**ICEA**

# certificate
### awarded to

## SHERLY DE YONG

as

## PRESENTER

in

## THE 3RD INTERNATIONAL CONFERENCE ON EMPATHIC ARCHITECTURE
## ( ICEA )
## SURABAYA 25-27 APRIL 2019

## return to zero

**UNIVERSITAS KRISTEN PETRA**

**IKATAN ARSITEK INDONESIA JAWA TIMUR**

**52ND ANNIVERSARY**
**DEPARTMENT OF ARCHITECTURE**
**PETRA CHRISTIAN UNIVERSITY**
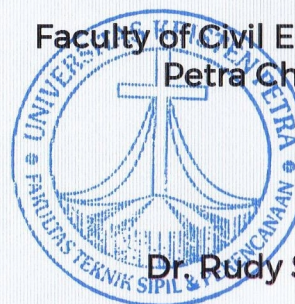
Chairman of
Indonesian Institute of Architect
East Java Chapter

Yuli Kalson Sagala, S.T., M.Ars., IAI

Dean of
Faculty of Civil Engineering and Planning
Petra Christian University

Dr. Rudy Setiawan, S.T., M.T.

CUMULATIVE POINT
5

# Book of Abstracts

# 3rd International Conference On Emphatic Architecture 25 – 27 April 2019

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# Prologue

On behalf of the management and the academic community of Petra Christian University, I am very pleased to warmly welcome all of the distinguished speakers and participants of the 3rd International Conference on Emphatic Architecture (ICEA) in Surabaya. Our warm welcome is extended, especially to all foreign speakers, delegates and guests who have taken a long journey from their home countries to be with us here at this conference. As the Dean of Faculty of Civil Engineering and Planning, I am definitely very honored by your presence.

This conference with the theme "return to zero" is an incredible opportunity for architect scientists to showcase many creative, innovative and useful ideas, case study, best practices, and research works for the further development of emphatic architecture.

I realize that you are fully dedicated to all the sessions, but I do hope you will also take time to enjoy fascinating Surabaya as one of the cleanest and greenest cities in Indonesia. Many of you travel long distances serves to remind us all just how important this conference. Thank you for joining the conference. Have a very enjoyable and a nice stay in Surabaya.

## Dr. Rudy Setiawan

Dean of Faculty of Civil Engineering and Planning
Petra Christian University

ICEA started on 2014 with "technology, Education and Culture". On 2017, the second ICEA was collaborated with the international conference of SENVAR (Sustainable Environment Architecture) to define broader and integrated understanding of sustainability. One from the view of social impact, which is from the users and the latter from the observation of architectural sciences.

The third ICEA (international Conference on Emphatic Architecture) focuses on 'return to Zero', means why don't we stop for a while as architects, planners, interior designers, engineers, to think again we have done? Do our works have given the good impact for our surroundings, our people, our environments?

There are tendencies in current developments that most physical developments have focused on achieving technological superiority, unique building form or even cost efficiency. As consequences, human and nature are often abandoned, disregarded and becoming second priority. Human as building users which will stay and use the building for years are no longer became the main consideration in building design and should be willing to adapt. Whereas nature is often abandoned and sacrificed for the sake of the physical developments. 'The Earth is Crying' due to the consequences of human actions in forgetting the importance of maintaining the balance between human and nature.

Now, we would like to invite architects, building practitioners, decision makers, and researchers to join the 3rd International Conference on Empathic Architecture (ICEA). Let's take a moment to pause, 'Return to Zero'. Let's discuss and rethink, how far is the impact of building development towards our city, our history, our culture, and towards our children.
Have a fruitful discussion.

**Prof. Lilianny S Arifin, Ir., M.Sc., Ph.D.**
Chairman, the 52th Anniversary of the Department of Architecture
Head of Architecture Department
Petra Christian University

Distinguished speakers and participants,

It gives me a great pleasure to welcome all of you to the 3rd International Conference on Empathic Architecture 2019.

The topic "Return to Zero" is chosen for the 3rd ICEA, with the aim to take a moment to pause and rethink how far is the impact of building developments towards our city, history, culture, and environment. And thus, we have received papers discussing 7 sub topics; rethinking of building technology, rethinking of computation, rethinking of architectural space, rethinking of culture, rethinking of cities, rethinking of people, and rethinking of building material. All accepted papers will be published in international publication, indexed by Scopus.

At the 3rd ICEA, we will have special sessions for students, which are the final round of Architecture Festival 2019 (an international student competition with the topic "Post Disaster Children Space") and the presentation of *Seminar Arsitektur Nasional* (SAN) 2019 (a national call for paper seminar for undergraduate students).

I would like to express my sincere appreciation to the conference speakers and reviewers, the competition juries, the sponsors of the event, and the committee members, which without them, this conference won't be possible.

Finally, I wish all of you a fruitful conference and an excited technical tour.

*Soli deo Gloria!* Glory to God alone!

## Eunike Kristi Julistiono, S.T., M.Des.Sc.
Conference Chairperson
Petra Christian University

# Schedule

## Schedule

25th of April 2019

*08.00 – 08.30    Registration*

***Opening Ceremony***
*08.30 – 08.40    Cultural Performance*
*08.40 – 08.45    Opening Prayer*
*08.45 – 09.00    Welcome Addresses*

***Plenary Session 1***
*09.00 – 09.40    Mr. Yori Antar (Han Awal & Partners, Indonesia)*
*                 "Empathic Architecture through Local Wisdom"*
*09.40 – 10.00    Coffee Break*
*10.00 – 10.40    Ms. Siritip Harntaweewongsa (GreenDwell, Thailand)*
*                 "Green Design, with People in Mind"*
*10.40 – 11.20    Prof. Mohammad Hamdan Ahmad*
*                  (Universiti Teknologi Malaysia, Malaysia)*
*                 "Rethinking Zero"*
*11.20 – 11.50    Discussion (Question and Answer)*
*11.50 – 12.20    Product Video & Photo session*
*12.20 – 13.20    Lunch*

***Parallel Session 1***
*13.20 – 15.00    Rethinking of Building Material      (Room 4.03A)*
*                 Rethinking of Culture                (Room 4.03B)*
*                 Rethinking of Building Technology     (Room 4.02B)*
*                 Student Session – Seminar Arsitektur*
*                 Nasional (SAN) Presentation           (Theatre)*
*15.00 – 15.30    Coffee Break*

***Conference Dinner***
*18.00 – 20.00    Conference Dinner*

## Schedule

26th of April 2019

*08.00 – 08.30    Registration*

***Parallel Session 2***
*08.30 – 09.50    Rethinking of Architectural Space and People*
*                 (Room 4.03A)*
*                 Rethinking of Cities and People*
*(Room 4.03B)*
*                 Student Session – Final Round of Architectural*
*Festival         (Theatre)*
*09.50 – 10.10    Coffee Break*
*10.10 – 11.30    Rethinking of Building Technology*
*(Room 4.03A)*
*                 Rethinking of Architectural Space*
*               (Room 4.03B)*
*                 Student Session – Final Round of Architectural*
*Festival    (Theatre)*
*11.30 – 13.00    Lunch and Praying time*

***Plenary Session 2***
*13.00 – 13.40    Mr. Keat Ong (Nota Design Group, Singapore)*
*                 "Injecting Architecture"*
*13.40 – 14.20    Dr. Kuowei Eleazar Godfrey Chiu (Tunghai University,*
*Taiwan)*
*                 "Biomimicry and Empathic Architecture"*
*14.20 – 14.40    Discussion (Question and Answer)*
*14.40 – 15.10    Photo session & Product Presentation*
*15.10 – 15.30    Coffee Break*
*15.30 – 16.30    Closing Remark & Prize Awarding*

## Schedule

27th of April 2019

Surabaya City Tour
*07.00            Meeting point at Petra Christian University*
*07.30 – 17.00    Field Trip to :*
*                 Kampung Lawas Maspati*
*                 Museum Bank Indonesia*
*                 Kampung Nelayan Kenjeran*

# Schedule

Parallel Session 1
25th of April 2019

| Room 4.03A:<br>Rethinking of Building Material | Room 4.03B:<br>Rethinking of Culture |
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| **ARCHITECTURE FOR SHARING**<br>Andy Rahman, Loundy Lompoliuw<br>Andyrahman Architect<br>Petra Christian University | **BUK: AN INORNATE FOLKSY CONSTRUCTION IN CREATING CULTURAL SPACE**<br>Yusfan Adeputera Yusran, Dian Kartika Santoso<br>Universitas Brawijaya |
| **BAMBOO ARCHITECTURE AS STUDENTS LEARNING PROJECT FOR COMMUNITY DEVELOPMENT IN INDONESIA**<br>Esti Asih Nurdiah, Anik Juniwati<br>Petra Christian University | **TO WHAT EXTENT RETURN TO THE ORIGINAL STATE IN CONSERVING HWIE TIAUW KA COMMUNITY BUILDING IN SURABAYA**<br>Timoticin Kwanda<br>Petra Christian University |
| **MATERIAL IS AN IMPORTANT PART OF LOCAL CULTURE FOR SUSTAINABLE BUILDING (GREEN SCHOOL BUILDING CASE STUDY)**<br>Maria I Hidayatun, Rezon Kevin Tandean<br>Petra Christian University | **RUMAH BAMBU IBUKU AS AN EXPRESSION OF INDONESIAN ARCHITECTURE REGIONALISM**<br>Maria I Hidayatun, Rudy Putra Setyantara<br>Petra Christian University |

| Room 4.02B:<br>Rethinking of Building Technology |
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| **LIGHTWEIGHT AND MULTI-PURPOSE PARTITION FOR VERTICAL HOUSING**<br>Eunike Kristi Julistiono, Lilianny Sigit Arifin, Bisatya Widadya Maer<br>Petra Christian University |
| **IMPACTS OF GREENERY FACADE TO INDOOR LIGHT ILLUMINATION AND THERMAL**<br>Luciana Kristanto, Wanda W.Canadarma, Samuel Hartono Nata<br>Petra Christian University |

# Schedule

Parallel Session 2
26th of April 2019

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| UTILIZATION PATTERN OF RESIDENTIAL TERRACE AS A TRADING PLACE IN KAMPUNG TRIDI JODIPAN MALANG<br>Adita Ronarizkia, Yusfan Adeputera Yusran<br>Universitas Brawijaya | VIOLATION FACTORS OF THE BUILDING COVERAGE RATIO: A STUDY IN TRIMULYO GENUK, SEMARANG, INDONESIA<br>Parfi Khadiyanto, Sugiono Soetomo, Sudharto P Hadi<br>Diponegoro University |
| NARRATIVE OVERLAPPING IN SPATIAL TRAJECTORIES: EXPLORING THE PRODUCTION OF SPACE WITHIN THE EVERYDAY<br>Nurseto Nugroho, Yandi Andri Yatmo, Paramita Atmodiwirjo<br>Universitas Indonesia | EMPATHIC URBAN FUNCTIONS ON MALIOBORO STREET IN YOGYAKARTA CITY, INDONESIA<br>Titien Saraswati<br>Duta Wacana Christian University |
| INTERIOR DESIGN STUDENTS' PERCEPTION FOR AUTOCAD, SKETCHUP AND RHINOCEROS SOFTWARE USABILITY<br>Sherly de Yong<br>Petra Christian University | KALANGANYAR RIVER AS A NATURAL URBAN CATALYST, LIVING PLACE OR SOCIETY PEST<br>Fairuz Mutia, Eva Elviana, Adibah Nurul Yunisya<br>Universitas Pembangunan Nasional "Veteran" Jawa Timur |
| | THE EVALUATION OF CITY LANDMARKS THROUGH THE STUDY OF PLACE ATTACHMENT<br>Rully Damayanti, Angela Christysonia Tampubolon<br>Petra Christian University |

# Schedule

Parallel Session 3
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| Room 4.03A:<br>Rethinking of Building Technology | Room 4.03B:<br>Rethinking of Space |
|---|---|
| **SURFACE EXPLORATION IN CREATING FREE DUST POLLUTION APARTMENT**<br>Rizka Tiara Maharani1, Sri Nastiti NE2, FX Teddy Badai S3<br>Institut Teknologi Sepuluh Nopember | **REINFORCING IDENTITY: BRINGING THE NEW FACE OF MALIOBORO HISTORIC PLACE**<br>Dyah Titisari Widyastuti<br>Universitas Gadjah Mada |
| **CONCERNS IN DIGITAL TURNS IN ARCHITECTURE**<br>Mia Tedjo | **VISUAL AND AUDITORY COMMUNICATION TO ESTABLISH SUSTAINABLE COMMUNITY THROUGH PHYSICAL ENVIRONMENTAL ANALYSIS**<br>Lya Dewi Anggraini, Yusuf Ariyanto<br>University of Ciputra |
| **DAYLIGHT PERFORMANCE OF HORIZONTAL LIGHT PIPE WITH EGG-CRATE REFLECTOR IN THE TROPICS**<br>Feny Elsiana, Frans Soehartono, Luciana Kristanto<br>Petra Christian University | **CONTEMPORARY URBAN VIEW IN UNDERSTANDING MEANING OF URBAN SPACE IN KAMPUNGS, SURABAYA**<br>Rully Damayanti; Maria Immaculata Hidayatun; Esti Asih Nurdiah<br>Petra Christian University |
| **THERMAL COMFORT STUDY IN TRANSFORMING CULTURAL HERITAGE AREA USING ENVI-MET SOFTWARE**<br>Tubagus M. Aziz Soelaiman, Woerjantari K. Soedarsono, M. Donny Koerniawan<br>Institut Teknologi Bandung | **SOCIAL SPACE TRANSFORMATION IN POST DISASTER HOUSING**<br>Syam Rachma Marcillia<br>Faculty of Engineering, Gadjah Mada University |

# Abstracts

# *BUK*: AN INORNATE FOLKSY CONSTRUCTION IN CREATING CULTURAL SPACE

Yusfan Adeputera Yusran[1*], Dian Kartika Santoso [2]
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## ABSTRACT

Indonesian society has its own unique tradition of making buildings. shaped as a barrier on the sides of the bridge in front of the house that sized to the proportion of human sitting and is usually joined with the house's fence. This construction eventually becomes a place for various activities, such as sitting, chatting with neighbours, or gathering. Not only one house in this hamlet owns the Buk, but almost appears in every house. This paper tries to describe this appearance phenomenologically in order to get more comprehensive understanding through the point of view of place attachment. This study provides another perspective in considering an inornate construction around us which built folksy by the locals. The result of this study shows that the *Buk* interpreted as a place and has an emotional significance to the culture and its people. *Buk* has rooted from the genius loci, that is the social interaction and harmony between neighbours and as a physical form that can be perceived by the senses and then develop into a cultural space by the community because of the activities therein and interactions formed between each other.

Keywords: Buk, Genius loci, Inornate construction, Cultural space

# TO WHAT EXTENT RETURN TO THE ORIGINAL STATE IN CONSERVING HWIE TIAUW KA COMMUNITY BUILDING IN SURABAYA

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**ABSTRACT**

The purpose of this paper is to examine to what extent in conservin physical condition, and history of construction date, architectural style, construction system, important person or event.  To find the original state of the building in term of building style such as form, method of construction, materials and colour, the research applied typological analysis and excavation methods to uncover original remains.

Based on typological analysis of a typical Chinese house in China and gypsum board.  In March 2019, the restoration was began by excavating the floor, and found the original tiles, removal of several layers of colour at the columns found the last layer that assume as the original colour, and the existing ceiling was uncovered and found the original teakwood panels.

To restore the building, some elements of the building returned to t state, for example the new section of building at the courtyard was preserved, only some part of the new ceramics tile at the wall was replaced by plaster.  Following the principle of authenticity and minimum intervention in conservation, some of this existing condition of the buildings was retained to display authentically the changes of the building over time.

**Keywords: existing state, original state, typological analysis, and excavation.**

# RUMAH BAMBU IBUKU AS AN EXPRESSION OF

# INDONESIAN ARCHITECTURE REGIONALISM

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**ABSTRACT**
The issue of globalization and geothermal has become a very strong is
This research is architectural research that focuses on how an archi
analyzed descriptively using the theory of Regionalism which
is based on local values.
The results of the research are a concept of how to be modern but st
parameters in Regionalism.

**Keywords: Regionalism, Rumah Bambu Ibuku, local value, architecture**

# INTERIOR DESIGN STUDENTS' PERCEPTION FOR AUTOCAD, SKETCHUP AND RHINOCEROS SOFTWARE USABILITY

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**ABSTRACT**
Many previous studies regarding CAAD software for design have been regarding the 2D-3D modeling software usability. A total of 127 first year interior design students participated in the study. After finishing the course about CADD software, they completed a survey using System Usability Scale (SUS) and polling method. After that the data was analyzed and measured. Statically, the findings show that there a difference usability between SketchUp – AutoCAD, but not so different between SketchUp – Rhinoceros and AutoCAD – Rhinoceros; secondly SketchUp is less usability than the AutoCAD and Rhinoceros. But using the survey polling, the findings show that most students will be using SketchUp for their 3D modeling design. Possibly not occurring significant result is because: the students may not really understand the System Usability Scale (the greater showed negative usability) and ambiguous perception in the questionnaire statement.

**Keywords: System Usability Scale (SUS); AutoCAD; SketchUp; Rhinoceros**

# KALANGANYAR RIVER AS A NATURAL URBAN CATALYST, LIVING PLACE OR SOCIETY PEST

Fairuz Mutia[1], Eva Elviana[2], Adibah Nurul Yunisya[3]
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## ABSTRACT

River as a water source became the most important part of Nusantara's phenomenology approach. Character appraisal were conducted to analyze non-physical aspects then analyze according to the principles of urban catalyst. The physical aspects then analyzed through a walkthrough analysis. The results showed that the utilization of natural potential in the form of water banks is the main focus of coastal architectural characteristics, as a manifestation of the pattern of social structure. Kalanganyar river as a natural urban catalyst should aim to be more dependent to it's nature. The rapid development until now, should make Government should re-thinking again about the regulations how far it can save the nature of the river.

Keywords: bahari architecture; coastal area; kalanganyar; place; urban catalyst

# ARCHITECTURE FOR SHARING

Andy Rahman[1], Loundy Lompoliuw [2]
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**ABSTRACT**
Architecture bureaus tend to sterilize their office from public acti
Office tries to break the boundaries, standing as an oasis
between its surrounding, community, and other architectural
bureaus. It provides an opened communal space for experts to
students, hamlets, communities, and even craftsmen to share
their knowledge and experiences. Bricks as the main material
used in this building also revive the spirit of *Nusantara*
Architecture, a contextual architecture in accordance with the
culture and values of Indonesia as a *Nusantara*. While its own
name stands for 'Consciousness of Sharing', it really does
provide a place for everyone to share their interests, and
giving a significant impact in many possible forms.

**Keywords: Sharing, Communal Space, Bricks, Nusantara Architecture**

# BAMBOO ARCHITECTURE AS STUDENTS LEARNING PROJECT FOR COMMUNITY DEVELOPMENT IN INDONESIA

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## ABSTRACT

Brick, concrete and steel have become common building materials in I local materials. This phenomenon might also be found among local people and builders. Industrial building materials area often questionable as sustainable materials, while bamboo, as local material, has been known as sustainable material. Therefore, the usage of bamboo in nowadays architecture need to be elaborated and taught to the young generation, especially students, and to the society for community development. This paper aims are to discuss the method in teaching and learning on bamboo architecture for students in architecture education as well as to discuss on how to implement the design method for community development. Case study was taken during community service project for Jarak Village's residents which was done by students and lecturer from Petra Christian University. By discussing the issue and methods, in the future bamboo architecture will present not only as a building which provide space for activities but also as an instrument in learning process and community development.

Keywords: Bamboo architecture, local material, community development.

# MATERIAL IS AN IMPORTANT PART OF LOCAL CULTURE

# FOR SUSTAINABLE BUILDING

# (GREEN SCHOOL BUILDING CASE STUDY)

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**ABSTRACT**
Indonesia is one of the countries scattered on the equator that prov:
do is through local culture with a focus on the material.
Material is one of the important elements that can withstand
buildings from the negative effects of climate. Green school
building is one of the buildings in Bali with a school
function that applies local material as the main concept of
the building with based on local culture.
This research is a case study that will prove how Indonesian Regional
The results of the study are expected to be one of the references for

**Keywords: material; local culture; regionalism, green school building.**

# SOCIAL SPACE TRANSFORMATION IN POST DISASTER HOUSING

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## ABSTRACT

The main purpose of this article is to consider critical issues on post-disaster housing reconstruction, with a focus on the cultural backgrounds of the affected population. Despite the external challenges appeared in reconstruction practice, housing, as a means of 'home' for the survivors should ensure improvements on their quality of life. Through in-depth examination and comparative analyses between two-real cases of post disaster housing in Yogyakarta, the methodology of this research is based on literature reviews, several periods of on-field observation, including physical data documentary collections in both area of study cases. Items related to development of space pattern, activities and social interaction behaviors in the spaces were assessed. Based on the cases, a discussion on how residents adopted and adjusted their post-disaster housing were performed, and in conclusion, results suggest that modification were being made to their social space in order to maintain users' personal and social lifestyles.

Keywords: Social space: post disaster housing; cultural values.

# PLASTIC CHAIR VERSATILITY AS AN APPROACH TO CONSTRUCT PASAR BARU INFORMAL SPACE

Roland Tejo Prayitno[1], Yandi Andri Yatmo[2], Paramita Atmodiwirjo[3]
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**ABSTRACT**

This paper investigates materiality as architecture manifestation in DeLanda called as morphogenic power of its own. Understanding material system and existing context are two essential process in order to produce a responsive design in this random, unpredictable pattern of informal space, which in this paper, the context that will be specifically studied is Pasar Baru. In the further study, the material which will be studied along with Pasar Baru context is the versatile usage of plastic chair. This paper will investigate materiality approach as a relevant method to create a contextual design, as this approach will be highly based on interaction system between the physical material and the context.

**Keywords: materiality; morphogenic power of its own; informal space.**

# UTILIZATION PATTERN OF RESIDENTIAL TERRACE AS A TRADING PLACE IN KAMPUNG TRIDI JODIPAN MALANG

Adita Ronarizkia [1], Yusfan Adeputera Yusran [2]
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## ABSTRACT

Kampung Tridi, Jodipan Malang, which was initially a slum residential culture and economy of the residents. The aspect which has been through adequate significant change is the economy, which is indicated from the number of residents who take benefit from their house's terrace that initially used as a conventional family area, now turn into an area of trading. This change is conducted to be economic support in order to fulfill their life needs. This research aims to identify the pattern of terrace utilization as the place where the trading activity takes place in Kampung Tridi Jodipan Malang. This research exerts the method of descriptive qualitative which identifies the pattern of terrace utilization through field survey, interview, and literature studies, while the method of analysis used behavior mapping. This research finding shows that the utilization pattern of the residential terrace as the trading spot is located exactly in the front part of the house, that is the terrace. The houses that using the terrace as the trading spot are mostly located in the front of the main path which leads to the Jembatan Kaca (Glass bridge) that connects Kampung Tridi with Kampung Warna-warni in the south.

Keywords: Thematic Kampong; Shophouse; Terrace Utilization

# NARRATIVE OVERLAPPING IN SPATIAL TRAJECTORIES: EXPLORING THE PRODUCTION OF SPACE WITHIN THE EVERYDAY

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**ABSTRACT**
This paper discusses the production of space inside everyday using t
everyday narrative. The inquiry results suggest that what is
important in the production of space process is the bridge
formed by the spatial trajectories. The more bridges that are
present means, the more spatial trajectories are involved. It
becomes important to consider the overlapping between spatial
trajectories that occur in that space because it indicates
various kinds of narratives involved.

**Keywords: narrative; spatial trajectories; bridge.**

# REINFORCING IDENTITY:

# BRINGING THE NEW FACE OF MALIOBORO HISTORIC PLACE

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**ABSTRACT**

The significant character of architecture for the majority places in of Yogyakarta, Indonesia. For couple of years, because of the modern development and economic reasons, the unique characters of buildings in Malioboro was going to fade away, covered mostly by commercial signboard, and some others had a different appearance from street walls pattern.

The local government already had an awareness to control the placemen effort to improve the quality of Malioboro streetscape is getting stronger.

This paper aims to examine to what extent the changes in the charact method is carried out to examine to what extent the modernity and commercial interests influence the continuity of typical building facades in Malioboro Street. This method attempts to measure the degree of continuity in facade of significant buildings through calculation of the coverage percentage and placement of commercial signboard. For the purpose of the study, field observation is conducted to compile the data of building facade and signboard dimension and placement. The result shows there are significant positive change in bringing back the identity of Malioboro regarding the type, size, and placement of building façade commercial signboard.

**Keywords: identity, building façade, commercial signboard**

# VISUAL AND AUDITORY COMMUNICATION TO ESTABLISH SUSTAINABLE COMMUNITY THROUGH PHSYICAL ENVIRONMENTAL ANALYSIS

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**ABSTRACT**
Space and community shape an urban formation which supports its commu
of streets and buildings for social functioning and reveals
that the community of Kampung Made has used indigenous means
of communication to control and share information among the
inhabitants, visually and auditorily, which characterized
their physical environment. The further result shows that
various social gatherings are the manifestation of maintaining
communication performed both in public and private spaces;
either streets or front yards and terraces; either mosques or
resident's hall. This study concludes that the community of
Kampung Made is sustained through a social gathering and
within the range of visual and auditory distances.

**Keywords: Sustainable community; Visual communication; Auditory communication**

# CONTEMPORARY URBAN VIEW IN UNDERSTANDING MEANING OF URBAN SPACE IN KAMPUNGS, SURABAYA

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**ABSTRACT**
The aim of this article is to understand the meaning of urban space model. This view reads urban space according to the social production that occurs in that area, which comprise of three main factors are space, society and time. It is contrasting the Western centric view by focusing on the norms (meaning) rather than forms (structure), and on the process of socially constructing spaces rather than physical product. It challenges any Western biased theory particularly by considering 'meaning' that is socially produced in cities. Western biased theory reads cities particularly in the quality of structure and identity of urban elements. The extension in this article is by considering 'meaning' in the reading process. The investigation of the case study, which is kampungs (=urban villages), is undertaken by observing meaning through the historical layer, the daily rhythm, and the observers' perceptions. The study identify that the unfixed urban elements that related to social activities creates a strong meaning to the society.

Keywords: kampung, contemporary, place meaning.

# RE-INTERPRETING TRADITION-BASED PARADIGM OF THE ISLAND CITY ARCHITECTURE

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**ABSTRACT**

The tropical architecture of island city, Bawean, has been known as analysis for the contemporary architecture with pioneer airport design as an object through re-interpreting traditional channel approach of Bawean architecture as a case. In the transformation process and its thermal interference in the design is evaluated by the Flow Design simulation program to evaluate the proposed design wind flow and a noise control evaluation. The concept of Bawean architecture, especially the *Dhurung* barn is applied by implying its original form into the modern form without losing the conveyed meaning. The results of this airport design show the locality of shape, space, and zoning, and the formation of thermal and acoustic design integration.

**Keywords: Airports design; Bawean; Dhurung barns; re-interpreting tradition; tropical environment.**

# THERMAL COMFORT STUDY IN TRANSFORMING CULTURAL HERITAGE AREA USING ENVI-MET SOFTWARE

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## ABSTRACT

Bandung recently has increased quite high in population growth, whi
requirements. Gempol area used as case study since most of the area has changed because of tourism and population growth. Reinforced by spatial planning policies such as RTRW and RDTR, these building and land use transformations in some cases could affect microclimate condition, especially thermal comfort. This paper provides the phenomenon of thermal comfort changes that occurs based on simulation using ENVI-Met software. The study compares Predicted Mean Voted (PMV) and its elements as thermal comfort indicator between existing condition and detailed spatial plan condition. The result shows that the PMV value of planned condition is lower (2.71) than current condition (3.00), which is more comfortable. Nevertheless, the existing condition will be changed into higher non-residential buildings and less greeneries. Some environmental factors that calculating PMV (air temperature, Tmrt, humidity, and wind speed) are also analysed to find out what factors makes the planned condition more comfortable than the existing. In the end, simulations using ENVI-met software might be one consideration in creating spatial planning policy more objective in the future.

Keywords: Thermal comfort; simulation; cultural heritage; urban morphology transformation.

# SURFACE EXPLORATION IN CREATING FREE DUST POLLUTION APARTMENT

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**ABSTRACT**

Design for free dust pollution in apartment design is proposed to red the design process. The result show that apartment with courtyard and the convex surface can be a choice because in courtyard wind tend to flow above the building and dust will fall in outdoor surface or roof so that convex surface is used to make it difficult to patch. Convex surface also makes wind speed level higher in surface with the result that dust easier to flow. In addition, the next design process also should consider the room placement due to airflow requirement and opening window. Bottom opening (awning) can be selected for minimalizing the possibility dust of enter the room.

**Keywords: Airflow; Apartment Design; Dust; Force-based framework; Identify Force; Surface.**

# CONCERNS IN DIGITAL TURNS IN ARCHITECTURE

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**ABSTRACT**

From a computer-aided design approach to a computational design appr
Discussions are rooted in digital design cognition, digital design eco-system and pedagogy. It is proposed that digital design tool affordances is a pertinent concept to support this emerging field, both pedagogically and with regard to software development. It is also suggested that the digital eco-system framework need to include the dialogue between analogue and digital design tools.

**Keywords: Digital architecture; Digital design cognition; Digital ecosystem.**

# DAYLIGHT PERFORMANCE OF HORIZONTAL LIGHT PIPE
# WITH EGG-CRATE REFLECTOR IN THE TROPICS

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**ABSTRACT**

The necessity to minimize solar heat gain in a modern air-conditioned
side window is low. Horizontal Light Pipe (HLP) is one of a
light transport system that can guide daylight deeper into
building interiors. Improvement of HLP, focusing on its
opening distribution is proposed in this study. An egg-crate
reflector is installed at HLP's opening distribution to
achieve a uniform light distribution inside office space.
The aim of this study is to evaluate and explain the daylight
performance of HLP with an egg-crate reflector at office space
in the tropics. Experiment with physical scaled model 1:5 is
used as a research method. Illuminance value, Daylight Factor
(DF), uniformity ratio and diversity of illuminance of an
office space lit by side window (base case) were compared to
the office space lit by side window and HLP with an egg-crate
reflector (case), simultaneously with daylighting standards.
The results showed that the application of HLP with an egg-crate ref
daylight distribution inside office space. The diversity of
illuminance of the case was 2.31:1 to 4.67:1 and had met the
maximum diversity of illuminance in office space. Integration
of HLP and egg-crate reflector improves both daylight level
and distribution. Improvement of DF and illuminance level were
in the range of 16.6% to 56.6%. Uniformity ratio of the base
case was in the range of 0.35 to 0.45, while the uniformity
ratio of the case was in the range of 0.48 to 0.66.
Application of HLP with an egg-crate reflector decreases the
diversity of illuminance and results in more uniform daylight
distribution inside space. The diversity of illuminance of the
base case at a low altitude of the sun (15:00) exceeded 5:1
while the diversity of illuminance in the case was kept lower
than 5:1 at all the measurement time.

# IMPACTS OF GREENERY FACADE TO INDOOR LIGHT ILLUMINATION AND THERMAL

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## ABSTRACT

This was preliminary research of greenery facade impact to indoor li orientation, dry season March-April 2018; secondly south orientation,dry season, November 2018. The result shown, on dry season west orientation, facade with vegetation reduce more 31.18% - 51.71% sunlight compared to facade without vegetation. The highest reduction was on 4.30-6pm. This meant it was effective to reduce excessive brightness of west sunlight. On dry season south orientation, the facade with vegetation reduce more 28.4% - 54.87% sunlight compared to facade without vegetation. The highest reduction was on 5-5.15am in the morning and 4.30-5pm in the afternoon. While the indoor thermal impact was unsignificant, reduction of air temperature only 0.5-1 deg°C, whereas only 1% reduction for RH.

Keywords: greenery facade, indoor light illumination, thermal

# LIGHTWEIGHT AND MULTI-PURPOSE PARTITION FOR VERTICAL HOUSING

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**ABSTRACT**
The degradation of housing quality due to rapid urbanization and con
Consequently, the space may be lack of privacy and comfort for
the occupants. This paper presents a lightweight and multi-
purpose partition as a solution to improve the living quality
in vertical housing. The lightweight characteristic is
intended to minimize the structural loads, and making the
partition can be installed or dismantled easily by the
occupants themselves. While the multi-purpose property
performs as a solution to increase space efficiency in a
limited area of each housing unit. The result is a flexible
and adaptable space which can be adjusted to the occupants'
different needs or conditions.

**Keywords: lightweight; multi-purpose; vertical housing; user-friendly.**

# UNDERSTANDING PHYSICAL SETTINGS OF STREET VENDORS IN SURAKARTA

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**ABSTRACT**

This study discussed the physical settings of street vendors in Surak
Results of the study were types of prepared-food street vendors in Su
vendors' location which usually under shade trees, b)consumer
area that was open, and was not covered by tarps, c)cool
temperature, d)consumers can sit comfortably, and e)consumers
can sit lesehan. Social comfortability was obtained when
consumers have a space to socialize, regardless the space was
physically narrow. Factors related to social comfortability,
namely: a)the seller's hospitality, b)consumers can have a
chat for hours, and c)cheap food prices.

**Keywords: Physical Settings; Physical Comfortability, Social
Comfortability.**

# VIOLATION FACTORS OF THE BUILDING COVERAGE RATIO:

## A STUDY IN TRIMULYO GENUK, SEMARANG, INDONESIA

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**ABSTRACT**

Excessive Building Coverage Ratio (BCR) defined as shutting of land prone area. Using a cross-tabulation method, we divided the cause of the violation of the GBCR into external and internal factors. External factors, such as the absence of sanctions, large area of land owned and less understanding on what BCR is, had a negative correlation with violations.

On the other hand, internal factors, such as income, household enter dangers arising from the violation thereof.

**Keywords: Building Coverage Ratio; flooding; tidal overflow; urban planning**

# EMPATHIC URBAN FUNCTIONS ON MALIOBORO STREET

# IN YOGYAKARTA CITY, INDONESIA

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**ABSTRACT**

Malioboro Street in Yogyakarta City, Indonesia, has already been know
occupied by street vendors. This was the attraction of
Malioboro Street, *bazaar* on pedestrian ways. While in other
places in the world the function of pedestrian way just for
pedestrians only, in Yogyakarta the street vendors could
freely occupy pedestrian ways for commercial matter. It was
likely that there were dynamic, empathic urban functions to
this street. With this condition, the question of this study
is: What kind of empathic urban functions already executed and
implemented to this street? The conclusion was that there were
some mutual empathic urban functions implemented between the
rulers of Yogyakarta City and the people.

**Keywords: pedestrian ways, street vendors.**

# THE EVALUATION OF CITY LANDMARKS THROUGH THE STUDY OF PLACE ATTACHMENT

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**ABSTRACT**
The presence of a landmark is one form of city identity. City l
facing danger.
Theoretically, the identity or symbol creates a bonding with the
This empirical work aimed to identify the social symbols acc
observers' spatial perception according to the three
main factor of place attachments and social symbols,
which are process, place and person.
The study will unveil the current value of the Hero City and para

Keywords: landmark, symbol, place attachment, Surabaya

# INTERIOR DESIGN STUDENTS' PERCEPTION FOR AUTOCAD, SKETCHUP AND RHINOCEROS SOFTWARE USABILITY

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## ABSTRACT

Many previous studies regarding CAAD software for design have been developed with reference to how the CAAD software (in this case: AutoCAD, SketchUp and Rhinoceros) will benefit the students while learning to 2D-3D modeling design. The purpose of this study aims to identify the first year students' perspective regarding the 2D-3D modeling software usability. A total of 127 first year interior design students participated in the study. After finishing the course about CADD software, they completed a survey using System Usability Scale (SUS) and polling method. After that the data was analyzed and measured. Statically, the findings show that there a difference usability between SketchUp – AutoCAD, but not so different between SketchUp – Rhinoceros and AutoCAD – Rhinoceros; secondly SketchUp is less usability than the AutoCAD and Rhinoceros. But using the survey polling, the findings show that most students will be using SketchUp for their 3D modeling design. Possibly not occurring significant result is because: the students may not really understand the System Usability Scale (the greater showed negative usability) and ambiguous perception in the questionnaire statement.

*Keywords: System Usability Scale (SUS); AutoCAD; SketchUp; Rhinoceros*

## INTRODUCTION

In the past, an interior designer was only using hand sketches and manual three-dimensional models to draw and design. Nowadays, the design can be done faster, both two-dimensional and three-dimensional designs and drawings, using the help of various kinds of computer aided architectural design (CAAD) software. The most popular CAAD Software for 2D and 3D software is Google SketchUp, AutoCAD and Rhinoceros software. Google SketchUp is a program that helps in the concept design stage and is easy to learn. (Salman, 2011) AutoCAD is a program used to draw 2 dimensions and 3 dimensions developed by Autodesk. While Rhinocers is a 3D modeling using NURBS (non-uniform rational B-splines) modeling.

Surveys report that AutoCAD is the dominant software used by designer practices and architecture. Software that is also often used is Google SketchUp (Salman, 2011). In recent years, Google SketchUp has become popular in academia, practice, and in digital design studies. The combination of the two systems is useful for exploration of design (Zuo, Leonard and MaloneBeach 2010), because of differences in the nature of the two software programs. Having skills in both software programs, helps students to be critical of which programs are best for certain design tasks and that offer flexibility. (Al-Qawasmi 2005). Google SketchUp is described as friendly, easy to learn (Zuo, Leonard and MaloneBeach 2010).

The Interior Design Study Program of the Petra Christian University under the Faculty of Arts and Design was established in 1998, is one of the leading design study programs in Surabaya, also teaches students to use software technology assistance in designing. This can be seen in the 2016 study program curriculum which has Computer 1 courses since semester 1. This Computer 1 course is a compulsory basic course that is part of the Interior Design study program curriculum. This course is a theory and practice course on skills / 2D drawing skills and digital 3D modeling using design software such as: SketchUp, Rhinoceros and AutoCAD.

The aims for this research is to identify student's perspective regarding the 3D modeling software usability, to identify the dominant software that they will use as the future interior designer. The result of this research will be reference regarding CAAD software usability in fresh year students' perception.

## LITERATURE

To determine the usability of Computer Aided Architectural Design software (CAAD) by first year students, there were three software that were analyzed: AutoCAD, SketchUp and Rhinoceros. This three software were introduced in semester 1 in Computer 1 courses. As part of the core curriculum, in Computer 1 courses, students were taught to develop their knowledge and digital 2D-3D modeling drawing skills. Students attempted to learn and practice about 2D Digital drawing using AutoCAD, then they were introduced new ways of discovering 3D modeling and orthographic views using SketchUp and Rhinoceros software.

AutoCAD is a commercial computer-aided design (CAD) and drafting software application. AutoCAD were developed and marketed by Autodesk. AutoCAD is usually used by industries, architects, project managers, engineers, interior designer, graphic designers, and many other professionals. AutoCAD were introduced first in Computer 1 courses because this software was capable of producing precise drawings with a minimum effort, especially in 2D modeling. (see figure 2.1)



**Figure 2.1** AutoCAD Logo

(Source: https://www.autodesk.com/).

SketchUp is a dynamic software program that is used to quickly compile, modify, and construct 3D modeling image. SketchUp software were developed and marketed by Google and Trimble Inc. This software usually used in the fields of architecture, design and engineering. SketchUp were introduced second in Computer 1 courses because easy to use and can be used to teach and learn 3D space geometry concepts. (see figure 2.2)



**Figure 2.2** SketchUp Logo

(Source: https://3dwarehouse.sketchup.com/).

Rhinoceros is a commercial 3D computer graphics and computer-aided design (CAD). Rhinoceros or Rhino were developed by Robert McNeel & Associates. (sumber: Wikipedia) Rhinoceros geometry is based on NURBS mathematical model (NURBS or non-uniform rational B-splines are mathematical representations that can accurately model any shape from a simple 2-D line, circle, arc, or box to the most complex 3-D free-form organic surface or solid) (see figure 2.3). Rhinocers were introduced last in Computer 1 courses. (see figure 2.4.) (Mcneel, 2013)
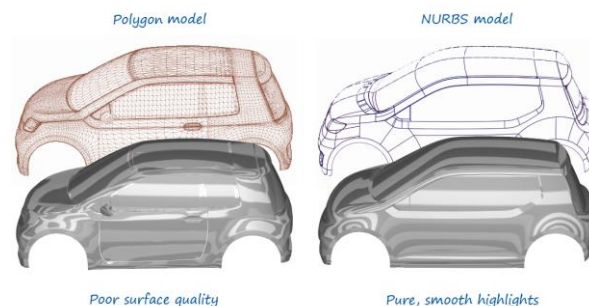


**Figure 2.3** Difference between Polygon Model and NURBS Model

(Source: https://www.aliasworkbench.com/theoryBuilders/TB1_nurbs1.htm).

**Figure 2.4** Rhinoceros Logo

(Source: https://www.romanoff.com/rhino-6-0-designing-software.html).

## METHODOLOGY

It is within this context that this study approached by Interior Design department – Petra Christian University, requesting feedback on the current usability software in interior design education. This was accomplished through the distribution of an electronic survey (managed by Google Form) using SUS (System Usability Scale) technic. The survey was distributed in December 2018.

### 1. Participants

The study was conducted in Interior Design course especially Computer 1 course in Semester 1. Among 145 students enrolled in the Computer 1 course (class A = 74 students, class B = 71 students), 127 of them participated in this research (87.58%). The age of participants ranged from 18 to 20. The majority participants were female.

### 2. The Course Schedule

The Computer 1 course is a 2 credits course, was held once a week for 4 h per meeting (Schedule for class A: Wednesday 13.30-17.30; Schedule for class B: Thursday 13.30-17.30) in 1$^{st}$ semester 2018/2019. The first five weeks will be AutoCAD course, then continue with SketchUp course and Rhinoceros course (see table 3.1)

**Table 3.1** Detailed Schedule for Computer 1 Course

| No | Tanggal Rencana | Rencana Materi Tiap Pertemuan | Acuan Ref No | Diisi oleh Dosen Saat Kuliah Dilaksanakan | | | | | Diisi oleh Ketua/ Wakil Ketua Kelas | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Tgl | Materi yg Terbahas di Kelas | Jml Hadir | Dosen | Paraf | Waktu mulai | Waktu selesai | Paraf |
| 1 | 15.08.2018 | Introduction – Pengenalan Mata Kuliah Komputer 1 | | | | | Sherly de Yong | | | | |
| 2 | LIBUR | OFF: Eid Al-Adha | | | | | - | | | | |
| 3 | 29.08.2018 | AutpCAD Pengenalan AutoCad (User Interface) + Toolbar Draw | | | | | Purnama Esa Dora | | | | |
| 4 | 05.09.2018 | AutoCAD: Toolbar Modify; Window Selection, Crossing Selection | | | | | Purnama Esa Dora | | | | |
| 5 | 12.09.2018 | AutoCAD: Block, Refedit Toolbar Layers; Toolbar Properties | | | | | Purnama Esa Dora | | | | |
| 6 | 19.09.2018 | AutoCAD: Dimension; (Design Center) Teaser for Advance AutoCAD: Construction Drawing, 3D Modelling AutoCad, 3dMax Rendering | | | | | Purnama Esa Dora | | | | |
| 7 | 26.09.2018 | SketchUp – Introduction *(Introduction, SketchUp Concept & User Interface)* SketchUp Tools (part 1) *(Principal Tool, Drawing Tool, Modification Tool)* | | | | | Sherly de Yong | | | | |
| 8 | 03.10.2018 | SketchUp Tools (part 2) *(Construction Tool, Camera Tool, Walkthrough Tool)* | | | | | Sherly de Yong | | | | |
| 9-10 | UTS UTS | U T S | | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 24.10.2018 | SketchUp *Model Settings; Input - Output (Model-Material Browser and Entitiles, Import-Export 2D-3D Graphics)* | | | | Sherly de Yong | | | | |
| 12 | 31.10.2018 | *Sketchup Extensions + Teaser for Advance Sketchup Extensions (3D Warehouse, Extension; Teaser Extension (Parametric Design using flowify and voronoi)* | | | | Sherly de Yong | | | | |
| 13 | 07.11.2018 | *Rhinoceros – Introduction & User Interface* | | | | Bramasta P. Redyantanu | | | | |
| 14 | 14.11.2018 | Rhinoceros – Introduction & User Interface | | | | Bramasta Putra Redyantanu | | | | |
| 15 | 21.11.2018 | Rhinoceros: Create Surfaces from Curves | | | | Bramasta Putra Redyantanu | | | | |
| 16 | 28.11.2018 | *Rhinoceros: Edit Surfaces from Curves* | | | | Bramasta Putra Redyantanu | | | | |
| 17 | 05.12.2018 | Rhinoceros: Organize, Render and Annotation + Teaser for Advance Rhinoceros | | | | Bramasta Putra Redyantanu | | | | |
| 18 | UAS | U A S | | | | | | | | |

(Source: author)

## 3. Instrument

There were two instruments used in this study. The first instrument is for gathering the information regarding the usability of the software. The instrument was adopted using the System Usability Scale (SUS). Usability is a technique used to evaluate products / design by testing them directly on users. The SUS is contained of ten statements (five positive statements and five negative statements). Each statement having a five-point scale that ranges from Strongly Disagree to Strongly Agree. The sample adapted SUS instrument can be seen in table 3.2. This SUS instrument were applied in three software (AutoCAD, SketchUp and Rhinoceros) (Nielsen, 2012)

**Table 3.2** The Sample of Adapted System Usability Scale (SUS) for AutoCAD Program

| Original SUS Question | Adapted SUS Question | Strongly Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| I think that I would like to use this system frequently. | I think I would like to use this **Program AutoCAD** frequently. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I found the system unnecessarily complex. | I found the **Program AutoCAD less** complex. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I thought the system was easy to use. | I thought the **Program AutoCAD** was easy to use. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I think that I would need the support of a technical person to be able to use this system. | I think that I would need the support of a technical person / **tutor** to be able to use this **Program AutoCAD**. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I found the various functions in this system were well integrated. | I found the various functions in this **Program AutoCAD** were well integrated. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I thought there was too much inconsistency in this System. | I thought there was too much inconsistency in this **Program AutoCAD**. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I would imagine that most people would learn to use this System very quickly. | I would imagine that most people would learn to use this **Program AutoCAD** very quickly. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I found the system very cumbersome to use. | I found the **Program AutoCAD** very cumbersome to use. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I felt very confident using the system. | I felt very confident using the **Program AutoCAD**. | ☐ | ☐ | ☐ | ☐ | ☐ |
| I needed to learn a lot of things before I could get going with this system. | I needed to learn a lot of things before I could get going with this **Program AutoCAD**. | ☐ | ☐ | ☐ | ☐ | ☐ |

(Source: author)

The next step is the participant will have ranked each of the 10 templates questions above, from scale 1 to 5, based on their level of agreement. After they fill the scale, we can calculate the answer from the participant. The first rule is for each of the odd numbered questions (question 1,3,5,7, and 9 considered as positive

statement), we subtract 1 from the score (for example, the participant scale is 5 for question no 1, then the final score will be 5-1 = 4). The second rule is for each of the even numbered questions (question 2,4,6,8, and 10 considered as negative statement), subtract their value from 5. score (for example, the participant scale is 3 for question no 2, then the final score will be 5-3 = 2). The next step is to take these new values which you have found, and add up the total score, after that multiply the total score by 2.5. The result of all these SUS score calculations is that our score out of 100.

The second instrument, the data will be compared again with the survey polling. In this polling, the same student will be asked regarding the possibility about programs that they will be use more often for their design process later. They can choose more than 1 programs between three program AutoCAD, SketchUp and Rhinoceros. (see figure 3.1)



**Figure 3.1** Polling questionnaire

(Source:author)

**RESULTS and DISCUSSION**

In this study, we wanted to identify the first year students' perspective regarding the 2D-3D modeling software usability using SUS (System Usability Scale) method. The result from the participant can be seen in the chart below. For AutoCAD Program, the mean score for SUS question number 1=4.18, 2=3.62, 3=3.72, 4=2.88, 5=3.94, 6=4.05, 7=3.48, 8=2.36, 9=3.41, 10=2.51. While the mean score for SketchUp Program is 1=3.85, 2=3.56, 3=3.74, 4=2.83, 5=3.74, 6=3.84, 7=3.53, 8=2.40, 9=3.39, 10=2.76. The mean score for Rhinoceros Program is 1=3.77, 2=3.72, 3=3.91, 4=2.89, 5=3.99, 6=3.99, 7=3.62, 8=2.33, 9=3.55, 10=2.77 The next step is calculating the participants' values based on regulation on SUS Score Calculation method (done in Microsoft excel program) (see table 4.1)

**Table 4.1** The System Usability Scale (SUS) Final Score for AutoCAD, SketchUp and Rhino Program

| | | Modified SUS Question | Mean of Score | SUS Calculation Score | SUS Final Score (x 2.5) |
|---|---|---|---|---|---|
| AutoCAD | 1 | I think I would like to use this Program AutoCAD frequently. | 4.19 | 3.19 | 7.97 |
| | 2 | I found the Program AutoCAD less complex. | 3.62 | 1.38 | 3.44 |
| | 3 | I thought the Program AutoCAD was easy to use. | 3.72 | 2.72 | 6.81 |
| | 4 | I think that I would need the support of a technical person / tutor to be able to use this Program AutoCAD. | 2.88 | 2.12 | 5.30 |
| | 5 | I found the various functions in this Program AutoCAD were well integrated. | 3.94 | 2.94 | 7.36 |

| | | | | | |
|---|---|---|---|---|---|
| | 6 | I thought there was too much inconsistency in this Program AutoCAD. | 4.06 | 0.94 | 2.36 |
| | 7 | I would imagine that most people would learn to use this Program AutoCAD very quickly. | 3.49 | 2.49 | 6.22 |
| | 8 | I found the Program AutoCAD very cumbersome to use. | 2.35 | 2.65 | 6.63 |
| | 9 | I felt very confident using the Program AutoCAD. | 3.42 | 2.42 | 6.04 |
| | 10 | I needed to learn a lot of things before I could get going with this Program AutoCAD. | 2.52 | 2.48 | 6.20 |
| | | **Total Score** | | | **58.35** |
| **SketchUp** | 1 | I think I would like to use this Program SketchUp frequently. | 3.85 | 2.85 | 7.13 |
| | 2 | I found the Program SketchUp less complex. | 3.69 | 1.31 | 3.29 |
| | 3 | I thought the Program SketchUp was easy to use. | 3.75 | 2.75 | 6.87 |
| | 4 | I think that I would need the support of a technical person / tutor to be able to use this Program SketchUp. | 2.83 | 2.17 | 5.41 |
| | 5 | I found the various functions in this Program SketchUp were well integrated. | 3.75 | 2.75 | 6.87 |
| | 6 | I thought there was too much inconsistency in this Program SketchUp. | 3.84 | 1.16 | 2.89 |
| | 7 | I would imagine that most people would learn to use this Program SketchUp very quickly. | 3.54 | 2.54 | 6.34 |
| | 8 | I found the Program SketchUp very cumbersome to use. | 2.41 | 2.59 | 6.48 |
| | 9 | I felt very confident using the Program SketchUp. | 3.39 | 2.39 | 5.98 |
| | 10 | I needed to learn a lot of things before I could get going with this Program SketchUp. | 2.76 | 2.24 | 5.59 |
| | | **Total Score** | | | **56.85** |
| **Rhinoceros** | 1 | I think I would like to use this Program Rhinoceros frequently. | 3.78 | 2.78 | 6.95 |
| | 2 | I found the Program Rhinoceros less complex. | 3.72 | 1.28 | 3.19 |
| | 3 | I thought the Program Rhinoceros was easy to use. | 3.91 | 2.91 | 7.28 |
| | 4 | I think that I would need the support of a technical person / tutor to be able to use this Program Rhinoceros. | 2.90 | 2.10 | 5.26 |
| | 5 | I found the various functions in this Program Rhinoceros were well integrated. | 3.99 | 2.99 | 7.48 |
| | 6 | I thought there was too much inconsistency in this Program Rhinoceros. | 3.99 | 1.01 | 2.52 |
| | 7 | I would imagine that most people would learn to use this Program Rhinoceros very quickly. | 3.63 | 2.63 | 6.57 |
| | 8 | I found the Program Rhinoceros very cumbersome to use. | 2.33 | 2.67 | 6.67 |
| | 9 | I felt very confident using the Program Rhinoceros. | 3.55 | 2.55 | 6.38 |
| | 10 | I needed to learn a lot of things before I could get going with this Program Rhinoceros. | 2.78 | 2.22 | 5.55 |
| | | **Total Score** | | | **57.85** |

(Source: author)
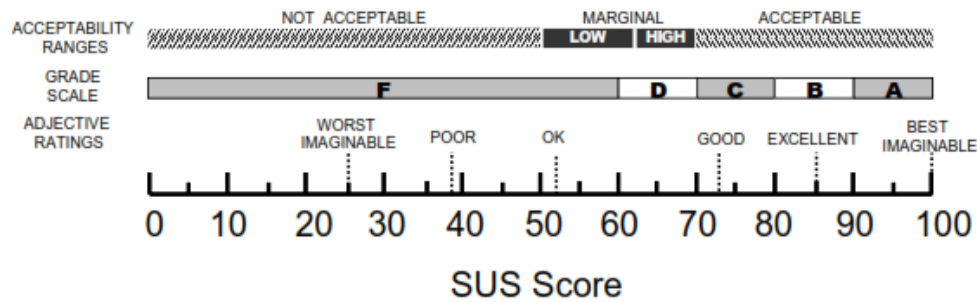
The result is as can be seen in table 4.1, where the AutoCAD is 58.35, SketchUp 56.85 and Rhinoceros is 57.85. The next step is comparing the result with the grade scale (see figure 4.1) (Bangor, Staff, Kortum, & Miller, 2009). There are three ways that will be used to determine score: using acceptability range, grade scale and adjective ratings. (Brooke, 2013). For the acceptability range, there will be 3 categories: not acceptable, marginal and acceptable. For the grade scale, there will be 6 scale: A, B, C, D, E, and F. While the adjective ratings, there will be 6 ratings: worst imaginable, poor, OK, good, excellent and best imaginable. Based on the SUS score (AutoCAD is 58.35, SketchUp is 56.85 and Rhinoceros is 57.85), the acceptability range for the three programs are Low Marginal, the grade scale are grade E and the adjective ratings are OK. Based on the score, students find that the AutoCAD is the most usability, second is the Rhinoceros and third is SketchUp)

The participants were also requested to give feedback through survey polling regarding the regarding the possibility about programs that they will be use more often for their design process later. The survey produced 127 responses (which the participants can voted more than one choice). From the polling question, 52% preferred AutoCAD, 60.6% preferred SketchUp and 39.4% preferred Rhinoceros. (see figure 4.2). Between those polling question, there are several participants that voted more than one.
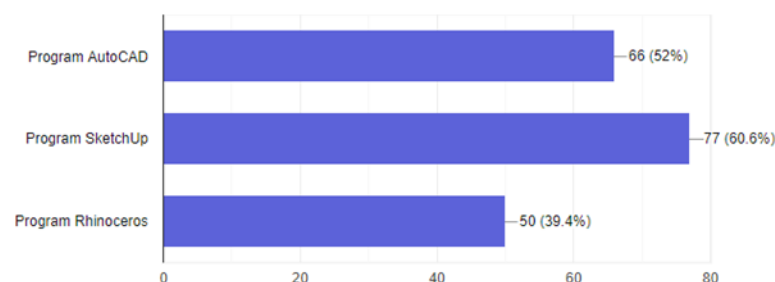


**Figure 4.2** Program Polling From the Students

(Source: author)

Beside the polling question, the participants were also requested to fill the reason about their vote. The reason from some participants who voted AutoCAD software were because AutoCAD is more detail, more consistent, more accurate, most widely used especially for detailed 2D modeling. Some participants who voted SketchUp, found out that SketchUp is easier to use, more attractive, more realistic and more practical for 3D modeling.

Rhinoceros has more features and lighter because of its NURBS-based 3D modeling. Some who voted AutoCAD and Rhinoceros because AutoCAD and Rhinoceros has similar user interface. Some who voted AutoCAD and SketchUp because these two program are relevant and usually an interior designer use both of these programs. Some who voted SketchUp and Rhinoceros because they could immediately create a 3D modeling. Some who voted all the program because they found out the difference usability among these 3 programs such as using AutoCAD to create 2D layout as a floor plan, then modeling it 3d using SketchUp, then create the product in 3D using Rhinoceros. (see Table 4.2)

**Table 4.2** Participants' Opinion Regarding Prefered Programs

| Programs | Students ID | Why you prefered those programs? |
|---|---|---|
| AutoCAD | 11180016 | Because it's more accustomed to using the program |
| | 11180023 | More detailed and more consistent with distance |
| | 11180033 | More detail, precision, complete and clearer use. |
| | 11180089 | Because it's easier to use and the shape can be applied through two dimensions first |
| | 11180058 | Because it is more accurate and easy to use |
| SketchUp | 11180123 | Simpler and easier to operate |
| | 11180014 | in my opinion besides being easy to learn, Sketchup programs are among the most efficient programs |
| | 11180127 | Because it looks more attractive, in 3D and colored, so it's easier for me to imagine my design. And I feel more in control of the program than others |
| | 11180065 | Because its use is easier, and usually people use it more often in designing plans |
| | 11180036 | Because in my opinion, SketchUp is the lightest in operating on a laptop and the software is relatively small compared to other 3D modeling software. SketchUp is also the easiest to learn, 3D object creation techniques only use basic 'push-pull' techniques and 'Line' applications and also process the material-mapping of objects that have been made very easy, such as adding stone, wood and glass textures to objects 3D. There is also a filling of the furniture that can be downloaded and used directly on our design. Its use is practical and not too time consuming. So from that, I will use SketchUp for the design process later. |
| | 11180077 | because SketchUp is easier and more practical to use, and the results generated from the sketchUp program are very good |
| | 11180146 | because in my opinion sketchup is easier to use. |
| | 11180154 | I think sketchup is the most realistic to use in terms of what I need and is easier than others |
| Rhinoceros | 11180009 | Because the results of the use of rhinoceros are good and compared to other programs, the rhinoceros is more visible and will be easier if you already know the commands that are commonly used. |
| | 11180160 | Because it is better and has many features |
| | 11180143 | Simple and easier |
| | 11180083 | Because Nurbs-based 3D modeling results are more concise and easy to use |
| AutoCAD & Rhinoceros | 11180139 | because in both programs the command can be typed without having to remember which icon, and especially on the autocad background screen so that my eyes are not too painful when using it too long. |
| | 11180024 | because the usage that I understand is better and both are not much different in terms of the user interface |
| | 11180031 | In my opinion, when compared to the Sketch Up program, the Auto Cad program is easier to use, because the operation of Auto Cad is not complex and coherent or not random so it does not make me confused. The results are neat and detailed. besides that, Auto Cad makes it easy for us to make initial designs (such as layouts, etc.) with unlimited size and high accuracy. I also chose Rhinoceros because Rhinoceros can produce cool, detailed product designs, smooth results and the |

| | | |
|---|---|---|
| | | program is also quite easy to use |
| | 11180041 | easier to learn, the commands are quite similar |
| **AutoCAD & SketchUp** | 11180110 | because in my opinion the autocad and sketchup programs are relevant for use in interior design study programs |
| | 11180148 | because in my opinion compared to the rhinoceros program, autocad and sketchup are simpler in their use. besides, as far as I know, the rhinoceros program is rarely used for interior design students. also I saw from the older level more brothers who use autocad and skechup, besides that I also felt that many menu menus in Autocad and Skechup further supported us as interior design students. |
| | 11180053 | Because both can be more detailed in the arrangement of space and not just interior products. |
| | 11180098 | From the material I got, I was more comfortable using autocad and sketchup. And the application is more suitable for me to use in the future in my lecture on Interior Design |
| | 11180136 | The programs that I will use more frequently are AutoCad and Skecthup because as interior design students we have to master both programs to realize the design that will be made |
| | 11180166 | because the resulting image is better, besides as far as I know, people usually use autocad and rhino |
| **SketchUp & Rhinoceros** | 11180052 | because sketchup is in the three-dimensional form of making space, Rhinoceros has an easy to use because it can be seen from all sides, compared to AutoCAD which only has two dimensions |
| | 11180028 | because I like so that my future works with it for new development / action. |
| | 11180162 | It's easier and more options for sketchup are free (not paid) |
| | 11180025 | in my opinion the Sketchup and Rhinoceros programs are more realistic and easier to understand because of some tools. And in my opinion the program is more often used in interior designer work because it is easier to see according to customer / client desires, and more realistic. |
| | 11180048 | I chose SketchUp because I like using SketchUp. With SketchUp we can immediately create a 3d shape of a build with the desired size. In my opinion, by making 3d I become more aware of how later the image of space is made so that it feels more fun using SketchUp. And the use of SketchUp is not too difficult in my opinion. But AutoCAD and Rhinoceros are certainly still used to design. Certainly it still needs to use the AutoCAD and rhinoceros programs. For example, with AutoCAD we can make plans according to what we want with a certain size and also given a dimension of size while Rhinoceros can be used to make products. I also think it's fun to use Rhinoceros to make various forms of products later. |
| | 11180076 | Because it is quite easy and for the future semester will often use the program |
| **AutoCAD, Rhinoceros & SketchUp** | 11180157 | I chose all three because they were important to use to design. Also I don't think it would be more practical if all three were used in designing later. Like the floor plan can use AutoCad. |
| | 11180114 | Because these three programs help each other to produce a perfect design |
| | 11180124 | we use autocad as a floor plan, then we look in 3d with sketchup, then in rhinoceros we can make a product in 3d. |
| | 11180007 | I will use all three because each application has its own advantages in making a 3d modeling that will help me in the future. Sketch Up programs may be used more often because their contents are complex and have various features that will be useful in the world of interior design. |

(Source: author)

## CONCLUSION

Based on the result and discussion above, the finding for are:

1. On the SUS Score, AutoCAD program is 58.35, SketchUp program is 56.85 and Rhinoceros is 57.85, the acceptability range for the three programs are Low Marginal, the grade scale are grade E and the

adjective ratings are OK. Based on the score, students find that the AutoCAD is the most usability, second is the Rhinoceros and third is SketchUp

2. On the survey polling regarding the software usability, majority students preferred SketchUp (by 60.6%), then AutoCAD (by52%) and Rhinoceros (by 39.4%). But based on students' opinion, each program has their own strength and usability. Such as AutoCAD is better for 2D modeling, SketchUp is more flexible and easy to use for a 3D modeling and Rhinoceros is for creating a 3D product based on NURBS system.

3. There a difference result between the SUS survey and the polling survey. This was possible because the student may not really understand and having an ambiguous perception in the System Usability Scale (SUS) questionnaire. Therefore, the result is different.

## ACKNOWLEDGMENT

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