Mechatronics in the technological innovation and entrepreneurship program

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Abstract *— Autumn 2003 Oestfold University College started up a bachelor program in technological innovat ion and entrepreneurship. The curriculum is influenced by an integrative and holistic approach to engineering education with early exposure to practice and design. The learning activities are structured around projects and cases with complex and authentic tasks, objectives, questions and problems. This paper present and discuss the use of cases in a multi -disciplinary design project from different perspectives: organizational – management - cultural -, use of different learning arenas - and creating teams of teachers for one topic.*

The cases presented are taken from the Mechatronics course taught the first year in the bachelor program. This is a 25 credits (European Credit Transfer System) multi -disciplinary course based on problem based learning and cases. The students are assessed using a combination of portfolio, project reports and written exam.

Problem based learning is a total approach to education and learning. Its common to define problem based learning as both a curriculum and a process. The curric ulum is based on problems that create a demand for key knowledge, problem -solving skills, work in teams and adjustment of learning strategies. The process is based on a systematic approach to solving problems or meeting challenges.

The cases presented are : Autonomous Lego vehicles, Science Camp, Bridge -models, Robotics -Case, Rocket technology and Energy from wind. The complexity in the cases increases with the progress of the course.

The Autonomous Lego vehicle case served as an introduction to Mechatron ics and technology. Using a Lego Robolab kit the students built a simple autonomous vehicle to take part in a speed race.

Second the students took part in planning and implementation of a scientific expedition to study earthlights in collaboration with s cientists (Science Camp). Problems solved involved logistics (the base stations were on a remote mountain), continuous manning and operation of professional equipment in a hostile environment and responses to changes in climate, plans and objectives. Data from the expedition are used by the Hessdalen Project in the search for knowledge about the earthlights phenomena.

Next case is focused on statics and mechanics (Bridge -models). The challenge is to design and build a bridge after a given specification in 48 hours. Key physical parameters are cost, building time and strength.

The biggest and most demanding case is programming and building an autonomous and remote operated robotics. Using an Evolution Robotics ER1 kit as a base the students build and prog ram a full size robot for use in a complex scenario with movement, sensors, voice, sight and wireless communication.

The fifth case is the Rocket technology case. This involves taking part in building and launching a rocket from the Andoeya rocket range u sed for research on the polar atmosphere.

The last case is the Energy from wind case. Key knowledge is electric circuits related with design and building of wind power plant model. Challenges will be the generator, voltage regulator and the design of the wings. Key physical parameters are energy delivered, voltage stability and cost.

Index Terms *— Innovation and entrepreneurship, Mechatronics, multi -disciplinary, Problem based learning, culture, management, organization*