ISSN No:-2456-2165

# A Study on Gender Performance in Architectural Design Studio

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**Abstract:-This study aims to understand the relationship between "Performances of Students of Architecture in Architectural Design Studio and their Gender" through the use of the Learning Combination Inventory, which was randomly administered to approximately 300 Bells University of Technology Students of Architecture, including both undergraduates and postgraduates, using parametric and non-parametric statistical tests. Data obtained utilising the four processing patterns-technical, sequential, exact, and confluent processes-showed that male students outperformed their female counterparts in the studio while using the Technical and Confluent Process. Gender identity differences were examined using Bem's gender schema, revealing that male students outperformed female students in both technical and confluent processes. According to these findings, male and masculine students were more creative than female and feminine students. The findings, as well as potential strategies for improving female students' creativity, were thoroughly examined.**

## I. INTRODUCTION

In Architecture Education, student performance is becoming increasingly important. Individuals have different methods of learning and understanding [Brown, R., Hallett, M., & Stoltz, R. (1994)], which characterise the simplest approach in which they get comprehension of a subject. Some individuals learn by perceiving, others by imagining, yet others by verbalising, still others by reflecting, and still others by doing [Felder, R., & 1Silverman, L. (1988)]. There are several learning theories and instruments for measuring them. Learning style inventory of Kolb, Vygotsky, L. S. (1978) inventory of learning styles, Llc (2004) learning combination inventory, and Keirsey temperament Sorter are examples of such tools. Kolb, D. (1981), a scholar, proposed that learning is discipline, culture, and gender specific, and various experiments to test this were published in the literature. Architecture education has frequently been criticised of failing to adequately provide for the learning requirements of females and other minorities within it, and it has been suggested to favour males, masculine, and white majorities in multiracial communities [55Datta, A. (2007)]. Numerous studies have been conducted to investigate the performance or features of architecture 55students, but few have focused on gender inequalities. Those research that focused on gender differences [Oruwari, Y. (2001)] yielded mixed results and were largely centred on the world's more industrialised nations. In order to fulfil the United Nations' gender mainstreaming goal [United Nations Development Programme, (2014)], it is necessary to thoroughly understand how gender impacts or links to their individual performances in architectural schools throughout the world.

## II. PROBLEM STATEMENT AND RESEARCH QUESTION

This study's main problem and question is to look for gender intelligence quotients in the performances of architecture students in the Architectural Design Studio at a private institution in Nigeria. The following particular questions will be addressed by this study:

- *What Gender Performs Better in the Architectural Design Studio?*
- *How do the Learning Patterns of these Students Vary by Gender?*

## III. LITERATURE REVIEW

Architecture is unnecessarily difficult, it is very difficult,' says Zaha Hadid, which results in the various design processes and learning styles that students incorporate in one way or another to prepare them for practise so that they can solve design problems through construction and coordination. This comprises a methodical technique in which design concepts are converted to paper or other methods of presentation prior to construction. Architects use numerous methods and phases in architectural studio design, according to Oluwatayo, A.A., et al. They include, but are not limited to, recognising a requirement, investigating the problem, drafting and analysing a brief, generating ideas and possible solutions to the problem, synthesising, selecting a preferred solution, and writing a specification. Yet, while the design process appears to be in a linear development, Lawson, B claims that in actuality, the architectural design process is not. Such thinking indicates, again apparently rationally, that design proceeds from the whole to the component, from outline proposals' to detail design'. The actual examination of how designers operate suggests that this is less evident than it appears [Lawson, B.]. This approach is supported by studies in practise, where designers frequently analyse, synthesise, and evaluate both the issue and the solution at the same time [Dorst, K., and Cross, V.]. Learning in the Architecture Design Studio include acquiring and processing knowledge, with the most essential learning experiences centred on self-reflection [Demirkan, H., and Demirbas, O. O.]. Under what [Salama, A. M.] referred to as the analysis-synthesis paradigm, this process was frequently linear and generalised. "Students are often unable to transfer the results of the first analytic phase into effective design and are made to expect that an optimal solution would indicate the conclusion of the process... it is anticipated that a creative leap will translate the programme into the design". This is frequently not the case. To solve this issue, [Salama, A. M.] presented a Process Oriented Model based on the design process in Architectural Design Studio and teaching styles to suit students' diverse learning styles. This model's design process component combines analytical comprehension of the problem at hand through investigation and information collection with creative decision making via interpretation of how the design challenge has been understood, followed by the development of a schematic design. The teaching style component is based on the notions of Multiple Intelligence and Split Brain. According to [Salama, A. M.], several techniques of learning exist, including logical, visual, and verbal learning, whereas Split Brain Theory recognises various but complimentary ways of processing information. Split Brain Theory, in particular, provides a linear sequential style in which the left half of the brain develops patterns in logical deductive ways, while the right side constructs patterns in a spatial-relational manner including inductive intuitive activities (Figure 1). Throughout the Architectural Design Studio levels, students are immersed in this interconnected style of investigation, synthesis, and assessment. After that, Fulani, O.A. used the Learning Combination Inventory to tie Salama's Process Oriented Model to the learning styles of students in the Architectural Design Studio (LCI).

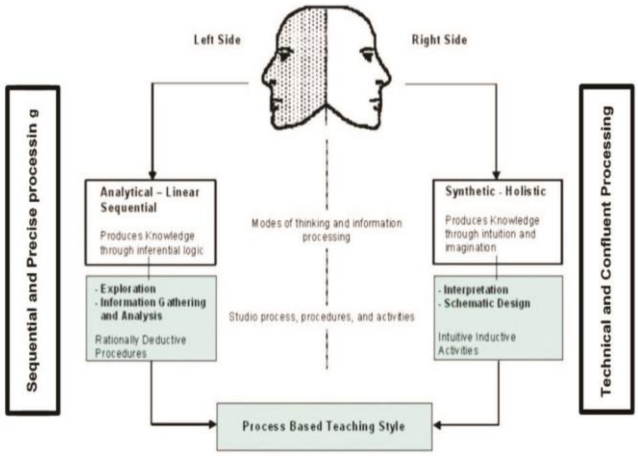


Fig 1 Salama's Process Oriented Model to LCI
Source: [Fulani, O. A.]

One of the few learning style techniques that focuses on the learner's intrinsic disposition is the Learning Combination Inventory, which is based on Kolb's learning cycles. LCI evaluates four learning tendencies, according to the findings: precise, technical, sequential, and confluent processing.

- *Precision Processing (PP)* is synonymous with precision, detail, and information. Precise learners must be kept informed and express themselves correctly and in detail. Such students learn best when there is a lot of specific information, time to double-check work, and opportunity to ask lots of questions. The overarching feature of precise processing is assurance.

- *Sequential Processing (SP)* is related with order, structure, and organisation. According to Harvey, R., sequential learners require explicit instructions, practical learning, and clear expectations. Kids learn best when given clear, step-by-step instructions, samples to examine, a plan to follow, and adequate time to go through instructions. This procedure seeks to develop well-organized relationships with past learning experiences.

- *Technical Processing (TP)* is connected with relevance, hands-on learning, and problem solving. Pupils in this group value actual application above written requirements. Learning in this area is greatest when students work alone, have opportunities to demonstrate abilities, and learn from real-world experiences, generally through projects rather than pen and paper tasks. In other words, Technical Processing is defined by the ability to regulate one's learning processes.

- *Confluent Processing (CP)* necessitates risk-taking and creativity. Such pupils demand open-ended alternatives, creativity, and the capacity to generate original ideas and problem-solving solutions. Intuition and unconventional approaches are used in Confluent Processing.

Gender performance in Architectural Design Studios is related to the Learning Combination Inventory, which measures how students learn and design. According to Datta, A.'s research, most students use various approaches at different stages of the design process in their Architectural Design Studio works, implying that students gradually adapt to the preferences and value systems of schools and lecturers in the studio. Males, on average, exhibited a slight preference for Technical Processing, according to the survey. This outcome is similar with the findings of [Cela-Ranilla, J. M. and Cervera, M. G.], who found that males preferred Technical Processing. Indeed, as compared to Humanities findings, students in technical subjects such as engineering apply Technical Processing on a first order level [Cela-Ranilla, J. M. and Cervera, M. G.]. The preference of male students in the Architectural Design Studio for Technical Processing is supported by [Fulani, O. A.], who found that overall, masculine oriented students used Precision Processing and Technical Processing at the first level of learning, while both genders used Sequential Processing. This indicates that students in the Architectural Design Studio rely on step-by-step guidance in accordance with established standards. This conclusion varies with [Datta, A.] and [Cela-Ranilla, J. M. and Cervera, M. G.], which found that females use Sequential Processing more than males. Thus far, no gender differences in Precision Processing have been discovered in design-based studies. Fulani, O. A., on the other hand, discovered gender disparities in Confluent Processing, with considerably greater proportions of men using this category at the first level. This means that more male students with masculine characteristics have the ability to be intuitive as well as produce fresh ideas and design solutions in the context of architectural design. "This is pretty reasonable when one considers the more autonomous and inquisitive personality of guys than females," says Fulani, O. A. Overall, male students outperform female students in all learning processes in the architectural schools evaluated, according to all indices.

## IV. RESEARCH METHODOLOGY

This research was conducted as a qualitative evaluation of a mixed-method study that included literary research with quantitative data analysis. The review of current information and discoveries from existing journals and theses was covered by literary research.

➢ *The Participants:*

For the study, a survey approach was used, with current sets of Architecture students from Bells University of Technology, including both undergraduates and postgraduates. The questionnaire, which included the Learning Combination Inventory (LCI) and general comments regarding previous outcomes acquired in Architectural Design Studio, was distributed to as many students as possible via social media sites. Students at the 100-Level were barred from participating since they had not yet begun serious architectural design studio work and were still in the early stages of their architectural education. The surveys were completed by 120 students, 105 male and 15 females. The students were all Nigerians, ranging in age from 18 to 40 years, with a mean age of 27years.

➢ *The Instruments:*

Google forms were developed to collect the student's name, level, gender, history and present grades, and their projected future performance in Architecture, as well as other thorough information to help the research. The adult education form [Llc (2004)] was used to collect data on learning patterns. This is a standardised questionnaire 55that has been used to research gender and learning in the design studio [Datta, A. (2007)]. Users' responses to seven items with Likert-scale responses ranging from 1 to are used to indicate one's proclivity to act in various ways on four subscales (28 items in all). Individually and together, the subscales of sequential, exact, technical, and CP describe each gender's learning habits.

➢ *Treatment of Data:*

The data for each gender performance was thoroughly examined by adding the scores for male and female students and subtracting the total of the feminine scores from the sum of the masculine. This allowed us to obtain the average performance for both genders in Architecture Design Studio. According to the Learning Combination Inventory handbook, the treatment for the LCI was to total up the scores for each of the four subscales and show them in tables created from the LCR website. Gender performance and learning processing techniques were computed, and these means were compared using one way analysis of variance and independent samples t-tests, as in prior research. Chi-square tests were also employed to investigate the correlations between the two. Individuals with scores ranging from 25 to 35 were deemed to be using the pattern at the first level. Individuals with scores ranging from 18 to 24.9 were said to employ that pattern when needed, while those with scores ranging from 7 to 17.9 were advised to avoid using that pattern. When the scores of an individual in each of the four patterns are compared, the unique schema for that individual is revealed. For this study, students who utilised all four patterns at the first level were labelled as extremely strong willed, as seen by their average Architectural Design Studio performance, whereas those who used three patterns at the first level were labelled as strong willed. Those who used two patterns first were referred to as dynamic students, while those who used only one pattern at the first level, regardless of how he utilised the others, were referred to as highly dynamic students, and those who used all four patterns as needed were referred to as bridge students.

## V. FINDINGS

➢ *Student Gender Clarification*:

The majority of the students that answered to the surveys supplied were male students, with the remaining 20% being girls. The large number of male pupils as opposed to female students indicates that architecture is mostly for the tough-skinned. This is to be expected, given that architecture education has been characterised as mostly masculinist [De Graft-Johnson, A., Manley, S., & Greed, C.

(2003)], with only the "tough-skinned" [Fowler, B., & Wilson, F. (2004)] surviving the nature of the subject.

➢ *Gender Processing Patterns*:

Table 1 displays the students' scores in all processing modes. Gender disparities in mean processing scores for all patterns may be noticed in the 55table. From the outcome of the independent samples t-test conducted to compare the means, significant gender differences were found only in TP (t=3.978, df =239, p=.55000) and 55CP (t=-3.305, df=239, p=.001). The mean TP scores for males (M=25.03, SD=4.15) was significantly higher than that of the females (M=22.59, SD=4.79). Also, the mean CP score of the males (M=24.57, 55SD=3.45) was significantly higher than that of the females (M=22.59, SD=4.79). In the use of processing patterns (See Table 2), Chi-square tests revealed that only the use of 5TP (x2=16.814, df=2, p=.000) and CP (55x2=6.672, df=2, p=.036) 55had significant relationships with students gender. For TP more than one half (52.4%) of the males as against about one quarter (28.2%) of the female students used it first. Most of the females (57.7%) and a sizeable proportion of males (44.1%) used it as needed while 14.1% of females and only 3.5% of males avoided using it. Close to half (48.8%) of the male students compared to 31% of the females used this pattern at the first level while 0.6% of the males and 67.6% of the females used it as needed. Only a negligible proportion of both genders avoided the use of this pattern.

Table 1 Gender and Mean Processing Scores of Students

| **Processing Patterns** | **Male** | | **Female** | | **Total** | | ***Independent samples t-test*** | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** | ***t*** | ***df*** | ***p*** |
| **Sequential** | 25.61 | 4.05 | 25.69 | 4.26 | 25.63 | 4.11 | *-.145* | *239* | *.885* |
| **Precise** | 25.14 | 3.88 | 24.77 | 3.98 | 25.03 | 3.91 | *.653* | *239* | *.515* |
| **Technical** | 25.03 | 4.15 | 22.59 | 4.79 | 24.31 | 4.48 | *3.978* | *239* | *.000* |
| **Confluent** | 24.57 | 3.45 | 22.99 | 3.26 | 24.10 | 3.46 | *3.305* | *239* | *.001* |

➢ *Gender Performances of the Students***:**

Table 2 depicts the students' performance levels. Just 7% of girls, compared to 21.8% of males, were found to be highly strong willed learners. Also, 36.6% of girls, compared to 20% of males, were extremely 55active 55learners. The Chi-square test revealed a statistically significant link between the genders of the students and their overall performance. The sequential and exact learning pattern volumes always surpassed the technical and confluent pattern volumes when the figures indicating performance were examined. Because of the variations, the females looked to have a more dynamic movement between learning patterns than the males, who were more balanced. This balance indicates that males will find it simpler to switch between learning styles than females. The interpretation is that females looked to have to forge and increase their learning processes in order to meet up with the energy to drive these activities. Androgynous females appeared to be the most advantaged. It can be shown that, of all the gender identities, females had the lowest mean score in all processing patterns, despite having the ability to employ all four processing patterns as needed. This relative feminine weakness' or lack of strength compared to men supports the findings of [Kimlicka, T., Cross, H., and Tarnai, J. (1983)], who discovered that masculine and androgynous persons found it simpler to control the outcome of their efforts than feminine people. Because they were extremely active learners, they required more mental and physical effort to complete most studio design assignments. The masculine gender identification appeared to be the most advantageous, as it required less effort to bring forth those inclinations required to complete studio design tasks. In summary, when gender was not taken into account, the masculine gender identification appeared to have the biggest benefit in switching between processing patterns since their scores in the different patterns were quite similar.

Table 2 Gender Identity and Mean Processing Scores of Students

| **Processing Patterns** | **Feminine** | | **Androgynous** | | **Masculine** | | **Total** | | ***One-way ANOVA*** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** | ***F*** | ***df*** | ***sig.*** |
| **Sequential** | 25.30 | 3.90 | 25.77 | 4.26 | 25.66 | 4.09 | 25.64 | 4.11 | *.204* | *(2,237)* | *.816* |
| **Precise** | 24.35 | 3.98 | 25.15 | 4.05 | 25.31 | 3.65 | 25.06 | 3.88 | *1.004* | *(2,237)* | *.368* |
| **Technical** | 23.17 | 4.08 | 24.02 | 4.31 | 25.09 | 4.71 | 24.29 | 4.47 | *3.228* | *(2,237)* | *.041* |
| **Confluent** | 22.93 | 3.13 | 23.85 | 3.41 | 24.93 | 3.52 | 24.11 | 3.47 | *5.843* | *(2,237)* | *.003* |

Table 3 Gender, Gender Identity and Student Learning Combinations

| **Learning Combinations** | | **Very Strong Willed N (%)** | **Strong Willed N (%)** | **Dynamic N (%)** | **Very Dynamic N (%)** | **Bridge N (%)** | **Total N (%)** |
|---|---|---|---|---|---|---|---|
| **GENDER** | Male | 23 (21.8) | 22 (21.2) | 29 (26.5) | 21(20.0) | 10(10.6) | 105 (100.0) |
| x 2 | Female | 1 (7.0) | 3 (21.1) | 4 (25.4) | 6 (36.6) | 1(9.9) | 15 (100.0) |
| =11.835 df=4 p=.019 | **Total** | **24 (17.4)** | **25 (21.2)** | **33(26.1)** | **27 (24.9)** | **11 (10.4)** | **120 (100.0)** |
| **GENDER** | F/NF | 2(13.0) | 2 (19.6) | 5 (26.1) | 5 (26.1) | 1(15.2) | 15 (100.0) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **IDENTITY** x2 =6.371 df=8 p=.606 | A | 1(20) | 1 (20) | 1 (18) | 2(42) | 0(0) | 5 (100.0) |
| | M/NM | 20(19.6) | 26(25.8) | 29(27.8) | 20(19.6) | 5 (7.2) | 100 (100.0) |
| | **Total** | **23 (17.4)** | **29 (21.3)** | **35 (26.3)** | **27(24.6)** | **6 (10.4)** | **120 (100.0)** |

## VI. DISCUSSION AND CONCLUSION

The previous section's findings aided in answering the study questions. First, it was discovered that male gender identities were more prevalent in the department, indicating a masculine paradigm in architectural schools. It was determined from the study that there were both parallels and disparities in the learning habits of both students in the school. The two genders had the highest preference for Sequential Process and Precise Processing, which means that they all preferred to learn by receiving clear instruction and carrying out tasks that they were familiar with in a well-organized manner, having plenty of time while being fed with information, taking notes, and understanding the subject matter being taught. Students, regardless of gender, performed worse on Technical Process and Confluent Process, and there were gender variations in their utilisation. Male students showed a larger endowment for Technical Process than female students, indicating that they preferred to learn via problem solving rather than writing and taking notes or completing bookwork. They were also higher in Confluent Process, indicating that they preferred learning challenges that gave them the freedom to carry out the learning tasks in their own unique ways, taking risks when possible. In addition, three of the eight students who avoided using this pattern were female, accounting for 14.1% of all females and 3.5% of men.

When the current study's findings were compared to those of previous studies using the Learning Combination Inventory [Cela-Ranilla, J., & Cervera, M. (2013)], it was discovered that there was agreement for Precise Process, Technical Process, and Confluent Process but disagreement for Sequential Process. Female students scored considerably higher than male students on the Sequential Process. The variation in these results might be due to the course of study. While the current course concentrated on architecture, the previous mixed students from several fields. The findings of Datta's study, which focused on a sophomore group of architecture students, differed from those of the current study. Females were shown to have a higher inclination for Sequential Process than all other patterns, but males had a higher tendency for Technical Process than all other processing patterns. The various learning contexts or socio-educational settings of the schools where the experiments were conducted might account for these disparities.

Based on the mean scores, the gender performance ratio for the gender categories revealed that males were more balanced in the Architectural Design Studio than females, who were lower in Technical and Confluent Process. When both genders were combined, it was discovered that the masculine males were the most balanced in the studio, while the feminine females were the most dynamic, implying that it was more mentally taxing for females to go about their studies than the other categories, implying gender inequality and difference in favour of the males.

## RECCOMMENDATIONS

It is important to remember that no learning combination is superior to another; yet, certain processing patterns are better suited to specific activities than others. Using this information, lecturers may considerably improve students' attainment of learning objectives through the use of deliberate teaching.

The findings have some implications for teaching and learning in order to obtain equal results for both genders. First and foremost, because more males than females were found to be proficient in tasks involving Technical Processing and Confluent Processing, methods that would aid in the development of these learning styles should be incorporated into teaching in order to foster a greater balance in the performance patterns for both genders. Lessons should be planned using deliberate teaching practises [Salama, A. (2005)]. To create a profound grasp of architectural design, the instructor should guarantee that students comprehend every design work in depth. Time should be set aside to thoroughly understand the brief through many brainstorming sessions in which everyone is encouraged to contribute and express his or her unique view of the assignment. He will be able to construct an intentional teaching plan based on these. It is advised that he divide the assignment into smaller manageable chunks with expected submission or review dates and attempt as much as possible to stick to this Step by step instructions and an example of what is required. This might be quite useful because many of the assignments assigned in architecture are something the student has never done before, and for some, viewing samples of earlier design work could assist to kick-start the design process. Most significantly, the studio assignments should be modified to account for the vast range of students based on the different processing patterns they had a proclivity to utilise, since the goal is to assist the students create a balanced study performance. Intentional teaching does not preclude students from developing their talents; in fact, the major purpose is to assist promote the students' strengths so that they can develop themselves along lines where they are weak.

ISSN No:-2456-2165

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