# Design Principles Priority of Creative Space Architecture for AKSI-ADB Project Scheme Evaluation

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**ABSTRACT**
Educational facilities are one of the determining factors for quality assurance in higher education. In the context of architecture, higher education campuses must create opportunities for creative exploration among students. This creative space allows people to experiment and try various things, and is also productive in building various things to improve the quality of education. Several higher education campuses are transforming quickly into campuses that are representative and have adequate educational facilities as a result of obtaining foreign loan and grant financing (PPHLN). There are several higher education campuses that received the PPHLN funded by the Asian Development Bank (ADB), namely the Advance Knowledge and Skill for Sustainable Growth (AKSI) ADB Scheme. This research will identify design principles priority of creative space architecture which can be used to evaluate the architectural design of campuses which is included in the AKSI-ADB project scheme. Mixed methods research (MMR) was used in this research. The research phase begins with an exploratory sequential design to obtain priority design principles for creative space architecture. The data is taken from the opinions of experts through Focus Group Discussions (FGD) and will be analyzed using analytic hierarchical process. The research show that it's important to prioritize the presence of presentation and exhibition spaces, with a priority weight of 26.9%. Other important criteria include having practice space, stimulant space, and group work space available. However, personal space and transition space are considered less important, with priority weights of 1.6% and 4.2%, respectively.

*Keywords: Education Facilities, AKSI-ADB, Creative Space, Campus Design, Quality of Education.*

## 1. INTRODUCTION

Education is an essential component of modern society, and higher education plays a crucial role in shaping the future of individuals and societies. The quality of higher education is determined by various factors, including the educational facilities provided to the students [1]. Educational facilities refer to the infrastructure, resources, and services that are available to the students to support their learning and development [2]. These facilities are crucial in providing a conducive learning environment that fosters academic excellence and personal growth. Therefore, educational facilities are one of the determining factors for quality assurance in higher education.

The availability and quality of these facilities can significantly impact the learning experience of students and their academic performance [3]. A well-equipped and maintained educational facility can attract and retain high-quality faculty, staff, and students, leading to a positive reputation for the institution. Thus, educational facilities are critical in ensuring the quality of higher education and preparing students for their future careers

The assumption is that if other quality determinants, such as curriculum, teacher competence, and student capacity are very supportive, then the higher the level of building performance, the higher the quality of education. Based on Suryadi's, et al. (2020) [3], shows that the correlation between the building performance variable and the higher education institutional performance variable is in a fairly strong category. Furthermore, the

contribution made by building performance to the variable higher education institutional performance as a whole obtained a value of 22%.

The quality of education is directly linked to the level of building performance in higher education facilities. A well-designed and well-maintained building can provide a comfortable and safe environment for students, faculty, and staff, which can enhance the learning experience [4]. The higher the level of building performance, the higher the quality of education that can be provided. Building performance refers to the ability of a building to meet the needs of its occupants. Building performance is an important aspect of architecture design.

In order to achieve optimal building performance on higher education campuses, architects must consider the needs of the academic community [5]. This includes creating opportunities for creative exploration among faculty and students. A creative space is a place where people can explore, experiment and try new things. It is a space where creativity thrives, and where people can collaborate and innovate [6]. This type of space is particularly important in the field of education, where it can be used to improve the quality of learning and teaching.

In a creative space, students and teachers can work together to build various things that can improve the quality of education [7][8]. For example, they can create new teaching tools, develop new curricula, conduct research, and develop prototypes that incorporate innovative technique and tools. For instance, teachers can use this space to develop new teaching approaches that align with need and interest of ther student. Moreover, students can also benefit from this creative space by experimenting with new learning methods and technologies that can enhance their engagement and understanding.

In terms of architectural concepts in achieving optimal building performance, higher education campuses must create opportunities for creative exploration among the academic community. This creative space allows people to experiment and try various things, and is also productive in building various things to improve the quality of education. Thoring, Luippold, and Mueller (2012) identified five creative space characters on campus; the solitary space, the team space, the tinker space, the presentation space, the transition space [9].

In reality, in the context of higher education in Indonesia, there is still a wide gap between the ideals of the need for quality educational facilities and the reality that can be provided, both at public and private universities. From a number of 400 state tertiary institutions and 4186 private tertiary institutions (under the management of the Ministry of Research, Technology and Higher Education, Ministry of Religion and official

education), it seems that no more than 30% meet the minimum standards of facilities and infrastructure [10]. While there is a growing demand for quality education, the infrastructure and resources available to support this need are often lacking. Many universities in Indonesia struggle to provide adequate facilities and resources to their students, which can have a significant impact on the quality of education that is delivered [11].

Several higher education campuses are transforming quickly into campuses that are representative and have adequate educational facilities as a result of obtaining foreign loan and grant financing (PPHLN). Universitas Riau (UNRI), Universitas Jambi (UNJA), Universitas Malikussaleh (UNIMAL), dan Universitas Pendidikan Indonesia (UPI) are several of the higher education campuses that received the PPHLN funded by the Asian Development Bank (ADB), namely the Advance Knowledge and Skill for Sustainable Growth (AKSI) ADB Scheme [12].

This research will evaluate to what extent the architectural design of the four campuses that are included in the AKSI-ADB project scheme can fulfill the parameters of the creative space concept. The campus project is still in the preparatory and construction stages, and no university has yet reached the operational stage, so this research is focused on aspects of architectural design. This research will obtain an overview of the quality of design, which has implications for the development of the university's academic and non-academic atmosphere, which in turn has an impact on improving the quality of tertiary institutions.

## 1.1. Creative Space in Campus

Creative space that allows people to experiment and try various things can be a game-changer in improving the quality of education [13]. The space is designed to encourage creativity and collaboration, allowing individuals to work together to build various things that can benefit the educational community. Such a space enables individuals to explore and discover new ideas, concept, and technologies that can positively impact the learning experience.

Thoring, Luippold, and Mueller (2012) identified five creative space characters on campus; the solitary space, the team space, the tinker space, the presentation space, the transition space. Firstly, private space to be alone (the solitary space) [9]. A space designed to accommodate thinking, contemplating or meditating activities, with a quiet atmosphere, quiet, quiet, and away from noise, like a library for example.

Then, group work space (the team space). A space that invites people to communicate with each other, exchange information, collaborate, with the character of a lively room, game room, and group or team interaction. Thirdly, the practice room (the tinker space). A space that

accommodates various learning activities, especially experimental practices, such as conducting research, experiments, making goods or works in laboratories, workshops, studios, and others.

Presentation and exhibition space (the presentation space). Space provided for actively presenting or exhibiting works, or passively watching performances or attending seminars, etc. Lastly, the transition space. Transition space is a space between which is used for circulation, but can also be used for interaction and communication informally, or for activities to temporarily withdraw from the creative activities on campus. They also categorize creative spaces on campus based on their function or spatial quality namely; repository functions, cultural indicators, embodiment of processes, social dimensions, and stimulant spaces [9].

## 2. METHOD

Mixed methods research (MMR) was used in this research [14]. The first research phase (Part 1) begins with an exploratory sequential design to obtain Priority Design Principles for Creative Space Architecture. The data is taken from the opinions of experts through Focus Group Discussions (FGD) and will be analyzed using analytical hierarchy process (AHP). Exploratory sequential design is the collection of qualitative and quantitative data carried out in stages. Previously, a literature study was carried out on the principles and criteria of creative space architectural design [15].

**Table 1.** Short cut keys for the template

| Data collection technique | Research Objects/Subjects | Parameter |
|---|---|---|
| Focus Group Discussion 1 | • Creative Space criteria/principles <br> • Architect/ Expert | Creative Space criteria priority weight |

Apart from this paper, the next stage of research will develop a decision-making model for the quality of creative space using a fuzzy logic system [16][17]. The final stage is to evaluate the design of UPI campus in the AKSI-ADB project based on this model. This stage will be described in the second part of this research (other paper). This research will obtain design principles model to evaluate the design of UPI campus in the AKSI-ADB project, which has implications for the development of the university's academic and non-academic atmosphere, which in turn has an impact on improving the quality of tertiary institutions.

## 3. RESULT AND DISCUSSION

The study has three main goals: firstly, to identify the criteria for measuring design quality; secondly, to create a model that measures the quality of university campus designs using criteria related to the concept of creative space; and thirdly, to evaluate the architectural design quality of four campuses in the AKSI ADB project according to the criteria of the creative space concepts. In this paper, research will concentrate on the initial objective, which is to find the criteria for design quality measurement.

The qualitative data was gathered by observing and interviewing architects who specialize in educational campus and creative space design. The purpose was to identify the criteria and aspects used to assess design quality. The collected data was then analyzed using the Analytical Hierarchy Process (AHP) method to determine the weight of each criterion for assessing design quality.

### 3.1. The criteria for measuring design quality are based on the concept of an creative space

Theoretical research has revealed that there are 10 criteria for evaluating the quality of campus design using the creative space concept. The criteria were adopted from the theory of Thoring, Luippold, and Mueller (2012) regarding space typology and spatial quality [15]. These criteria are listed in Table 2, based on the findings of the theoretical investigation.

To evaluate the quality of campus design, the criteria are compared in pairs to determine their relative importance. This process helps identify the criteria that contribute the most to a good design. The study uses quantitative analysis to compare different indicators and alternatives, which helps make informed decisions. The Analytical Hierarchy Process (AHP) is used to select an indicator hierarchy, which is a method for solving complex problems by grouping and arranging them in a hierarchy. The AHP technique is employed to address intricate and disorganized issues. This involves grouping and organizing them into a hierarchy, followed by assigning numerical values to human perception to identify the most important element [18].

**Table 2.** Creative Space Design Quality Criteria

| No. | Indicator | Aspect Disclosed |
|---|---|---|
| 1 | Personal space | There is a private room to be alone |
| 2 | Collaboration space | Group work space is available |
| 3 | Practice space | Practice room available |
| 4 | Presentation and exhibition space | Presentation and exhibition space |
| 5 | Transition space | There is a transitional space (for example: used for circulation, but can also be used for informal interaction and communication, or for activities to temporarily withdraw from creative activities on campus. |
| 6 | Repository space | There is space that functions as a repository (example: a place to store and showcase the best works of students) |
| 7 | Cultural indicator space | Available space as an indicator of cultural behavior. (example: students must be quiet and not make noise in the library) |
| 8 | Process enabler space | Space is available as a manifestation of the process, namely a special room for different activities (example: a room for discussion, separated from a room for computer-based work) |
| 9 | Social dimension space | There is a space for social interaction |
| 10 | Stimulant space | Provide space as a source of stimulation (example: inspirational structure, shape, and texture on the wall) |

The study utilizes AHP to create a set of standards for evaluating campus design quality, focusing on creative space concept. The standards are organized into a hierarchy to ensure effectiveness. The priority of indicators is determined by conducting pairwise comparisons for all elements within each sub-system of the hierarchy. The process of numerical analysis involves transforming the comparison into a matrix. Table 3 displays the comparison of elements in the hierarchy using a scale ranging from one to nine.

The AHP standard scale is used to create a

### 3.2. Results of Weighting Creative Space Design Criteria

The AHP method is applied using the Expert Choice 2020 software, by carrying out a pair-wise comparison model. Pair-wise comparisons were made at each level. The results of the FGD (Focus Group Discussion 1) as well as theoretical investigations show that there are 10 criteria that must be met for a campus to fulfill the concept of a creative space campus. The ten criteria are CC1 Availability of personal space; (CC2) collaboration

**Table 3.** Comparison Rating Scale

| Level | Definition | Information |
|---|---|---|
| 1 | Both elements are equally important | The two elements have the same influence on the goal |
| 3 | One element is slightly more important than the other elements | Experience and judgment slightly favor one element over the other |
| 5 | One element is more important than the other | Experience and judgment strongly favor one element over the other |
| 7 | One element is clearly more important than the other elements | A strong element supported in its dominance has been seen in practice |
| 9 | One element is absolutely important than the other elements | Evidence that supports one element over another has the highest possible affirmation level |
| 2, 4, 6, 8 | Values between two adjacent judgment values. | This value is given if there are two compromises between the two choices |
| opposite | If the element j gets one number when compared to element j, then j has the opposite value when compared to i | Available space as an indicator of cultural behavior. (example: students must be quiet and not make noise in the library) |

comparative rating scale that evaluates the significance of an element. This scale is based on the level of importance outlined in table 3 and can be determined by consulting the priority weight.

space; (CC3) practice room; (CC4) presentation and exhibition room; (CC5) Transition space; (CC6) repository space; (CC7) cultural indicator space; (CC8)

process enabler room; (CC9) social dimension space; (CC10) source of stimulant room.

Furthermore, pair-wise comparisons were carried out at each level. Table 4 shows the geometric mean values

Figure 1 shows that the criteria for the availability of presentation and exhibition space on a campus (CC4) are the criteria that are the most important priority in producing a campus design that meets the concept of a

**Table 4.** Comparison of main criteria pair matrix with priority weight for goals: creative campus

| | CC1 Personal space | CC2 Collaboration space | CC3 Practice space | CC4 Presentation and exhibition space | CC5 Transition space | CC6 Repository space | CC7 Cultural indicator space | CC8 Process enabler space | CC9 Social dimension space | CC10 Stimulant space |
|---|---|---|---|---|---|---|---|---|---|---|
| CC1 Personal space | | 6.0 | 8.0 | 8.0 | 4.0 | 6.0 | 6.0 | 6.0 | 4.0 | 8.0 |
| CC2 Collaboration space | | | 2.0 | 4.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| CC3 Practice space | | | | 2.0 | 4.0 | 2.0 | 4.0 | 4.0 | 4.0 | 2.0 |
| CC4 Presentation and exhibition space | | | | | 6.0 | 4.0 | 4.0 | 4.0 | 6.0 | 2.0 |
| CC5 Transition space | | | | | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| CC6 Repository space | | | | | | | 2.0 | 2.0 | 2.0 | 2.0 |
| CC7 Cultural indicator space | | | | | | | | 2.0 | 2.0 | 2.0 |
| CC8 Process enabler space | | | | | | | | | 2.0 | 2.0 |
| CC9 Social dimension space | | | | | | | | | | 3.0 |
| CC10 Stimulant space | | | | | | | | | | |

of the pair-wise comparisons made by the architects between the main criteria and objectives. The intended goal is to fulfill the design using the campus creative space concept. After that, the relative priority of the main indicators is determined by calculating the priority weight (Figure 1).
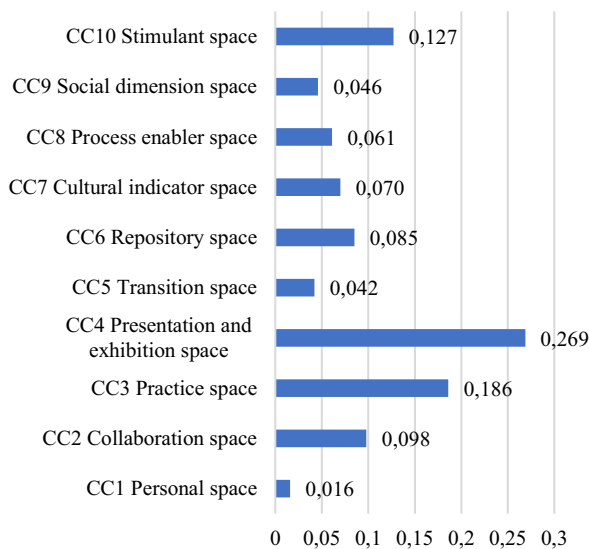


**Figure 1.** Priorities with respect to: Goal: Creative Campus

creative space campus. Thus, in order to create a creative space campus, the availability of presentation and exhibition space needs to be considered the most. This criterion holds a priority weight of 26.9% in achieving the objective. Other important criteria include the availability of practice space at 18.6%, stimulant space at 12.7%, and group work space at 9.8%. The availability of personal space and transition space are not given much importance when evaluating the design of the creative space campus, as they only account for 1.6% and 4.2% of the criteria, respectively.

The consistency principle is employed to determine the priority weights, which involves measuring the level of inconsistency in comparisons using the consistency ratio (CR). As per this principle, the CR value should be less than 0.10. In this study, the CR value for the comparison of primary criteria is 0.03, indicating that the weighting of indicators is acceptable in accordance with the consistency principles.

Based on the AHP analysis, it is found that the priority weights of design principles based on the concept of creative space are as follows in Table 5.

**Table 5.** Priority weight of creative campus design criteria (Quality of Creative Space Campus Design)

| No | Criteria | Weight |
|---|---|---|
| 1 | Presentation and exhibition space | 26.9% |
| 2 | Practice space | 18.6% |
| 3 | Stimulant space | 12.7% |

| 4 | Collaboration space | 9.8% |
|---|---|---|
| 5 | Repository space | 8.5% |
| 6 | Cultural indicator space | 7.0% |
| 7 | Process enabler space | 6.1% |
| 8 | Social dimension space | 4.6% |
| 9 | Transition space | 4.2% |
| 10 | Personal space | 1.6% |
| Inconsistency = 0.03 with 0 missing judgments | | |

Based on this research, presentation and exhibition space is the most important priority in producing a campus design that meets the concept of a creative space campus. Presentation and exhibition space is considered one of the most important elements in campus design as it provides opportunities for students, faculty, and the community to showcase their work, research, and ideas. Based on Fisher (2005), and Hauan and Kolstø (2014), exhibition and presentation spaces are critical components of academic environments, providing opportunities for showcasing student work, faculty research, and community engagement [19][20].

The second most important priority of design principles is practice or making space. Making or practice space is important in campus design because it provides students with a place to apply what they have learned in the classroom, develop new skills, and collaborate with others. According to a study published in the Innovations in Education and Teaching International Journal, the availability of making or practice space on campus positively impacts students' engagement, creativity, and critical thinking skills [21].

Stimulant spaces in campus design are also important because they provide students with areas that promote creativity, productivity, and social interaction. These areas can include libraries, study rooms, coffee shops, and outdoor spaces. Stimulant spaces can enhance student engagement, increase retention rates, and promote academic success [22].

Collaboration space is fourth priority weight criteria. This space is one of essential aspect of higher education campus as it provides students with the opportunity to collaborate and work together on projects and assignments. These spaces are designed to accommodate group activities and discussions, and are equipped with necessary resources such as whiteboards, projectors, and comfortable seating arrangements.

According to a study conducted by Hammar (2014), 76% of students believe that group work is essential to their academic success [23]. The study also found that students who work in collaborative environments are more engaged, have better problem-solving skills, and are more likely to retain information than those who work independently.

Although personal space has the smallest weight, according to Namazian and Mehdipour (2013), personal space is important in built environment design including campus design because it can affect the well-being and productivity of individuals. Personal space is important for psychological well-being and social interaction, and can have an impact on how people feel about their environment [24].

The concept of a creative space holds significant importance in the design of a campus as it provides an environment that fosters innovation, collaboration, and critical thinking among students and faculty [25]. The ten design principles have varying levels of importance, but they still provide a framework for evaluating campus design based on the concept of creative space. In other words, the ten design principles have different levels of significance, but they serve as a guide for assessing campus design using the idea of innovative spatial concepts.

The reference design illustration of design principles of creative space architecture based on priority weight can be seen in Table 5.

## 4. CONCLUSION

In order to create a campus design that aligns with the concept of a creative space campus, the most crucial factor is the presence of presentation and exhibition space. This criterion has a priority weight of 26.9%. Presentation and exhibition space are critical components of academic environments, providing opportunities for showcasing student work, faculty research, and community engagement

Other important criteria include the availability of practice space, stimulant space, and group work space. Those spaces positively impact students' engagement, creativity, and critical thinking skills. They also provide students with areas that promote creativity, productivity, and social interaction. However, the availability of personal space and transition space are considered less important with priority weights of 1.6% and 4.2%, respectively.

The ten design principles have varying levels of importance, but they still provide a framework for evaluating campus design based on the concept of creative space. This is particularly relevant in the evaluation of the four campuses that are part of the AKSI-ADB project plan.

**Table 6.** Design principles of creative space based on priority weight with design reference illustration.

| No | Criteria | Design Principles | Design Reference Illustration |
|----|----------|-------------------|-------------------------------|
| 1 | Presentation and exhibition space | The space is utilized for the purpose of sharing, presenting, and viewing knowledge, concepts, and outcomes of work in a single direction, either through presentations or exhibitions. |  **Figure 2.** University of Connecticut Social Sciences and Classroom Buildings [26] |
| 2 | Practice space | The space is utilized for constructing models and structures, providing an opportunity for testing, creativity, loud sounds, and mess. |  **Figure 3.** Columbia University's School of Engineering Makerspace [27] |
| 3 | Stimulant space | The space has the ability to offer various types of stimuli such as views, sounds, smells, textures, materials, etc., which can act as a stimulant. |  **Figure 4.** VR Center, Universidad del Retoño [28] |
| 4 | Collaboration space | The space is utilized for activities such as group projects, workshops, in-person conversations, meetings with clients, or consultations between students and teachers. |  **Figure 5.** Steelcase learn lab with media: scape [26] |
| 5 | Repository space | The space has the ability to hold, showcase, and encourage the exchange of various types of information and knowledge, including implicit, explicit, and embedded knowledge. |  **Figure 6.** Princeton University Library [29] |
| 6 | Cultural indicator space | The space can identified by the way it indicates a particular behavior, which can be through common knowledge, written or unwritten regulations, ceremonies, designations, and symbols. |  **Figure 7.** UNITI Cultural Center in Stony Brook University [30] |
| 7 | Process enabler space | The space in which work is conducted can either facilitate or impede the work process, depending on the spatial structures or technical infrastructure that are present. |  **Figure 8.** Students at work at the University of Georgia Science Learning Center [31] |
| 8 | Social dimension space | The space refers to how the physical environment affects social interactions and enables people to come together for personal exchanges and meetings. |  **Figure 9.** Caspersen student center lounge, Harvard Law School [26] |

| No | Criteria | Design Principles | Design Reference Illustration |
|----|----------|-------------------|-------------------------------|
| 9 | Transition space | The space are linked together to other space and used for different purposes such as relaxation, moving from one space to another, and taking breaks. These areas include hallways, stairs, outdoor spaces, and cafeterias. |  **Figure 10.** Gathering space: University of Connecticut Social Sciences and Classroom Buildings [26] |
| 10 | Personal space | The space is enables individuals to focus on tasks that require intense concentration such as thinking, reading, and writing, as well as deep contemplation, necessitating minimal distractions to prevent interruptions. |  **Figure 11.** Sensory spaces to make campus more inclusive – The Library of Trinity College Dublin [32] |

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