

CREATIVE LEARNING SPACES: A USER PERSPECTIVE ANALYSIS ABOUT THE IMPACT OF DESIGN STUDIO SPACES ON CREATIVITY

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Abstract

The learning process and learning environments have an unbreakable, embodied relationship. In almost all instances, learning environments has a negative or positive influence on the learning process of students. In other words, it creates an undeniable psychological impact which may have the capability of changing the entire life of the students in the future. Though the learning environment is a governing factor of the learning process, designers usually do not pay much attention to that particular fact. Thus, the traditional classroom typology has been repeatedly and unscientifically used all throughout history.

In this research paper, the concept of creativity has been defined using a variety of theories and interpretations and a comprehensive framework for assessing creativity has been established. Also the paper analyses literature on creative learning spaces and develops a theory to be used as a guideline in evaluating the quality of such spaces. A detailed description of the methodology in which the research is carried out and how the two frameworks derived in the previous chapters connects to it is illustrated by the third chapter. The study concludes with a user perspective analysis where the perception of the students on studio spaces is used to investigate the relationship between spatial characteristics of space types in studios and intrinsic characteristics of creativity.

The results indicate that there is a clear relationship between studio spaces and the creativity of students and that the spatial characteristics of studio spaces has a direct impact on the intrinsic characteristics of creativity. Thus, it is recommended that architectural design studios should be specifically designed with careful consideration of prioritized spatial characteristics relating to each space type. This will in turn aid in fostering the creative potentials of the minds of architecture students.

Keywords: Creativity, Learning Environment, Architectural Design Studio, Creative Learning Spaces, Intrinsic Aspects of Creativity,

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Introduction

Creativity is a key aspect in architectural education. Creativity has been defined by many throughout the ages. A significant one out of its many definitions is the one made by Amabile: “Creativity as an outcome should be novel (in terms of being original, unique, and surprising), meaningful, and useful at the same time” (Amabile, 1996). The above statement indicates the significance of creativity in terms of its characteristics, in particular of being innovative, imaginative and intellectually expressive. Another definition says, “Creativity is a process” (Wallas, 1926), thereby suggesting that creativity is a function of progressive enlightenment. Even though there are numerous definitions to creativity, giving a precise definition to its nature is still a difficult task. This is because creativity by nature is a subjective condition which is sensorial and forms within the mind of a person.

Given that architecture is predominantly a creative process, there is inevitably a strong relationship between the function of architecture and the notion of creativity, although the very nature of that relationship is still difficult to fathom. With respect to architectural education, however, facilitating creative thinking is crucial to the production of future design intellectuals. This requires a dual behaviour to be recognized at the design-teaching studios. On the one hand, the learning environment should be arranged in such a way that creative thinking on the part of students could be plausible. On the other hand, the subsequent design processes taking place within the learning space should be structured to facilitate creative outputs by the students. Accordingly, two main relationships /dependencies can be identified with respect to the juxtapositioning of architecture and creativity within a learning environment.

- (1) 1st dependency - Impact of the architectural space (learning environment) on creativity
- (2) 2nd dependency - Impact of creativity on architectural design process

The study aims to investigate the above-mentioned dual dependencies. In first dependency, design studio spaces refer to the learning environment, which can easily be replaceable by the design-production studios of an architectural practice if the research is made applicable to a general architectural design process. Even though the main objective of this research is to find out the impact of the design-production spaces on the function creativity, the intangible nature of creativity makes it impossible for it to be directly investigated. The assessment of student creativity can generally be done by using evaluation methods such as creativity tests, portfolio marks, exam marks etc. (both qualitative and quantitative measures). This study does not follow such evaluation methods, simply because of their unreliability and irrelevance to the end objectives. Instead, the study will develop an indirect and qualitative analysis method, in particular to evaluate the 2nd dependency.

The objectives of this research are twofold. First, at a generic discursive level, the study aims to define a methodological framework to evaluate the relationship between the ‘function creativity’ and a physical space supporting that act of creativity. Secondly, from a specific technical standpoint, the research seeks to investigate the relationship between learning environments and the creativity aspect of an architectural design process. To this end, the research expects to find out the potentials embedded in learning spaces in terms of enhancing productive creativity levels. In practical terms, this refers to identifying and outlining ‘spatial characteristics’ that contribute positively to the ‘intrinsic aspects’ that supports creativity during ‘an architectural design process’.

Creativity and the Architectural Design Process

Creativity is seen to play a huge role in the field of human psychological research, hence various attempts have been made to study it. But precisely defining and interpreting the term “creativity” is still a huge task for researchers who are involved with studies related to creativity. Amabile (1996) stated,

Creativity researchers are often accused of not knowing what they are talking about. The definition and assessment of creativity have long been a subject of disagreement and dissatisfaction among psychologists, creating a criterion problem that researchers have tried to solve in a variety of ways. (p.19)

A discourse on how the social and environmental behavior of and around humans influence the act of creativity is critical in developing a theoretical base to evaluate the impact of learning environments in the process of creativity. Both intrinsic motivations and extrinsic motivations plays major roles on creativity because of their own influential nature. Intrinsic motivations can be simply defined as each individual’s internal self- encouragement towards something which they are really interested at and passionate about. Amabile (1996) stated that, “Intrinsic motivation, which is the drive to engage in some activity because it is interesting and involving, appears to be essential for high level of creativity. And intrinsic motivation can be significantly affected by the social environment” (p.17). Extrinsic motivations are the external encouragements or forces which impose on human activities or psychology. Amabile (1983) stated that, a focus on competition and external rewards, a desire for external recognition, a reaction against time pressures, a deliberate rejection of society’s demand and the conditions in working environment can be identified as the examples for extrinsic motivations.

The learning environment can also create a huge impact as an extrinsic motivation on creative individuals. In architectural education, creativity holds a very powerful position because architecture involves with conceptualizing new ideas. Thus, the learning environment upon which architectural education is based will be a strong force which impacts the creativity of the students. According to Danaci (2015), creativity and design course can be considered as the backbone of architectural education. Further she states that architectural education should facilitate the cognitive thinking which can productively use in the creative process. (Danaci, 2015)

It becomes important to analyze the architectural design process in a discourse about creativity. Mozaffar and Khakzand (as cited in Darnei & Safari, 2017) explained that the design process contains two main characteristics: the first is the essential creative effort, and the second is the close association with drawings. According to Christopher Alexander, on the other hand, that there are two main phases of design process which can be named as analysis and synthesis. Similarly, RIBA (1973) proposed a three stages of design process, namely analysis, synthesis and evaluation.

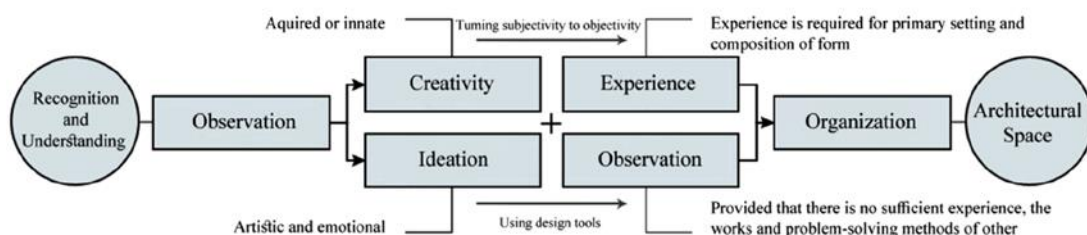


Figure 1: Proposed model of architectural design process; Source: Daemi and Safari (2017)

Four main creativity related theories dealing with implicit facts of the creativity process and its psychological nature were analyzed leading to the derivation of 'Developed Theory - 01' which was used as an aid in measuring the impact of studio spaces on creativity. These theories were:

- (1) Four steps of creativity solving process (Wallace, 1926)
- (2) Creativity relevant skills (Amabile, 1983)
- (3) Concept of divergent and convergent thinking (Guilford, 1950)
- (4) Concept of flexibility and fluency (Guilford, 1967)

The analysis of the four theories were done as follows:

Table 14: Comparison of selected creativity theories: step 01-evaluation of creativity theories and understanding the direct similarities.

Name of the Theory	Aspects of the creativity process	Key terms	Category
Theory-01 Four steps of creativity solving process (Wallas, 1926)	1. Preparation 2. Incubation 3. Illumination 4. Verification	1. Ideas in all Direction 2. Unconscious Processing 3. Sudden insight 4. validate the idea	Variety of Ideas Incubation Illumination Verification
Theory 2- Creativity relevant skills (Amabile, 1983)	I). Breaking perceptual set II). Breaking cognitive set III). Understanding complexities IV). Keeping responses open long as possible V). Suspending judgement VI). Using "wide" categories VII). Remembering accurately VIII). Breaking out of performance scripts IX). Perceiving creativity	II). New cognitive pathways Link between Diverse ideas Break out well used scripts Perceive something differently	Unorthodoxy Variety of ideas Understanding complexities Non fixed – ideation Variety of ideas Remembering accurately Unorthodoxy Unorthodoxy

Theory 3-Concept of divergent and convergent thinking (Guilford, 1967)	i). Divergent thinking ii). Convergent thinking	Large quantity And variety of ideas Narrowing down To one solution	Variety of Ideas concentration
Theory 4-Concept of flexibility and fluency (Guilford, 1967)	a). Flexibility b). Fluency	Variety of ideas, Diverging into different direction. Quantity of ideas	Variety of ideas Quantity of ideas

Considering above, the developed theory of 'intrinsic aspect of creativity' was derived which consists of eight factors:

- | | |
|----------------------|--------------------------------|
| (1) Novel initiation | (5) Non -fixed ideation |
| (2) Incubation | (6) Accurate memory |
| (3) Illumination | (7) Understanding complexities |
| (4) Verification | (8) Concentration |

Architectural Learning Spaces

A learning space can be a classroom, an auditorium, a studio, or a conference room; but it can even be a few benches under a tree. Accordingly, learning spaces can generally be divided in to two categories: formal learning spaces and informal learning spaces. According to Oblinger (2006), a physical and virtual space which creates an impact on learning process can be defined as a learning space. Further, she describes that the learning space is a place which generates the human interaction while simultaneously satisfying the explorations and collaborations of a learning outcome (Oblinger 2006). Bligh (2014) stated that a learning space satisfies two distinct functions. The first is the act of supporting the learning activity, and the second is acting as an environment construct.

Learning spaces in architectural education has clear distinction when compared to other subject fields. The main reason for that is the unique nature of architectural learning process. Mainly the architectural learning process contains of design teaching on the one hand and studying theory subjects on the other hand. In such case, the learning spaces will have to be different when they cater to one function as opposed to the other. Generally, design studio spaces are used for design teaching and the subsequent exploration of architectural design, and classroom are used as the learning spaces of relevant subjects.

While the nature of a learning space is critical to a proper transferring of architectural knowledge, space in general can be developed by responding to many different qualities, characteristics and strategies. According to the "theory of spatial characteristics" put forward by a group researcher in 2017, there are sixteen (16) spatial characteristics of a learning space which can create an impact on the student's creativity (Thoring et al., 2017). They are:

- | | |
|------------------|------------------------|
| 1. Atmosphere | 9. Materials |
| 2. Climate | 10. Objects |
| 3. Colours | 11. Plants and flowers |
| 4. Flexibility | 12. Room Layout |
| 5. Furniture | 13. Smells |
| 6. Health issues | 14. Sound |
| 7. Light | 15. Technology |
| 8. Location | 16. View |

Above spatial characteristics must surely play a critical role in generating what this study calls as 'creativity-supporting learning spaces'. Many researches have proposed that learning spaces should support the students' creativity and the traditional classrooms should change accordingly.

Two main theories dealing with creativity supporting learning space were analyzed leading to the derivation of 'Developed Theory - 02' which was also used as an aid in measuring the impact of studio spaces on creativity. These theories were:

- (1) Typology of creative learning spaces (Thoring et al., 2017)
- (2) Propositions about the impact of Space on Creativity (Thoring et al., 2017)

The analysis of the two theories were done as follows:

Table 2: Comparison of the selected theories relate to creative learning spaces

Typology of creative learning spaces
(Thoring et al. 2012, 2017)

Propositions about the impact of space on creativity (Thoring et al. 2017)

Space Types	Key words	Similarity	Key words	Propositions
A. Collaborative Space	Group works, workshops and face to discussions (face to face interactions)		Imperfect, strange and unexpected space, triggers curiosity	1.Surprising Space
			Manifest ideas. Large space encourages mind to expand.	2.Space as a Platform for Ideas
B. Presentation Space	Sharing and presenting the knowledge. Oral presentations and exhibitions.		Chaos and irregularity avoid fixation	3.Creative Chaos
			Visible materials Books and other reading materials.	4.Visual Stimuli
C. Making Space	Facilitates experimentation, play noise and dirt. Model making space		White space, empty space which supports creativity.	5.Reduced Stimulation
			Materials, smells and sound.	6.Tactile, Olfactory, and Acoustic Stimuli
D. Transitional Space	Link other functional spaces. Hallways, and staircases and outdoor areas. Breaking and transferring		Space for manually making things.	7.Making Spaces
			Window view help to expand the mind.	8.Open View
E. Personal space	Facilitate concentration, “Heads down woks” (Reading, writing deep work) Reduced stimulation and distractions.		Visible movements Own movements	9.Bodily Activity Movement
			Ownership of space Games toys playing environment	10.Playful Experimental Atmosphere
			Designates space for creativity, historic creative surrounding	11.Creative Labelling
			Meeting and exchange the ideas	12.Social Interaction

Considering above, the developed theory of 'the relationship between creative learning spaces (space types) and intrinsic aspects of creativity' as follows:

1. Novel initiation	A/B/C/D/E
2. Incubation	A/B/C/D/E
3 illumination	A/D/E
4. Verification	B/C
5. Non -fixed ideation	A/B/C
6. Accurate memory	E
7. Understanding complexities	A/E
8. Concentration	E

In here,

A= Collaborative Space

B= Presentation Space

C= Making space

D= Transition Space

E= Personal space

Research Methodology

This research weaves around two (02) main data collection rounds as follows:

- 1) Preliminary data collection round (general observations and open-ended questionnaire)

A number of fifty (50) architecture students from the level 5, B.Arch. degree program at University of Moratuwa was the population sample for the preliminary data collection round undertaken for the user perspective analysis. Being the senior-most students, these have experienced more studio spaces than other architecture students of this particular university, which was the key rationale behind the selection of this sample.

The preliminary data collection round contained two steps.

- i) Open ended questionnaire related to the case study 1; Level 5 design studio
- ii) Open ended questionnaire related to the case study 2; Level 4 design studio

- 2) Secondary data collection round (close ended questionnaires for focus group)

In the secondary data collection round, a close-ended questionnaire was given to a 25 number of focus group, which has been selected by evaluating the findings of the preliminary data set. The rationale behind the selection of this focus group is their swiftness and clarity in communication; in particular, these 25 students have used powerful one- or two-word adjectives and metaphors to describe the nature of the design studios. In the sense of human psychology, these words (adjectives and metaphors) can be used as the symbols of strong mental image, which expresses the intensified and powerful impact of a particular observation (Ronald, 1989). (In here; specifically; the impact of design studio spaces)

In the verification of the research findings, the study followed the 'content analysis method'. In the first step of the analysis, preliminary data collected from 50 undergraduate architecture

students were evaluated using the afore-mentioned 'content analysis' method. This contained two main steps as follows:

1. Deriving codes
2. Categorizing the codes

The subsequent analysis of the research has followed three main verification methods and tools.

1. Verification method 1- use the "vocabulary of creativity" (adapted from developed theory-01) as the verification tool
2. Verification method 2 - use the statistical analysis methods as the verification tool
3. Verification method 3 - use the 'Developed theory 02' – i.e., Dependency relationship between space type and intrinsic aspects - as the verification tool.

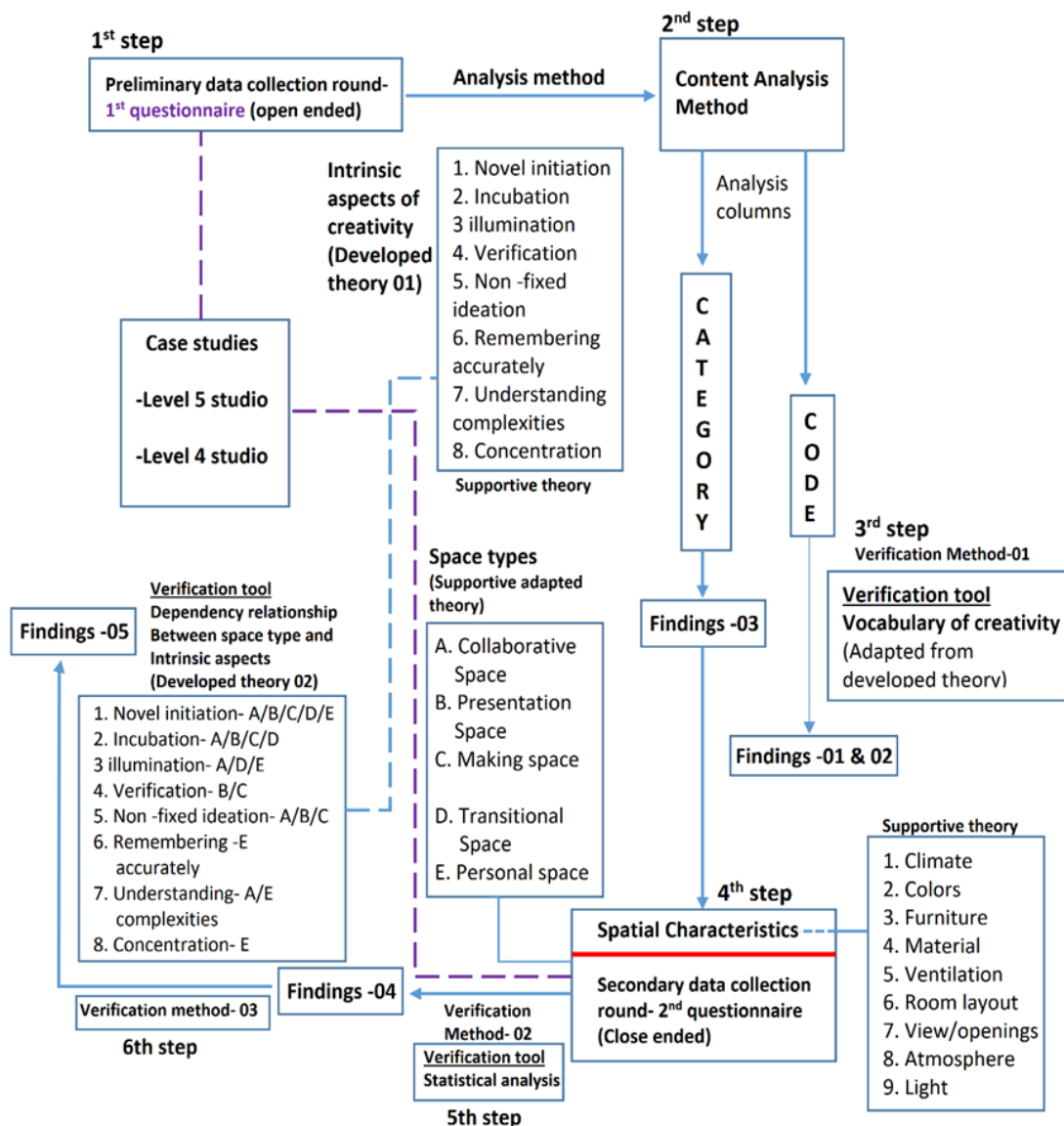


Figure 2: Usage of supportive, adapted and developed theories in data collection rounds and verification methods

Source: Author

Case Study Analysis

This particular case study analysis is predominantly a user Perspective analysis and the preliminary and secondary data which have mainly collected from selected two case studies have been analyzed within this chapter. The two selected case studies are Level 5 architecture design studio and Level 4 architecture design studio of University of Moratuwa. The preliminary data (user perspective data) related each case study has evaluated under the content analysis method. As the second step of the analysis, the results of content analysis have verified under the developed theories. The next step of the case study analysis is the statistical of secondary data. Afterwards the results of the statistical analysis have been verified under the developed theory -02 to establish the final conclusions of the research.

Case Study 1: Level 5 Architecture Studio

Level 5 architecture design studio is located in the ground floor of the “Sumanadasa” building at University of Moratuwa. It usually accommodates 50+ architecture students.

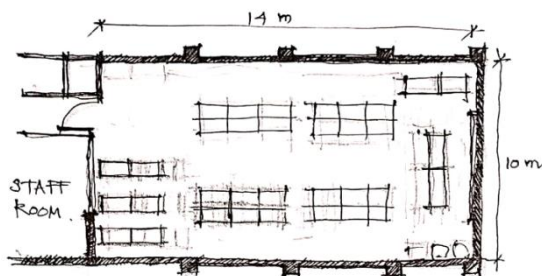


Figure 3: Sketched plan of the Level 5 architecture design studio
Source: Author

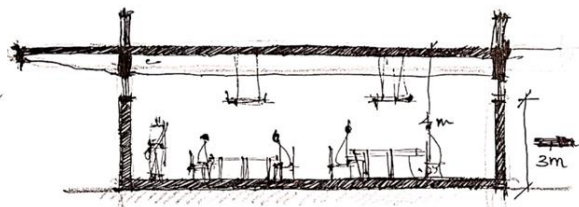


Figure 4: Sketched section of the Level 5 architecture design studio
Source: Author

The user perspective analysis of the level 5 architecture studio consists of two methods of analysis.

1. Content analysis of preliminary data
2. Statistical and theoretical analysis of secondary data

Out of the 50 samples which were collected for preliminary data, a few have been presented below:

Table 3: Content analysis chart / case study 01- Level 5 architecture design studio

Stud-ent No.	Ques-tion No.	Meaning Unit (data from questionnaire 01)	Condensation unit	Code	Category
01	01	“It is very competitive background.” “Space is not for free thinking”	-very competitive background	03	3
	02	“It all about overall experience of the space.”	-Absence of for free thinking	02	3
			-overall experience of the space	03	3
	03	Yes			
04	Negative	-less effective	04	6	

	05	“the outcome is not that much effective” “cannot maintain the concentration” “there is less visual comfort”	outcomes -uneasy to concentrate -less visual comfort	05 17	10 2
02	01	“There is less visual connection with nature.it frames our thinking capacity and blocking the thinking beyond.it feels like the studio space is blocking our mind.”	-Less visual connection with nature -Frame the thinking capacity -Block the thinking beyond -Feels like blocking the mind. -Less amount of natural light	13	5
	02	“less day light gain and lack of natural ventilation”		02	3
	03	Yes		02	3
	04	Negative		02	3
	05	“It is blocking the day light and natural ventilation. Less openings and existing openings are located in the wrong level.it is blocking the visual connection with nature.”		10	5
03	01	“It feels like a fish tank. It is comfortable yet uncomfortable. Cannot feel the time. It is feels like monotonous. Very rectangular. Sometimes disturbing and stressful.”	-A fish tank -physically comfortable but mentally uncomfortable -cannot feel the Time -monotonous -very rectangular -disturbing and stressful -no infinity views	16	3
	02	“No natural light and ventilation. There is no proper facilities. Not an architectural studio, that is in my mind and what I am expecting.” “Can concentrate on tasks like writing but not on designing. The space is limited and no infinity views. May be good for collective group works but not for individual design projects.”		17	2
	03	Yes		07	5
	04	Negative		08	8
	05	“Everyone can see anyone, visual connection is high. Because of A/C students tend to stay within the studio. There is no natural ventilation and no visual connection with outside. A/C system makes students sleepy”. “Fish tank effect and rectangular monotonous volume.”		16	3
				09	3
				06	5

As the second step of the content analysis, the identified codes divide into the code types. This step is the initial step of the categorization of the codes. This particular research has found 26 codes.

- | | | | |
|-------------------|--------------------|----------------------|-------------------|
| 01. Sound | 08. Boring | 15.openings | 22. Functionality |
| 02. Free thinking | 09. Stress | 16.mental image | 23. Colours |
| 03. Experience | 10. Light | 17. Comfortability | 24. Stay |
| 04. Outcomes | 11.Ventilation | 18. Human connection | 25. Space |
| 05. Focus | 12.Facilities | 19. Air conditioner | 26. Escape |
| 06. Outside view | 13.natural views | 20. Furniture | |
| 07. Sense of time | 14. Personal space | 21. Variety | |

As the third step of the content analysis, the identified codes classify into categories. According to that, ten (10) **categories** were found.

1. Functionality of the space

Code (22) – Variety
Code (21) - Functionality

2. Physical impact of the space

Code (12) – Facilities
Code (17) – Comfortability
Code (25) – Space
Code (24) – Stay

3. Psychological impact of the space

Code (02) – Free thinking
Code (03) – Experience
Code (09) – Stress
Code (16) – Mental Image
Code (26) – Escape

4. Colour

Code (23) – Colour

5. Views

Code (06) – Outside view
Code (07) –Sense of time
Code (10) – Light
Code (13) - Natural view
Code (15) – Openings

6. Outcomes

Code (04) - Outcomes

7. Climate

Code (11) – Ventilation
Code (10) – Air conditioner

8. Atmosphere

Code (08) – Boring
Code (18) – Human connection

9. Furniture and layout

Code type (20) – Furniture

10. Concentration

Code (01) – Sound
Code (05) –Focus
Code (14) – Personal space

Conclusion

The findings of this particular research have addressed different resolution levels. The findings of content analysis which has been related to the user perspective analysis of Level 5 studio and Level 4 have established resolution level of low and medium conclusions. According to those particular results, it was found that the overall studio spaces have created a clear and direct impact on the several intrinsic aspects of creativity. The confirmation of the hypothesis that creativity is impacted by learning spaces (studios) can be identified as the low resolution conclusion, while the identification of directly impacted aspects within the creativity component such as **non- fixed ideation, concentration, incubation, novel initiation, illuminance and accurate memory** can be identified as the medium resolution conclusion. Furthermore, the user perspective analysis has clearly shown evidence that, the overall creativity has been directly and indirectly affected by the conditions of the studio spaces. The established 26 code types and 10 categories has proven above fact in the content analysis.

Afterwards, the secondary data analysis was used to generate high resolution conclusions, which was instrumental in proving that the specific space types which cater to the intrinsic aspects of creativity should be meticulously designed incorporating the relevant spatial characteristics.

The developed theoretical frameworks introduced in this research could be used in the advancement of the fields of architecture and psychology. Furthermore, such research could be

introduced as tools in designing student friendly studio spaces which would foster the creativity of students and make their learning experience stress free, effortless and productive.

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