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Student Preferences and Current Usage in Interior Environment of the Library: A Case Study at a Malaysian University

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Abstract:

Recent trends in the design and renovation of libraries concentrate principally on the library as place and as a social space, how do university students currently use the library? Do students primarily use the library to gather and interact, or are they using it to learn as in the suggestive traditional role of the library? How can students' preferences for an ideal interior learning space be integrated into the design of a library to better support a learning environment? A case study of the main library at a University Sultan Zainal Abidin (UniSZA) was used to examine these research questions.

A student survey was used to engage users of the space and recognize how they use the library. The analysis from this quantitative method approach was used to reveal how students use the study spaces in the library and how the interior spaces of the university library can be designed to respond to student behaviors and preferences.

Student survey results revealed that students value the library and use the library as a study space. The most significant finding was that 82.28% of survey respondents stated the main reason they choose to study at the library is for quiet study space. This finding is in opposition to the literature on the library as a social space. While we are designing libraries to foster collaboration, we must also maintain the notion that libraries should provide patrons with a welcoming and comfortable quiet study environment that promotes prolonged use.

Keywords — **Users Preferences, Current Use, Third Place, Interior design, Library Environment.**

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I.   INTRODUCTION

Information about final paper submission is available from the conference website. In the last five years, it was found that traditional library services have decreased and libraries have evolved from a place to study and borrow material, to a place of social learning, however more and more libraries are sacrificing their bookshelves to make way for infrastructure and interior design elements to invite these changing needs and activities, Areas being developed include collaborative work areas, meeting rooms, technology booths and relaxing lounge areas with coffee facilities. [1] and [2]

Moreover, the academic libraries internationally, as well as locally and regionally, have gone through some form of transformation of

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their library spaces to respond to their current users' needs, Besides In a recent study where ten academic university libraries were surveyed they all had, Confirm that it had to the redesigning of spaces to support user output as part of their main thrusts. [1] And [3] this phenomenon has triggered the need for this research.

[4] Moreover, the academic library occupies a special place on many college and university campuses, often forming one of the focal points or making up one side of a central quadrangle. The library serves as the campus version of the "third place," a concept that was coined by the sociologist Ray Oldenburg in his 1989 book The Great Good Place. A third place is somewhere that people congregate and engage with one another that is not home and is not work [5] [6].

While the current role of the library is to satisfy a need for an environment that cultivates student collaboration and peer learning [7] The traditional role of the library was to symbolically reinforce the spirit of learning by providing areas for reading and meeting [8]. While the current trend in library design has shifted toward the student learning commons and group study areas, it is imperative to study the effects of this shift on student attitudes and preferences for study spaces within the university library.

The purpose of this study was to analyse current trends and user preferences in the design of libraries; the design of the twenty-first-century library interior environment has changed from the traditional library. While the student learning commons is a relatively new concept and design, many libraries strive to fit within the model and have organized their library spaces and services accordingly.[4] [9] The literature on the student learning commons suggests the shift in the library is based on changes in student study habits and progression in technology.

However, there are relatively few studies that fully support the student learning commons as evidence-based design. This study Will be developed and performed to investigate if the designs of (UNISZA) library interior spaces are congruent with student ideal study environments, and to provide recommendations for the design of future library spaces based on the data collected to identify the dimensions of the academic library based on user perception. The formative elements of the library are elicited based on the literature review, and the dimensions of the academic library are identified using principal component and cluster analysis. By identifying reliable and meaningful dimensions of user perception of the academic library, the findings of this study are expected to provide empirical evidence of user perception of the library, thus improving our understanding of users and strategies for the effective design of library space.

II. METHODOLOGY

The analysis from this quantitative research methods approach was used to reveal how students use the study spaces in the library and how the interior spaces of the university library can be designed to respond to student behaviors and preferences. Research on ideal study environments within the library environment was used to provide suggestions on improving the design of study spaces within the university library setting.

The target respondents for this research were undergraduate as well as postgraduate students studying at (UniSZA gong badak Campus). National and international students were selected from the general student respondents in the library. As mentioned above, the number of students respondents the UniSZA Branch Library is 375 National and international students. The target respondent for the study was all the students who had access to the library.

The software package used to analyze the questionnaires was (IBM SPSS statistics 20). The same software was also used to develop graphs, charts and tables to illustrate findings or summarize gathered data. All the data was captured and

analyzed using (SPSS-principal component analysis and cluster analysis).

III.   RESULT AND DISCUSSION

In this section, the researcher offers the results according to the statistical analysis of the collected data. The goals and objectives for the study were to understand the current usage of the library, preferences, to provide a better study space in the design of future libraries. The research questions identified categories that were used to organize the research data: current usage and preferences of students. The findings of the research were tackled with regard to the research questions. Therefore, the researcher employed different statistic formulas to show the final results of the collected data. The undergraduate and postgraduate student's survey spans all sections: current usage and preferences.

A. The first question of current use

How do students learn by using the library? Do students mostly use the library to gather and interact, or are they using it to learn as the traditional role of the library?

That question was analyzed by using (SPSS-principal component analysis and cluster analysis) as the below:

TABLE 1
DESCRIPTIVE STATISTICS OF CURRENT USE

Attributes	N	Mean	Std. Deviation
Printing services	360	4.5500	1.73534
Traditional use	360	4.4250	1.76153
Computer lab	360	2.8472	1.52107
Research	360	5.7500	1.66523
E-library	360	3.4611	1.98704
Social environment	360	4.7639	1.66475
Third place	360	5.6000	1.59071
Current use	360	3.8667	1.49614
Current_use1	360	5.1000	1.79476
Temperature	360	5.2861	1.61429
Interior layout	360	3.5278	1.43156
Location	360	5.0861	1.21999
Furniture	360	4.9111	1.53796
Bookshelves	360	4.4472	1.68807
Table study	360	5.2889	1.33514

Individual	360	5.7639	1.21839
Carrel rooms	360	5.6056	1.55493
Discussion rooms	360	5.3000	1.34930
Overall interior layout	360	5.3917	1.43744

The above table showed the mean and standard deviation for each current use factor; where (Individual) factor got the highest rate of approval among the other factors with mean (5.76), then at second rank (research) with mean (5.75), then at third rank (third place) with mean (5.60), and a fourth rank (carrel rooms) with mean (5.60) while the (Computer lab) got the lowest rate of approval among the other factors with mean (2.84). The following figure explains the mean bar graph of current use factors.

From the above table, can observe the high values of current use attributes, which indicates the importance of space planning of the UniSZA library which is more commonly used from the study sample individuals, where the students using the space of the library design as below:

Firstly: (Individual spaces) the Individual spaces which are the most common area between them. Therefore the library is a building type where users often spend a great deal of time in private contemplation. For many students, the bulk of their private study time is spent in libraries.[10] While most of the students tend to like nearly silent space, therefore, demand the individual study area is quite high. Also, limiting silence of the special bound areas not solely supporting the individual study; however additionally permits the rest to become an area for sharing and using it to share the information.

Valued the unique pleasure of being alone in a quiet place as one of the powerful attractions of libraries, Many institutions make available private rooms for individual study, which those rooms are required to be booked in advance. [11] The rooms can either be equipped with PCs in each, or basic IT facilities, such as wireless network access. The University of East Anglia, UK is an example. They allow

students to book individual study rooms up to 7 days beforehand.

Moreover, relating to the individual study area, it's been operated that there may be each quiet and silent study areas. In some library premises, these areas are separated. as an example, quiet study space is found on one floor and silent study area on another floor.

Hence, what's really the most distinction between the two? As a matter of reality, a quiet study space permits voiceless spoken communication solely, which suggests no loud sit conferences or phone/ Skype talks, and within the silent study space, no noise (no talking, nothing) is allowable. Figure 1 below will provide deeper insights on the gradation of tolerated noise in a typical academic library by Edwards 2009.
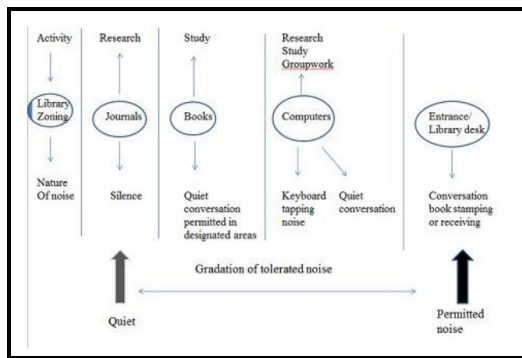

Figure 1the gradation of tolerated noise in a typical academic library By Edwards2009.

Secondly: the second of the most common usage between the students in the library as a third place, starting with a definition of the third place. According to Ray Oldenburg in "The great good place" [12], a person needs three different and important places: home, work, and a third undefined place. In order to be mentally and even physically healthy those elements are supposed to be balanced in people's lives. The home shall bring relax, comfort and a predicted environment while in work, a person must be motivated, productive and fulfilled. A third place, on other hands, is an escape place. Relief from stress and no stopping life, It

provides a loose and interactive structure. It constitutes a place where people actually feel equals, without any kind of hierarchy, a place that does not simply reduce people into customers. In addition, such a leveler place may develop relationships in a way that in other realms is not as likely possible to happen. This prevails as a result of staying in a place where conventional status counts for nothing.

therefore, and according to Ryan Flessner, a fifth-grade elementary school teacher, decided to use the theory of third space as a resource in his classroom. He noticed that many of his students did not know each other, were reluctant to share their thoughts or work together in groups and were not comfortable enough in his classroom to make connections between mathematics in the classroom and real-world applications. After creating a third space where students brought in their own culture and life experiences, students felt comfortable enough to instigate mathematical problem-solving in small groups [13]

In summary, in spite of all the competition, libraries are still a massive and secure place to host students although they need to bring their concept a little bit more up to date: the inner space and environment must be evaluated and additional importance must be given to students needs and preferences instead of fixing rules. Space and environment are decisive factors in making people, especially students, more comfortable. Also, relaxed and low stressed environments are seen as key aspects. In conclusion, there is an evolving process in constructing the library as the third place, and spreading it is the most important step. But still, the library remains the center of the student's community.
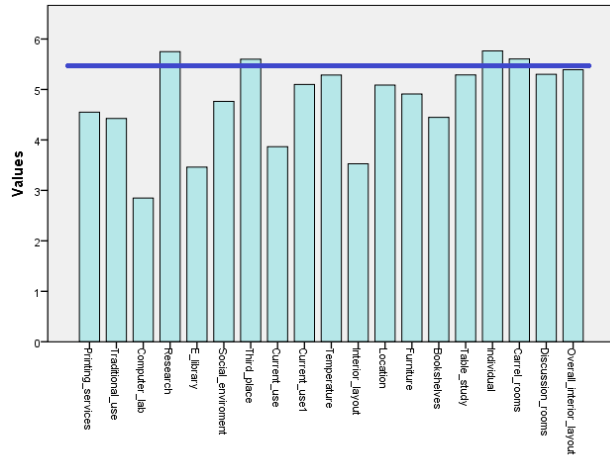
Figure 2: Mean bar graph of current use

The above figure describes the mean for current used factors, where can notes that most of the factors mean was above (4), which means that the arithmetic mean is high, and the highest mean was for (individual) factor, then at second rank (research), then at third rank (third place), and a fourth rank (carrel rooms), while the (computer lab) got the lowest rate of approval.

From the previous figure can note that all current usage attributes values were high and higher than (4). Therefore, from the above table, can observe the high values of current use attributes, which indicates the importance of space planning of the UniSZA library which is more commonly used from the point of view of the study sample individuals there are many ways to use the elements and the design of the library. also, the appropriate layouts elements provide a feeling of comfort between the students, making these attributes of the most influential factors on the library users.

The researcher attributes the reason for this high level of current usage from the students to the library to the importance of this variable, as it represents a process of organizing to form a single unit that is aware of a single overall view that achieves a certain concept, also the importance of knowing the current usage of the library stems from being an activity that has a direct relationship to the

affairs of each of us, because we are the users of the library.

TABLE 2
COMMUNALITIES OF CURRENT USE FACTORS

	Initial	Extraction
Printing services	**1.000**	**.802**
Traditional use	**1.000**	**.600**
Computer lab	**1.000**	**.675**
Research	**1.000**	**.782**
E-library	**1.000**	**.819**
Social environment	**1.000**	**.629**
Third place	**1.000**	**.773**
Current use	**1.000**	**.672**
Current use1	**1.000**	**.755**
Temperature	**1.000**	**.819**
Interior layout	**1.000**	**.685**
Location	**1.000**	**.715**
Furniture	**1.000**	**.644**
Bookshelves	**1.000**	**.760**
Table study	**1.000**	**.747**
Individual	**1.000**	**.825**
Carrel rooms	**1.000**	**.787**
Discussion rooms	**1.000**	**.728**
Overall interior layout	**1.000**	**.847**

The above table indicated that, the amount of variance in each variable that is accounted for initial communalities are estimates of the variance in each variable accounted for by all components or factors. Extraction communalities are estimates of the variance in each variable accounted for by the factors (or components) in the factor solution. Also, data showed that all variables fit well with the factor solution.

Also, the above table of communalities shows how much of the variance, where the communality value which should be more than (0.5) to be considered for further analysis, while the variables get communality value less than (0.5) are to be removed from further steps factor analysis, in the variables has been accounted for by the extracted factors. For instance over (82%) of the variance in "individual" is accounted for, while (60%) of the variance in "traditional use" is accounted for.
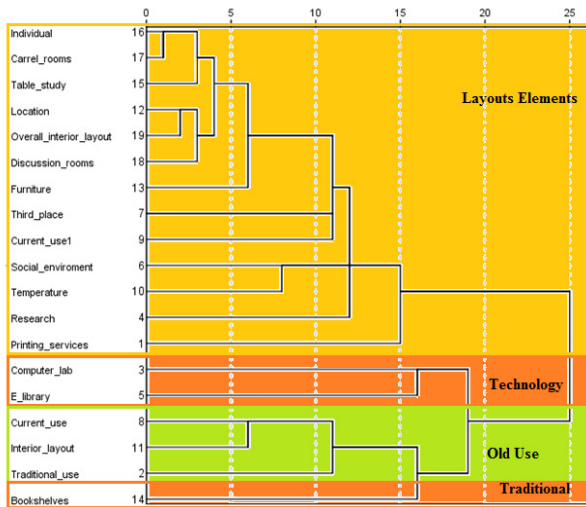
Figure 3: Dendrogram of Current use

From Figure (3) it can be noted that the factors or groups that were linked together were identified in each step of the analysis, where can note that, at the first step there were (14) factors collected together in the first step through a number of partial groupings among factors to produce one group, also the data showed that, factors (3 and 5) joined the first group at second step to produce the second group, then the factors (8, 11, and 2) joined the second group at third step to produce the third group, and finally the factor (14) joined the other factors at last step.

There is four cluster involved in the Dendrogram as shown in Figure above that had been generated from Cluster Analysis of the SPSS software. Firstly, there is 13 keyword involved in the first cluster that been named as the **Layouts Elements** group that been highlighted in the orange color. The highest mean score in the features group is the keyword of (individual space), which is stated that majority of the respondents seems agreed on the importance of interior layouts elements for the library.

Secondly, the cluster involved 2 keywords in the group that been named as the **Technology** group that been highlighted in red color. The highest mean score keyword in the technology group is the (computer lab). Although the computer lab is the least used by students, it is still a very important

element of the library design. the researchers had been definition the computer lab as the Room or space equipped with computers (networked or not) devoted to pedagogical use in libraries. A computer laboratory must be safe from any disruptive, non-pedagogical content, pupils and teachers may need authorized access credentials. Therefore, this area should provide by good and creative design to make the students feel safe.

There are 3 keywords involved in the third cluster that been named as the **Old Use** group. One of the means had scored in the old use group is the (traditional use) keyword that had been classified as the group of the students using the library just for studying quietly.
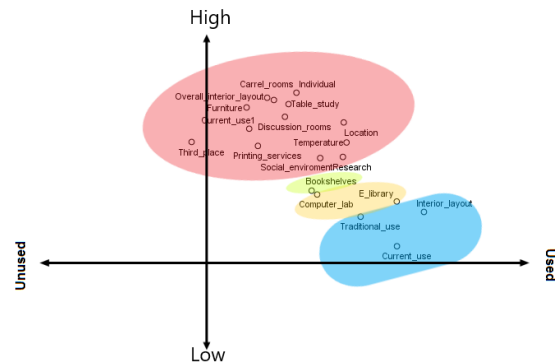

Figure 4: Component Plot in Rotated Space in 2-deminsions

The Component Plot in rotated Space gives one a visual representation of the loadings plotted in a 2-dimensional space. The plot shows how closely related the items are to each other and to the two components. This plot of the component loadings shows that some factors load highly and positively on the first component and other factors have a loading near zero on the first component, but loads highly on the second.

The Component Plot in rotated Space gives one a visual representation of the loadings plotted in a 2-dimensional space. The plot shows how closely related the items are to each other and to the two components. This plot of the component loadings

shows that (table study, individual, location, research and temperature) all load highly and positively on the first component. While (interior design, e-library and current use) loading near zero on the first component, but loads highly on the second.

B. The sconed question of students preferences'

How can students' perceptions of ideal interior learning spaces be integrated into the design of a library to better support a learning environment based on student preferences?

That question was analyzed by using (SPSS-principal component analysis and cluster analysis) as the below:

TABLE 3
DESCRIPTIVE STATISTICS OF STUDENTS' PREFERENCE

Variables	N	Mean	Std. Deviation
Location	360	5.8139	1.19251
Walls	360	2.9556	1.75306
Walls1	360	5.7611	1.03888
Flooring	360	2.7806	1.83411
Flooring1	360	3.3722	2.05775
Ceilings	360	3.9556	1.65835
Ceilings1	360	5.3056	1.35834
Lighting1	360	5.4111	1.38552
Lighting2	360	4.9417	1.64187
Furniture2	360	5.0861	1.75389
Furniture3	360	5.4389	1.28268
Space layout	360	4.0861	1.53722
Space_layout1	360	4.6694	1.47180
Space_layout2	360	5.3056	1.52453
Space_layout3	360	5.4306	1.34792
Temperature	360	4.9333	1.72674
Privacy1	360	5.2306	1.55302
Materials	360	5.6833	1.53320
Social environment	360	5.1722	1.44473
Computer lab	360	5.5194	1.52953
Overall_interior_enviroment2	360	5.4639	1.36360

The above table showed the mean and standard deviation for each student's preference attributes; where (location) factor got the highest rate of approval among the other factors with mean (5.81), then at second rank (walls1) with mean (5.76), then at third rank (materials) with mean (5.68), and a fourth rank (computer lab) with mean (5.51), while the (flooring) got the lowest rate of approval among the other factors with mean (2.78).

From the above table, can observe the high values of student's preference attributes, which indicates the importance of design elements of the unisza library which is more commonly preferred from the point of view of the study sample individuals, where the students preferred of design elements of the unisza library as below:

Firstly: the location which is the most preferred common element between them. Therefore the library is a building type where users often spend a great deal of time in private contemplation. Therefore, the location is one of the important elements in interior design where each place of the design needs location suitable for the task of design because the library site is the heart of the University, therefore, most of respondents they preferred the site of the library in the middle of campus for easy to access.

Secondly: the second of the most preferred common element between the students in the library it is the walls with light colors, as mentioned before the importance of color in interior design, Color can make or break a space. Choosing appropriate colors for a facility's spaces is an important aspect of interior design. Even if your organization has hired an interior designer, it's good to know a few basics about color. While the color is sometimes divided into two categories: warm and cool tones. Warm tones, like red, orange and yellow can energize a space and its occupants. Cool tones such as blue, green and purple generally create quiet, relaxing atmospheres.

Therefore, when choosing wall and flooring colors, it's important to keep the goal of the space in mind If energetic work is being performed in a space, warm, exhilarating tones might be good to consider, for example. In break areas, cool tones may be

more appropriate when students can relax. Therefor, the researcher concluded Color has a profound influence on space and the people in it, while we can use it to our advantage to create an inviting productive space.
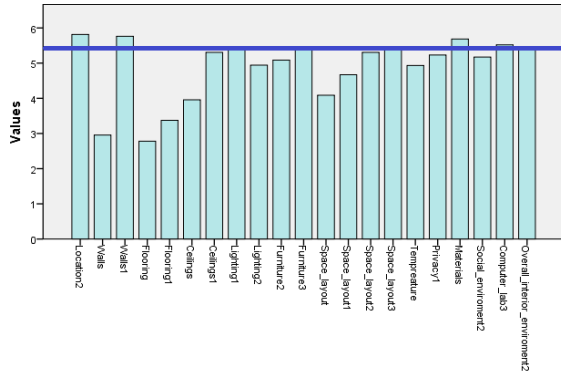

Figure 5: Mean bar graph of student preference

The above figure describe the mean for student preference factors, where can notes that most of factors mean was above (4), which means that the arithmetic mean is high, and the highest mean was for (location) factor with mean (5.81), then at second rank (walls1) with mean (5.76), then at third rank (materials) with mean (5.68), and at fourth rank (computer lab) with mean (5.51), while the (flooring) got the lowest rate of approval among the other factors with mean (2.78)

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TABLE 4
COMMUNALITIES OF STUDENT'S PREFERENCE FACTORS

	Initial	Extraction
Location	**1.000**	**.654**
Walls	**1.000**	**.652**
Walls1		**.771**
Flooring	**1.000**	**.781**
Flooring1	**1.000**	**.798**
Ceilings	**1.000**	**.650**
Ceilings1	**1.000**	**.779**
Lighting1	**1.000**	**.778**
Lighting2	**1.000**	**.685**
Furniture2	**1.000**	**.848**
Furniture3	**1.000**	**.858**
Space layout	**1.000**	**.762**
Space_layout1	**1.000**	**.749**
Space_layout2	**1.000**	**.763**
Space_layout3	**1.000**	**.747**
Temperature	**1.000**	**.632**
Privacy1	**1.000**	**.627**
Materials	**1.000**	**.758**
Social environment	**1.000**	**.699**
Computer lab	**1.000**	**.698**
Overall_interior_enviroment2	**1.000**	**.823**

The above table indicated that, the amount of variance in each variable that is accounted for. Initial communalities are estimates of the variance in each variable accounted for by all components or factors. Extraction communalities are estimates of the variance in each variable accounted for by the factors in the factor solution, and the above table shows that all factors are fit well with the factor solution.

Also, the above table of communalities shows how much of the variance, where the communality value which should be more than (0.5) to be considered for further analysis, while the variables get communality value less than (0.5) are to be removed from further steps factor analysis, in the variables has been accounted for by the extracted factors. For instance over (85%) of the variance in "furniture" is accounted for, while (62%) of the variance in "privacy1" is accounted for.
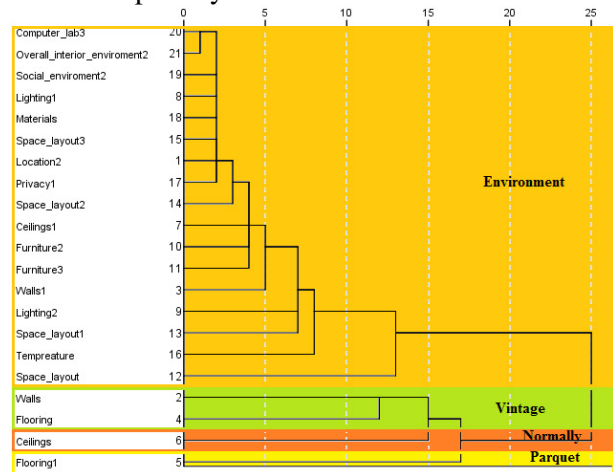

Figure 5: Dendrogram of student's preference factors

From the Figure (5) it can be noted that the factors or groups that were linked together were identified in each step of the analysis, where can note that, at the first step there were (17) factors collected together in the first step through a number of partial groupings among factors to produce one group, also the data showed that factors (2 and 4) joined the first group at the second step to produce the second

group, then the factor (6) joined the second group at the third step to produce the third group, and finally the factor (5) joined the other factors at the last step.

There are four clusters involved in the Dendrogram as shown in Figure above that had been generated from Cluster Analysis of the SPSS software. Firstly, there is 17 keyword involved in the first cluster that been named as the **Environment** group that been highlighted in the orange color. Which is stated that majority of the respondents seems agreed on the importance of layouts elements for the library.
Secondly, the second cluster involved 2 keywords in the group that been named as the **Vintage** group that been highlighted in green color.

There are two groups get a one keywords involved that been named as the **Normally** group of the third cluster that been highlighted in red color, the fourth cluster that been named as a **Parquet** group that been highlighted in yellow color.
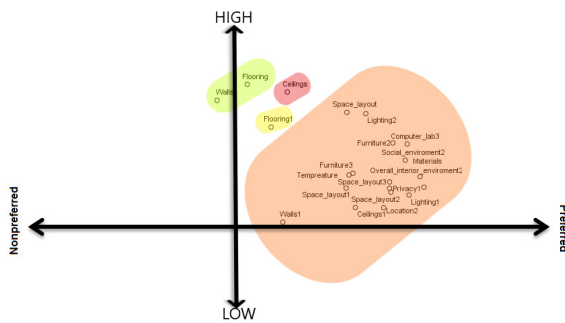

Figure 6: Component Plot in Rotated Space in 2-deminsions

The Component Plot in rotated Space gives one a visual representation of the loadings plotted in a 2-dimensional space. The plot shows how closely related the items are to each other and to the two components. This plot of the component loadings shows that some factors load highly and positively on the first component and other factors have a loading near zero on the first component, but loads highly on the second.

The Component Plot in rotated Space gives one a visual representation of the loadings plotted in a 2-dimensional space. The plot shows how closely

related the items are to each other and to the two components. This plot of the component loadings shows that (furniture2, furniture3, materials, social environment, computer lab, lighting and temperature) all loads highly and positively on the first component. While (flooring, walls, ceilings and flooring1) loading near zero on the first component, but loads highly on the second.

IV. CONCLUSIONS

It is important to the understanding of the role of the physical interior environment on users' perceptions of creating better design. In researcher opinions and understanding, to achieve a better design of university libraries, aspects of physical and environmental criteria should be emphasized from the beginning of the planning space. By understanding all of the influences on the perception and expectation of users on creating a better design, decision-makers can ensure that their approaches to those ambient and physical elements within their expertise appropriately interact with and enhance the other influences on the total user's experience and behaviors. It is more than just the functionality and aesthetics of the ambient and physical design, but also temporal effects, social interaction and psychological consequences.

Therefore, to create and to achieve a better design for future university libraries, the various aspects of physical interior environments and interior ambiance should be considered such space planning, selection of furniture, lightings, material, and finishes. According to [14], the interior environment comprises two of these influences – physical and ambient – and strongly affects the remaining functional, temporal, emotional, indicative, and social influences. Each of these influences affects customer response both directly and indirectly through its effects on the other influences. The physical setting is one of the most prominent and pervasive of these influences. Although physical environments comprise many factors, including the ambient, interior environment, that interact and influence each other in numerous

ways, ultimately, the focus must be on the users – his or her expectations, desires, needs, and experience.

Therefore, the trend of library design needs to be re-evaluated as new library renovations seek to fit into the student learning commons model. While the student learning commons in this case study was being used throughout the survey results showed that it was the most widely used space the study space most desired by students. Without gathering the appropriate research on how students use the space, current efforts in library design are not being focused on the spaces that would have the most impact on students. A statistically significant higher percentage of students seek individual study spaces within the library. The interiors spaces within libraries are also not being designed in a way that promotes students' ideal study environment.

Interior design for university libraries should be grounded on an evidence-based design that has been proven to fit with the largest percentage of the user population. While designing a learning space the designer should take a larger population into account by providing flexibility within the space. However, research has shown that efforts to satisfy the needs of all users have gone too far in the direction of open space planning. The results clearly show that while student's attitudes and behaviors are diverse, they clearly seek power, large workspace, privacy, and a quiet work environment in the library.

When the design of university facilities is planned, the architecture, entry sequence, and main interior lobby spaces are often where monetary funds are allocated. The design of the intimate spaces within the building are often designed separately from the building, and typically on a much smaller budget and in spaces that have already been defined. The research conducted reveals a need to design functional intimate spaces that work well on a personal and human level. The study spaces within a library should do several things. On a functional level space must be quiet, allow for students to plug in their personal laptop and a certain level of

control over other environmental aspects such as lighting and furniture arrangement. Concurrently, the design of spaces must feel welcoming to an individual. The spaces should have an adequate level of visual stimulation, but yet be quiet enough to study. The booth or study nook has shown to be an appealing image and potential design feature among users in the group study area at the university library.

ACKNOWLEDGMENT

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