

# **IMPLEMENTING DESIGN-BUILD PROJECTS: SKILLS DEVELOPMENT BY FACULTY THROUGH CASE ANALYSIS**

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## **Abstract**

The paper offers a concise description of a design-build project case in the field of wood technology and its particular issues which were subject to a case analysis in the framework of the enhancement of faculty teaching skills. Recommendations for coaching and monitoring design-build projects are offered. Finally methodological issues and appropriateness of introducing project case analysis for faculty development purposes are discussed.

*Keywords: design-build projects, coaching, faculty development*

## **New Context for Higher Education in Flanders**

In 2003 the Flemish Parliament adopted a new Higher Education Act ruling the so called bachelor-master structure as laid down in the Bologna Declaration. In order to respond to the needs articulated by industry and labour market, also some new general curriculum requirements were introduced e.g. a more competency based approach, including more active and authentic learning settings for acquiring generic competencies, such as team working and communication. This characterizes the new context with which higher education in Flanders has to cope. Fortunately this Flemish Act also included the launching of an incentive program regarding educational innovation in higher education. All higher education institutions were invited to elaborate an institutional policy paper on educational development.

## **CDIO at the Faculty of Technology, University College Ghent**

In its policy paper, the University College Ghent pointed at the following four issues: implementation of a powerful learning environment; competency-based curricula; staff development; improvement of study guidance. In this framework the Faculty of Applied Engineering Sciences and the Faculty of Technology at the Hogeschool Gent (University College Ghent) successively joined the CDIO Initiative in 2004. In order to comply with the CDIO concepts and standards, the Faculty of Technology's wood technology curriculum was redesigned, introducing design-build projects from the first year onwards. The new curriculum was first implemented in 2004-2005. From the start the Faculty of Technology opted for gradual introduction of the 12 CDIO-standards, starting with implementing design-build projects into the new curriculum, as was done in the Faculty of Engineering Sciences before [1].

## ***Faculty Development***

Faculty development is an important issue when it comes to new approaches in higher education. The people factor in faculty members may at times leave some of them unconvinced or even

unequipped to deal with the challenges modern engineering education presents [2]. So, since none of the faculty members was very familiar with design-build projects, all of them were introduced in a half-day course to the general principles of project-based learning, working with groups and group dynamics. As a matter of fact, the need for further education of faculty in group dynamics has also been demonstrated by other CDIO members [3].

**Project-Based Learning versus Design-Build Projects.** In his attempt to define the features of projects in project-based learning, Thomas [4] offers five criteria:

- Project-based learning projects are central, not peripheral to the curriculum.
- Project-based learning projects are focussed on questions or problems that “drive” the students to encounter (and struggle with) the central concepts and principles of the discipline.
- Project-based learning projects involve students in a constructive investigation.
- Project-based learning projects are student-driven to some significant degree.
- Project-based learning projects are realistic, not school-like.

All of these criteria are met by the design-build projects as introduced at the Faculty of Technology. This enables staff to rely on the general educational principles appropriate in a project-based learning setting, to run the design-build projects, especially in respect of the coaching, monitoring and assessment of project teams.

### ***Interactive Case analysis Workshop***

Despite this course, most of the teachers felt quite insecure when being exposed to their new duties, even the second time of running the new curriculum. Hence it was decided to strengthen the efforts in the field staff development. Should change agents offer interventions on issues that faculty perceive as valuable in order to address an immediate need, individuals would be more likely to participate [2]. Hence, it was decided upon introducing an interactive faculty development approach including the case analysis of a running design-build project offering particular problematic issues in the field of group dynamics and assessment. All staff members involved in the implementation of design-build projects attended the case analysis workshops facilitated by the faculty’s education development officer. Targets of the workshop included the acquirement of monitoring and assessment skills as well as the listing up recommendations for coaching and monitoring designed-build projects. The interactive case analysis workshop was scheduled while the design-build projects were running. The purpose was to benefit from observations made and to learn from the ‘real live’ experiences in the project teams, in order to improve the faculty’s project coaching and monitoring skills. Reflective practice has been demonstrated to foster faculty’s willingness to leave old teaching methods for new approaches [5]. One specific project team case was selected by the faculty’s education development officer for analysis in the interactive workshop. This case was rich enough to suite all the purpose of the workshop.

**Design-Build Project Case.** The design-build project includes the designing of a staircase ready for production according to a building plan. Also the measurement plan is available to the students. The ‘client’ expects some specifications to be fulfilled as well. Second year bachelor

students work in project teams (5-6 team members) during 1 semester under the supervision of a project coach. One half day is scheduled in the weekly course timetable for project work in the workplace. This is the minimum time students are expected to allocate to their project work.

**Description of the Project Team Case.** The team consisted of 5 students, with a rather heterogeneous background in terms of prior knowledge. One of the team members quits his studies, leaving the team with only 4 members. Some of the students in the team do not stick to the work agreements made within the team. The ‘team puller’ feels somehow insecure fearing a kind of revenge at the occasion of the peer-assessment, so he keeps silent, rather than expressing his frustration. Following extracts (translated from Dutch) from his personal project logbook picture perfectly the precarious situation (see Figure 1 below).

*“...11 a.m.: finally they show up; I was afraid it would happen this way. Student X has delayed his tasks again. I get angry and ask what is the matter with him ‘Can’t you do it, or do you simply not want to do it? Why wait until the last day to let us know about it?’ I am really fed up with it. I can’t collaborate with that guy. He is doing nothing more than freewheeling. Also student Z has not done what was expected him to do...”*  
*“..I feel sorry always having to manage and coordinate all the things her. Everyone should show some responsibility, not only me...”*

Figure 1: extracts from personal project logbook

**Workshop Scenario.** The faculty’s educational development officer facilitated the workshop set up for the staff members of the wood technology department involved in the design-build projects. She prepared 5 key questions covering the whole workshop. A related question to each of these 5 key questions was also answered beforehand by the students of that specific project team. After having pictured the specific project team case for the workshop participants, the 5 key questions were successively tackled. Each time one of the questions was tackled, the answers offered beforehand to the faculty’s educational development officer by the 4 students involved on the related question, was presented to the participants. The participants were alternatively asked to discuss and reflect in small groups, to identify the barriers and come up with an answer; or in the case of the agree/disagree questions, to express their opinion individually, using the green or red card. Other questions arisen from the discussion were tackled too. The answers on the 5 key questions were systematically linked to the more theoretical issues covered by the first half day course on group dynamics, coaching and monitoring project work. Recommendations were eventually articulated through plenary group reflection.

### **Participants’ Opinions**

No survey was set up to collect the opinions of the workshop attendees from the wood technology department. However, the departmental workshop records express clearly that all participants perceived the workshop as very useful and illuminating. The educational faculty development officer is praised for the way the workshop was formatted.

The case analysis workshop was also repeated with other participants (n=25): teachers from other faculties and even partner institutions, willing to start with project-based learning. This time a questionnaire (5 point Likert type scale) was administered to learn more about the participants' opinions on the workshop format. The responses revealed a high rate of satisfaction on all questions related to the format ( $\bar{X}$  between 3.98 and 4.38).

Some responses confirm our findings in previous research in the Faculty of Applied Engineering Sciences on self-perceived skills development needs by faculty. At this occasion, open end comments left by some respondents revealed the concern to get a very practical oriented in-service training with examples originating from engineering education practice [6].

### **Recommendations Originating from the Case Analysis Workshop**

The recommendations aroused during the interactive case analysis workshop are overlapping to some extent the previously presented recommendations by other CDIO members [7]. However also some new recommendations were articulated. Some recommendations highlighted in the workshop include:

- Ice breaking activities before starting the project are very useful especially when students don't know each other very well.
- Students' preference regarding group size appears to be 5-6 team members.
- The assignment of students to teams should be very well prepared according to some factors: gender, prior knowledge, Kolb test outcomes, etc.
- Peer-assessment methodology should be very well considered: a combination with self-assessment reflection report, and logbook keeping might be a good option.
- Students' opinions on the course are an important source for improving the course for new student cohorts.
- Coaches should be aware to which extent project teams are self-regulating or not. It might be necessary to give students roles with different tasks in the group to ensure everyone takes up a task.
- Be prepared to handle conflicts in groups.

### **Conclusions**

The interactive case analysis workshop format was found to be an effective methodology when it comes to faculty development in the field of coaching and monitoring project-build projects. The workshop is not tailored to replace the introductory course on group dynamics and project-based learning, but offers added value when offered as follow-up of the introductory course. The format enables a context related and practical oriented approach, which is highly appreciated by the target group. A process of facilitation towards new teaching approaches should not only pave the way for teachers to acquire knowledge on the new model, but perhaps more importantly, it should also guide the practice of reflection throughout the change process. The case analysis workshop format, as practiced at the Faculty of Technology, suits this purpose as well.

## References

- [1] D'heer J., Raes P., Vandenplas C. and Van Torre P., "Two Years at CDIO at Hogeschool Gent: Design-Build Projects and Assessment", 2<sup>nd</sup> International CDIO Conference, Linköping, Sweden, June 13-14, 2006, Available at <http://www.cdio.org/papers/papers.html>
- [2] Steyn D., Sculpting the sculptor. Designing a Faculty Support Program for New CDIO Member Institutions. 1<sup>st</sup> International CDIO Conference, Ontario, Canada, June 7-8, 2005 Available at <http://www.cdio.org/papers/papers.html>
- [3] Bankel J. and Blom K., "Teaching Group Dynamics to Engineering Faculty", 2<sup>nd</sup> International CDIO Conference, Linköping, Sweden, June 13-14, 2006 Available at <http://www.cdio.org/papers/papers.html>.
- [4] Thomas J., A Review of Research on Project Based Learning, 2000, Available at [http://www.bobpearlman.org/BestPractices/PBL\\_Research.pdf](http://www.bobpearlman.org/BestPractices/PBL_Research.pdf)
- [5] Kolmos A., Facilitating Change to a Problem-Based Model, *The International Journal for Academic Development*, Vol. 7, 2002, pp 63-73.
- [6] D'haese I. and Raes P., "Coaching Design-build Projects in Engineering Education: Self-Perceived Development Needs by Faculty", *Proceedings of IADAT e-2006 International Conference on Education*, Barcelona, July 12-14, 2006, pp 91-94.
- [7] Soderholm D., Knutson-Wedel M., Andersson S., Edstrom K., Eles P. and Egstrom M., Recommendations to Address Barriers in CDIO Project-based Courses, 2003, Available at <http://www.cdio.org/papers/papers.html>

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