Emerging Practices

Inquiry into the Developing

新兴实践：发展中的探究

马 谨　Davide Fassi　娄永琪　编

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#developing education

Interdisciplinary Project Challenges and Frameworks for KMUTT's School of Architecture + Design

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Abstract: An interdisciplinary, collaborative working approach is required in the Industrial Design program at the School of Architecture and Design (SoAD), King Mongkut's University of Technology Thonburi (KMUTT). The program keeps students focused only on working with real industries, and the curriculum is an excellent bridge between classroom education and real world practice. In the regular school program, instructors are encouraged to structure their studio classes collaboratively by working with the School of Design, the School of Engineering, and outside industries, organizations, and communities. Due to the diverse areas of expertise that are brought together during collaborative projects, these projects allow students to perceive design in various aspects and the varied approaches are reflected through the designs. Collaborative projects are initiated with both commercial and noncommercial entities (non-profit organizations and communities). As part of a technology oriented university, SoAD faculty have opportunities to collaborate on projects with the School of Engineering, which enhances and drives design creativity and innovation so that it is more practical, feasible in production, and cost efficient. The collaborative projects sometimes occur within KMUTT, with Thailand's national universities, and with international universities. Though there are four types of collaborations, they share common challenges, which include synchronizing working processes, balancing expertise, and matching levels of team experience. This paper shares experiences and reflections on collaborative projects through case studies that feature frameworks of interdisciplinary practice at SoAD and involve the aforementioned challenges. These case studies can contribute to the creation of guidelines for best practices in collaborative interdisciplinary work for universities that have international programs and faculties that focus on real-world immersion.

Keywords: *Interdisciplinary projects, design collaboration, collaborative working approaches*.

1. Introduction

For more than a decade, the SoAD faculty has placed emphasis on integrating classroom education with real world practice. Design processes must involve many disciplines, depending on project characteristics, requirements, and connections.

Four case studies are presented in this paper based on the four categories as shown in Figure 1. They are Educational/National (Technology and Life Quality Improvement project), Educational/International (Technology and Universal Design Project), Client-based/National (Guideline for Juvenile Detention Project–DJOP), and Client-Based/International (Bathroom Design for Nordic).

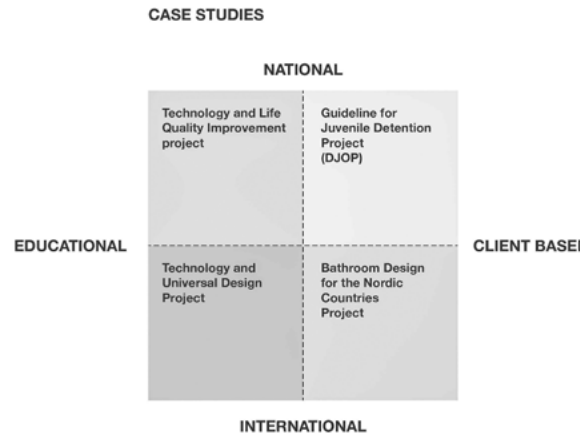


Figure 1. Case studies in four categories of collaboration projects at KMUTT.

National collaborative design projects range from working with other departments at KMUTT to working with other universities in Thailand. International collaboration design projects involve the design department at KMUTT and exchanges with international programs located in other countries. In terms of the scope of the various design projects, they are either education-focused or client-based.

Four case studies are offered to illustrate the interdisciplinary collaborations engaged in by the industrial design department, with a focus on objectives, processes, and challenges. These case studies can be used to generate further discussion about the strategies and suitable approaches to apply in different collaborative situations. Each collaboration type has its own factors and challenges, which can be interpreted and can lead to design collaboration guidelines.

2. Typologies of Collaborative Approaches at KMUTT

2.1 Educational/National: Technology and life quality improvement project

This project featured collaboration between groups of Industrial Design students and Department of Control System & Instrumentation Engineering students. The project objectives included generating design concept innovations and to developing practical solutions by using control system engineering technologies. To understand the collaborative process of the project, the design and engineering process is plotted out in Figure 2.

Due to the university schedule and the fact that this was an educational program, both the design and engineering classes needed to start at the same time. Planning and synchronization were key issues, as well as matching expertise and knowledge of student teams, keeping with the

time schedule, designating leading roles, communicating effectively, and balancing constraints.

Challenges:

I. Designation of leading roles

At the beginning of the project, instructors from both the design and engineering programs had to decide which department would take lead responsibility for the project. If the project were based on design innovation requirements, then the design department would lead the project. This would allow the engineering students to explore and expand new solutions and technologies. On the other hand, if the project were based on existing product development, the engineering department would lead the project. Design students would be confined within given technologies and production requirements from the engineering end.

II. Matching expertise and knowledge of student teams

In general, the design process must start before engineering engagement, particularly for user research analysis and synthesis, in order to understand real needs and to establish project requirements. For this reason, engineering students spent the first section of the class studying general engineering lessons. The content, however, was not always relevant in relation to the project requirements based on user findings. In order to collaborate between design and engineering departments, the initial design conceptual phase needed to be completed prior to engineering integration.

III. Effective communication

Clear specifications and documentation needed to be delivered and understood by both parties. All specifications should be expressed in detail, leaving no room for misinterpretation. From previous experience, the use of visual tools, such as scenario-based designs, helped both design and engineering students to understand the context of use and interaction steps more effectively. This led to reducing mistakes, time saving, and better implementation of the final product at the end of the project.

IV. Balancing constraints

Design is derived from usability and the true needs of users, but engineering students might not be able to determine appropriate corresponding solutions to actualize the design. For example, results from user research indicated and suggested the perfect size for a portable product that should be comparatively small. However, the engineering constraints regarding to sizing and existing technologies include cost, available parts, and customized productions particularly for a small scope project. Fine-tuning across conceptualization and production capabilities was required through iterations of the prototyping process until the design reached a practical solution.

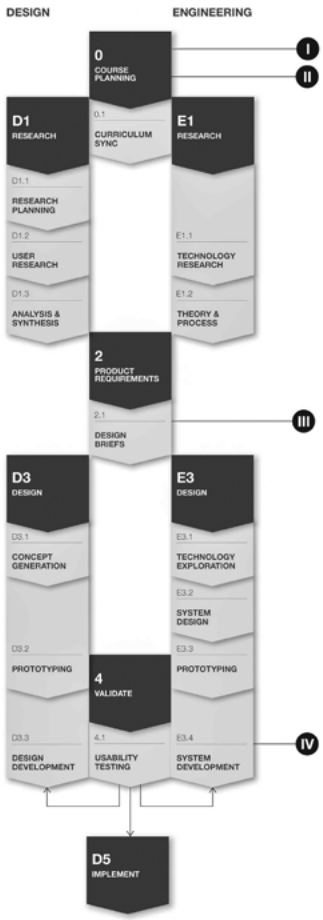


Figure 2. (Left) Collaboration process for Industrial Design and Engineering Programs. Copyright © 2014 Chujit Treerattanaphan.

Figure 3. (Right) Process for KMUTT Design Studio. Copyright © 2014 Chujit Treerattanaphan.

2.2 Educational/International: Technology and universal design project

This project was targeted at classes that include international exchange students from the Engineering and Technology Program, Finland. Exchange students could select any classes that were open to international students and the credits were transferred to their original school. They followed the same processes and completed the same assignments as KMUTT students, and this program is visualized in Figure 3.

Challenges:

I. Limited design fundamental background

Exchange students shared their western cultural perspectives with KMUTT design students. The main objective for the engineering exchange students within design classes was to expand their horizons in understanding and getting involved with design processes rather than taking on the role of engineer. The students' backgrounds in design fundamentals were limited, and sometimes this became an obstacle. Students from other fields should be required to take prerequisite design fundamentals courses before

enrolling in a design studio class at KMUTT, or else they should participate by working collaboratively with design students and sharing their own areas of expertise rather than participating as design students.

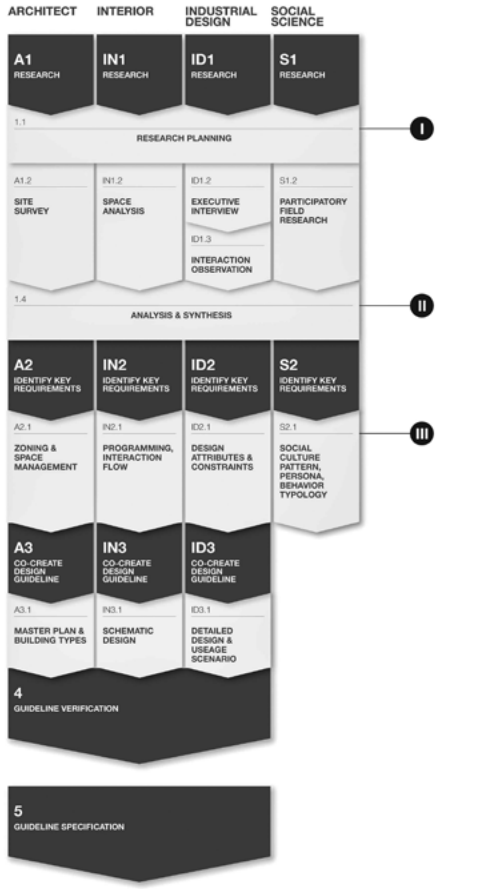
II. All-inclusive english program collaboration
Not all departments at KMUTT have English programs. In order to support further development of the exchange program, the university has an important role in identifying potential classes that can be offered in partnership with other international schools. Not only do classes need to be taught completely in English, but all administrative and support staff must have English capability as well.

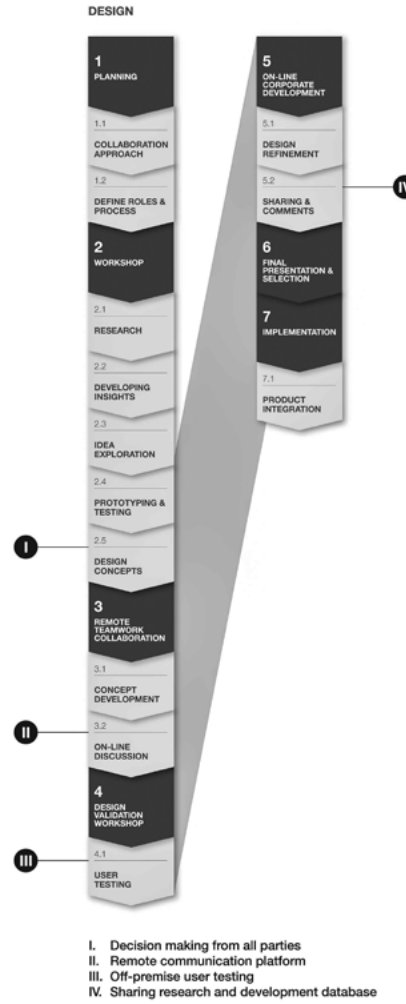
III. Culture and language barriers
Usability testing is a key component in the design process. Due to an unfamiliar living environment and new language, non-resident students felt that finding participants or subjects would be very difficult. Teaming up with Thai students reduced this tension and decreased these barriers, and non-resident students were able to be involved in all aspects of the design learning process.

2.3 Client-based/National: Guidelines for juvenile detention project–DJOP
This project featured collaboration among ministry of justice officers, design professionals at the Research and Design center at KMUTT (REDEK), architecture students, interior design students, industrial design students, and social science students. All participating students were from KMUTT and other Thai national universities. The project involved achieving a deep understanding of the people, spaces, activities, and interactions within a juvenile detention center. Standard guidelines were developed for the construction of future juvenile detention centers across Thailand. Figure 4 shows the working process for this case study.

Challenges:
I. Information synchronizing platform
Due to the mix of various parties, areas of expertise, and research locations, a research framework was established at the beginning of the project. The field research framework started with user needs and then expanded to cover space programing, zoning, and creation of a master plan. All research questions for all parties were documented and distributed to member teams in 15 locations across Thailand. At the end of the field research period, all information was gathered and arranged in the same format to compare for the pattern analysis process.

II. Balancing requirements from “top-down” and “bottom-up” approaches
“Top-down” requirements, including legal regulations and management





policies, were acquired by organizing executive interviews. "Bottom-up" requirements were gathered by participating in and observing activities within the detention center, and by interviewing all stakeholders including juvenile delinquents, officers, and parents. Organizing co-creation sessions with both executives and officers helped all groups to develop the potential solutions and approaches that responded to the needs of all levels.

Figure 4. (Left) Collaboration process for guidelines for Juvenile Detention Centers Project. Copyright © 2014 Chujit Treerattanaphan.

Figure 5. (Right) Collaboration process for International Design Project. Copyright © 2014 Chujit Treerattanaphan.

III. Standardized plus localized

The final guidelines were intended mainly for national juvenile detention and training centers. Most of the suggested designs and constructions are essentially standardized. However, people in different locations in Thailand have diverse and distinct cultures and social practices. Localized factors should be taken into consideration and integrated specifically to suite local contexts. During this project, social science students in local areas who spoke local languages and were familiar with ways of living contributed their efforts and gained profound local insights.

2.4 Client-Based/International: Bathroom design for Nordic

This project involved collaboration among the Nordic Construction Company (NCC), the National Board of Housing Sweden, the Swedish Trade Federation, Cotto Thailand, Lund University Industrial Design (LUID), and KMUTT Industrial Design (SoAD). The purpose of this project was to produce high quality, sustainable and low cost bathroom product lines. The collaborative working process can be seen in Figure 5.

Challenges:

I. Decision making from all parties

An intensive five-day workshop was set up to facilitate discussion among all parties at KMUTT and to reach agreements on design briefs and design direction decision making.

II. Remote communication platform

In some periods during the design process, both LUID and KMUTT design students worked separately on their premises. Online communication tools became essential and allowed students to exchange files and comments and to engage in further discussions.

III. Off-premise user testing

User testing is one stage of the design process that is crucial for validating design concepts. The results of this design project were intended for Nordic populations. All KMUTT design students had to travel to Sweden with full-scale mock-up prototypes for target user testing. All mock-up prototypes were created for easy assembly with lightweight materials due to transportation limitations. With the support of local contacts at LUID, setting up the testing site and finding local participants was manageable.

IV. Sharing research and development database

All designed files and data were shared online as a database for all involved parties to have direct and immediate access through every step the project. Clients and manufacturing teams offered prompt responses and feedback on design developments. This communication allowed students to make necessary adjustments and to react to the comments instantly. By storing all records in a database, the data could be viewed at any time and helped to promote the concept of learning from others rather than only relying on one's own knowledge.

3. Conclusions

By generating these four case studies and workflow diagrams, we can more easily understand and identify challenges occurring in particular steps during working processes. In conclusion, even though each case study has its own distinctive character, they still share the common ground of

challenges that reveal key considerations for each type of project. Such challenges include matching expertise and knowledge, utilizing information synchronizing platforms, balancing constraints, and facilitating clear, detailed communication. When engaging in multidisciplinary projects in educational contexts, curriculum synchronization is an essential factor. When collaboration occurs between departments, seamless coordination of class objectives, course content planning, and time schedules must occur. The project should include components that provide mutual benefits for all parties involved, as this will increase participants' motivation to work together in the future. Examples include entering a competition or organizing a public exhibition. For classes that have international students, project teams that have both Thai and exchange students as members seem to gain deeper knowledge and undertake more advanced plans.

Client-based projects usually require higher expectations for project outcomes. In addition to class instructors, professional specialists should be involved for mentoring and providing feedback and suggestions throughout the process. For international projects, remote communication plays an important role and makes collaboration possible.

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