturing has been accused of one-way information transfer, limited interaction between a teacher and students, teacher-centric, passive student roles, etc. Unless lecturing is practiced in a

class, interaction cannot help being limited. A recent student survey indicates that lectures account for only 10% usefulness for their learning.

KAIST proposes a simple and bold approach to overcome limitations of conventional lecturing by utilizing recent e-learning technologies. Lecturing is not allowed or minimized in a classroom. In a classroom, any teaching and learning activities other than lecturing are encouraged. A new classroom is made to facilitate interaction by changing the unidirectional table layout to a group layout and installing a whiteboard and a digital display for each group. Lecture videos, together with lecture slides, quizzes, exercises, etc., are provided in Internet for self-learning. Therefore, as a result, class hours are mostly filled with teacher-students, students-students, and TAs-students interactions including discussion, Q&A, exercise problem solving, group or team learning, team projects or tasks, etc. We implemented such a flipped or blended teaching and learning model, named *Education 3.0 class*, for more than 30 classes including calculus 1 & 2, general chemistry 1, biology, and basic programming for freshmen. 40 classes are in progress. We report our approaches, experiences, and issues for the interactive teaching and learning during the last two years. Student feedbacks were positive and the student achievement and class evaluation were also promising. Teachers and TAs as well as students, who were all skeptical initially, changed to be positive. The retention ratio for Education 3.0 classes was 75%. We will also introduce the future plan on increasing education 3.0 classes, classroom transformation, and globalization. We believe that interactive teaching and learning will improve our students' capabilities for creativity, communication, teamwork, leadership, and even characters, which are required by the industry and society.