Planning and Design of Future Classrooms in Universities

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Abstract: Recently, with the development of educational informationization, the research related to future classrooms became a forward-looking task in the educational technology field. Through a case study and literature review, we propose a basic constructional scheme of the future classrooms for universities. The scheme aims at creating a university classroom environment in the future, which meets the requirements of the education concept and function, as well as the requirements from teachers and students. When it comes to innovation, we hope to ensure that the classroom is equipped with state-of-the-art information technology and great facilities, so that it can provide rich resources and diverse functions. In addition, the entire flat surfaces in the room are interactive, such as wall space, table top and screens. Based on this design, we try to break the traditional classroom space layout, make it design-driven and futuristic. For example, the tables are designed to create group workstations or meeting style in various combinations. This classroom will offer classes tailored for many types of active learning, including discussions, group work, and presentations, which emphasize a high degree of interactivity in the learning space.

Keywords: *future classroom, design, educational technology*

GENERAL

Times are changing dramatically, while most of our classrooms are not. Traditional classrooms are designed for depiction teaching, which cannot offer the best learning environment for many other types of active learning, including discussions, group work, and presentations. Since traditional classrooms are inflexible, stereotyped and static, they can hardly meet the needs of the new age. Recently, the research related to future classroom became a forward-looking task in the educational technology field. Over the years, although the equipment of classroom and multimedia technology improve a lot, the design solution of future classrooms, which emphasize a high degree of interactivity and combination of education and space concept, is not enough as expected. Our scheme aims at creating a university classroom environment in the future, which meets the requirements of the education concept and function, as well as the requirements from teachers and students.

We did some case studies about future classrooms, for example, Technology Enabled Active Learning (TEAL) plan at Massachusetts Institute of Technology in USA, Komaba Active Learning Studio (KALS) at University of Tokyo in Japan, Classroom of the Future (COTF) at Nanyang Technological University in Singapore, Competence Centre Virtual Reality at TechnischeUniversität Ilmenau in Germany and so on. Among those great cases, we selected TEAL and KALS, and then analyzed them in details.

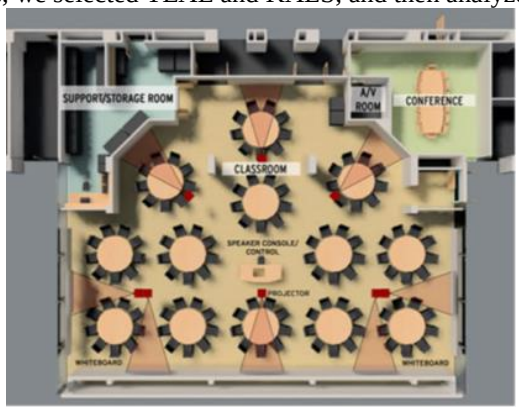


Figure 1 TEAL classroom, source from: http://www.educause.edu/ero/article/learning-space-design-action

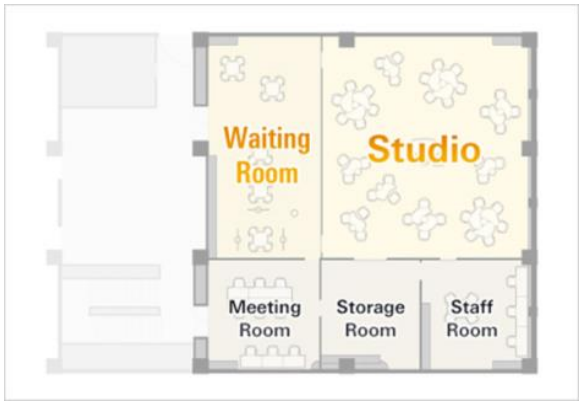


Figure 2 KALS, source from: http://www.kals.c.u-tokyo.ac.jp/english/facilities.html

TEAL is a teaching format that merges lectures, simulations, and hands-on desktop experiments to create a rich collaborative learning experience. The classrooms contain an instructor's workstation in the center of the room surrounded by 13 round tables, each seated with nine students. Each table holds three groups of three students. Each group uses a computer to view lecture slides and collect data from experiments. Thirteen whiteboards and eight video projectors with screens dot the room's periphery.

KALS was created based on the University of Tokyo's goal of an ideal liberal education. The KALS facility and ICT devices are specially designed to reflect each student's contribution immediately. The studio capacity is 40 people. The layout of it is similar to that of TEAL. The bean shaped tables made it easy to rearrange the layout of the classroom, for they are designed to create group workstations seated with two to six people in various combinations.

TEAL classrooms and KALS both have clear and advanced design concept, use similar layout, and are equipped with great interactive facilities. They set great examples for our research. For example, the flexible bean shaped tables of KALS are very impressive. We try to learn from their advantages and put forward some innovation ideas in our design solution.

Through case studies and literature review, we summarized several points that should be taken into consideration:

1. Break the traditional classroom space layout; make it design-driven and futuristic.
2. Equip the classroom with state-of-the-art information technology and great facilities that are easy to update and maintain, so as to ensure high sustainability.
3. Provide rich, opening and sharing resources which are easy to access.
4. Offer classes tailored to different types of teaching and learning.
5. Provide ergonomic tables and chairs, safe and environmental protection.
6. Guarantee the classroom with a complete safety protection system.

According to the above analysis and some questionnaire survey, the final design solution is as following:

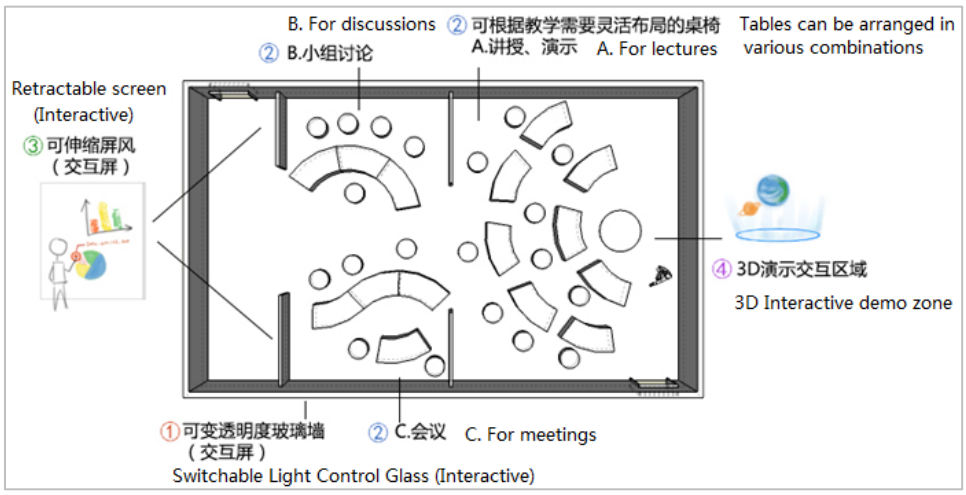


Figure 3 Design Solution

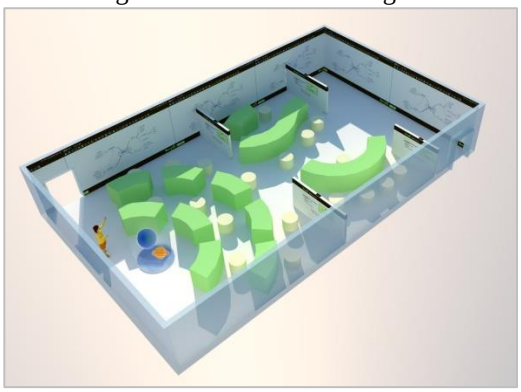
The classroom capacity is about 40 people. The storage space is under the floor, containing tables and chairs, which can be pulled in and out depending on the form of a class.

①: The walls are made of switchable light control glass. We put forward the notion that "any surface is interactive". The entire flat surfaces in the room are interactive, such as wall space, table top and screens.

②: The shape of the table is 1/8 of the circle. The tables are designed to create group workstations or meeting style in various combinations, which emphasize a high degree of interactivity in the learning space.

③: Retractable screens are designed to divide classroom space into different learning spaces if needed. They can be used as interactive boards for discussion or presentation.

④: 3D interactive demo zone is connected with all interactive screens. Teachers can use them to interact with students. For example, they can grab the 'earth' from 3D interactive demo zone and throw it on the wall and the 3D earth image will become a 2D image with detailed explanations showing on the interactive screen.



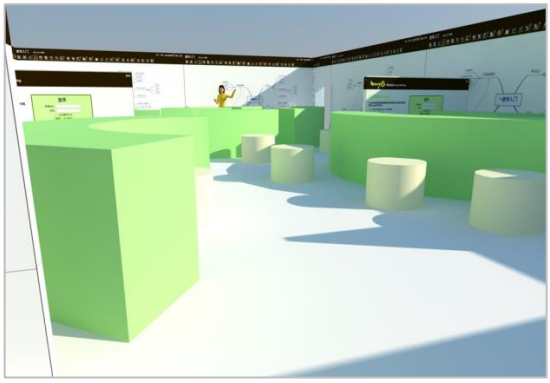


Figure 4, 5 Renderings

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