An Evaluation of Social Interactive Spaces in a University Building

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Keywords:
environment behavior, integration, visual impact

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0 Abstract

This article concentrates on social interactive spaces in a university building and investigates how these spaces are correlated to visual "e-partition" lines. Although, environment-behaviour literature argues the social interactive spaces through proximity theory, there are only a very few contributions on its integration with visual capacity. Thus, the article aims at the visual impact of interior environment; it explores how social domains in a university building correlate to visual convex lines and how these settings are identified as "sociofugal" or "sociopetal" environments by using 'Space Syntax' method.

1 Introduction

Students' social behaviour at university buildings, their social interactions and their gathering areas are among the important issues of architectural programming and architectural design performance. These issues show many implications about the usage of interior spaces of university buildings and the characteristics of physical determinants, which play a part in social interaction in spaces. Thus, this article is aimed at exploring visual potential of interior design and the way they are interrelated to the notion of socio-behavioural phenomenon, depending upon the students' life in university buildings.

As there are many contributions to the physical characteristics of the environment (Lynch, 1960; Weisman, 1981; Peponis et al., 1990; O'Neill, 1991), the socio-behavioural essence of the setting can be considered also as a determinant, such as issues like mental representations, architectural legibility, way finding, spatial identity or cognitive mapping. "Space Syntax" methods, especially e-partition analyses, not only help us to understand the level of visual stimulation in the interior space, but they also point out a specific place reflecting social interaction level of the setting. This specific place is mainly derived from topological properties such as memorable and describable characteristics of physical features and assigned functions.

2 Social Interaction in Setting and Visual Field

The notion of social interaction in space can be explained by major components forming the essence of social relation in the setting. In Barker's theory, elements such as actors, milieu, synomorphy and time are the important components for understanding the meaning of fitness of the activity (Barker, 1968). These components also identify the sociobehavioural nature of the space. In environment-behaviour literature, the terms such as "sociopetal" and "sociofugal", describes the components as "bringing people together" and "forcing them apart" in spaces. These two controversial terms in social sense not merely describe the social interaction of the space, but they also indicate physical characteristics of spatial configuration. For example, sociopetal layouts provide different postures among users for social interaction and seating arrangements are allocated in a socioconsultive distance (Lang, 1987). On the other hand, sociofugal layouts are those where it is easy to avoid social interactions; back-to-back benches are typical examples of a sociofugal layout (Hall, 1974).

The notion of being a socially interactive space cannot directly be linked to sociospatial characteristics, it should also be argued with visual qualities of the spaces. The terms such as Gibson's (1950) "visual field" and "visual world" help us to understand visual affordability of the environment and the impact of visual stimulation while we move through the spaces. The concept of visual field is also correlated to human body movements and postures. As Gibson (1950) contributed to the literature, the visual field is made up constantly shifting light patterns -recorded by the retina- which actors use to construct their visual world. The actors on the space differentiate between the sense impressions that stimulate the retina; and the sensory data they see from other sources are used to correct the visual field. In this case, actors have not only the sensory data in relation to visual impact of the architectural features, but the non-verbal communication data about others' movements and activities complete the potential of the visual field. This discussion leads us to conclude that social intelligibility of a space is not fully linked to social interaction level among users, but it is correlated to visual capacity of the environment, and actors' "kinaesthesia". Thus, this article investigates students' social interactive domains in a university hall; how their visual fields are interacted and how these visual fields are labelled as "sociopetal" or "sociofugal" spaces.

3 The Method

The linkage between visual stimulation and the level of social interaction has directed a case study in a building of Istanbul Technical University (ITU). This building called as Taskisla is currently being used as the school of architecture and research institutes. Taskisla is a historical building in neo-classical style and was built in 1853 as a military hospital. The functional use of building was transformed into military barracks and military courts in 1876. The building had gone through a restoration process during the period of 1944–1950, and it was transformed into the schools of architecture and engineering. At present, the school has four main circulation towers connecting four wings. The general layout of the building is symmetrical and general appearances are identical. Taskisla has three floors including one basement; there is also an extension at the attic for additional studios, and the courtyard is located at the centre (Fig. 1 and Fig. 2). However, in the case study, the studios at the attic and basement had not taken into the consideration.

Fig. 1. Images from Taksisla

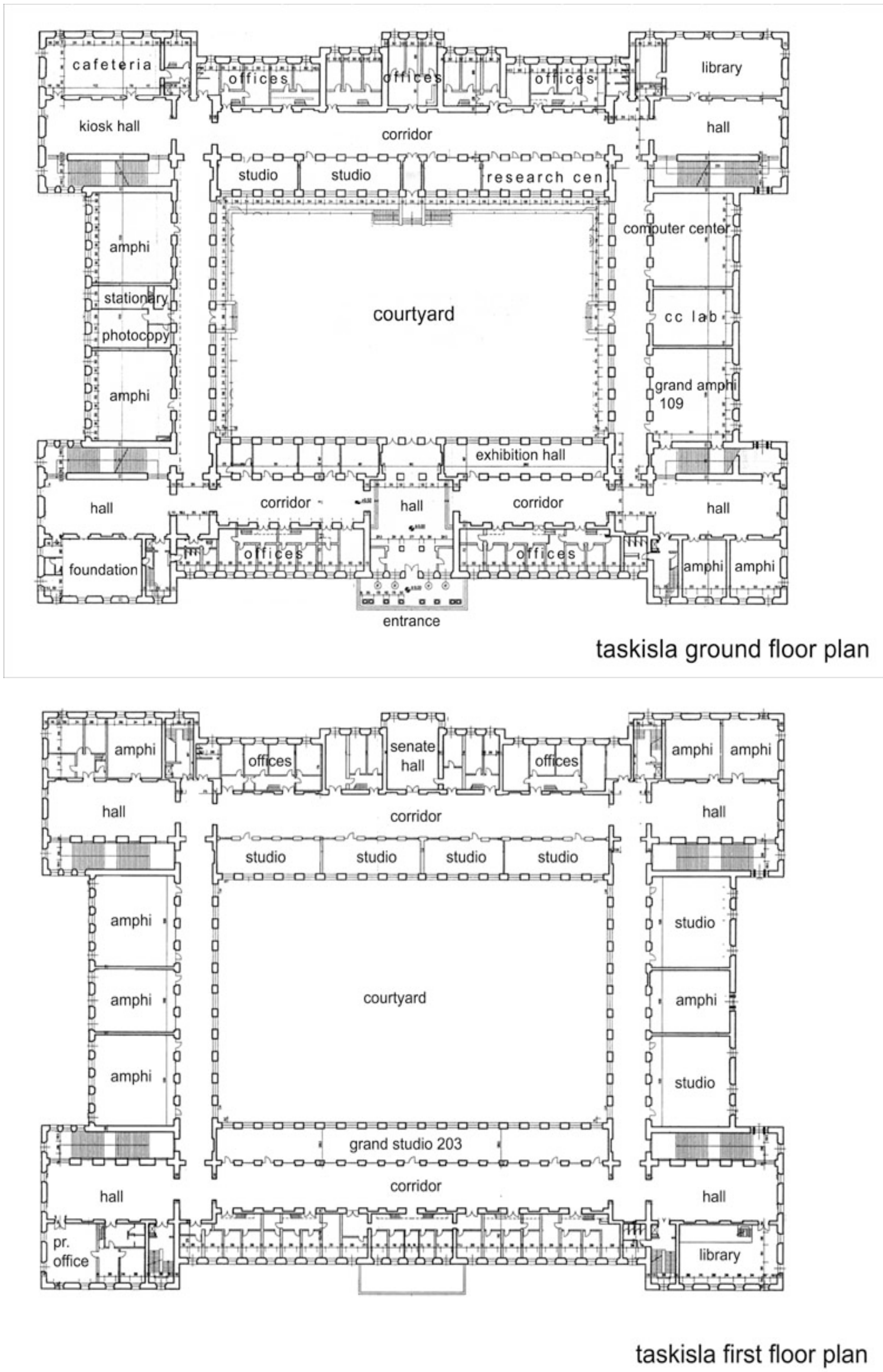


Fig. 2. Ground and first floor plans of Taksisla

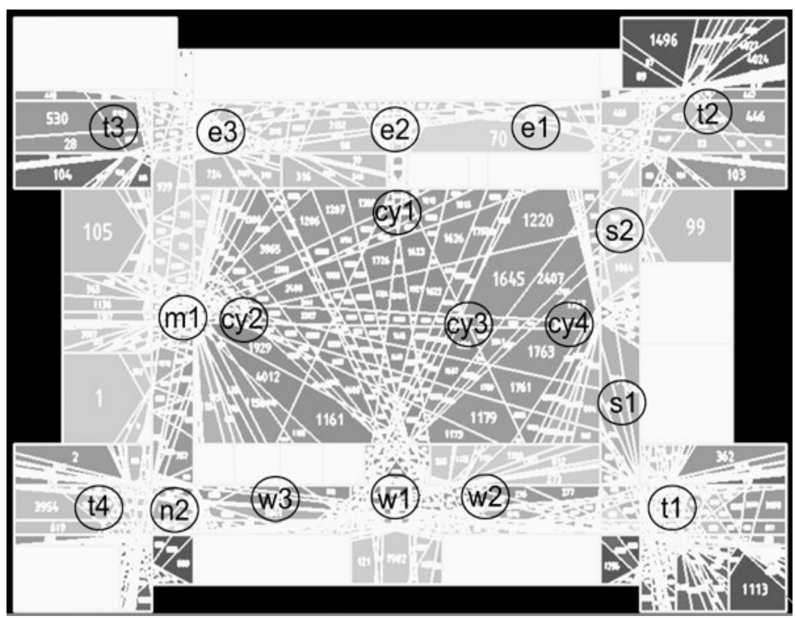
The entrance floor has many spaces allocated for exhibition, lounge and meeting spaces. The second floor has many spaces mainly allocated for educational purposes. The inner circle of the long corridors are surrounded by architectural studios facing the courtyard, while the spaces located on the outer circle are reserved for instructors' offices. The scheme is geometrically very simple, but it gives fewer cues especially for orientation and way finding. The main need to overcome institutional character and maintain distinction is to allocate more functions on public halls and corridors.

The evaluation of this university building is realised in three stages. Primarily, e-partition analyses and secondarily bubble analyses are applied to floor plans. Both of these stages are basically oriented to get information about the visual capacity of spatial configuration. As for getting information about e-partition lines, a space syntax software called "Spatialist" of Georgia Tech., USA is activated. The third stage is based on observations dealing with frequencies of social interaction on selected zones.

E-Partition Analyses:

E-partition line analysis is implemented in ground and first floors. Visually integrated areas are denoted as red zones indicating more intersected e–partition lines and blue zones indicating less intersected e–partition lines reversibly (Fig. 3 and Fig. 4). Low occupied and less used spaces by students are eliminated in the e-partition analysis in order to get precise information about students' social interaction. Thus, e-partition analysis is applied mainly to selected spaces that are highly used by students, such as circulation areas. This analysis in both floor plans has provided information about real integration, relative integration, and depth or connectivity values. The areas demarcating red zones are very indicative about high visual interactions.

Fig. 3. E-partition analysis of ground floor and selected bubbles



Bubble Analyses:

In the second stage, some social interaction zones have been randomly selected on floor plans. 18 zones from the ground floor and 10 zones from the first floor are selected for investigation. Each zone is shown as a circle and simplified as a conceptual bubble (Sommer, 1974) on floor plans (Fig. 3 and Fig. 4). Each bubble gives us implications about the level of social interaction changing from intimate, personal, social distance to the public distance. The main postures used in the case study are assumed as sitting mode on benches or standing mode which are considered highly as non-verbal behaviour of social gatherings. Therefore, so as to indicate "social distance" especially dealing with more standing students in circulation areas, the size of the bubbles are set to be 4-6 meters in diameter.

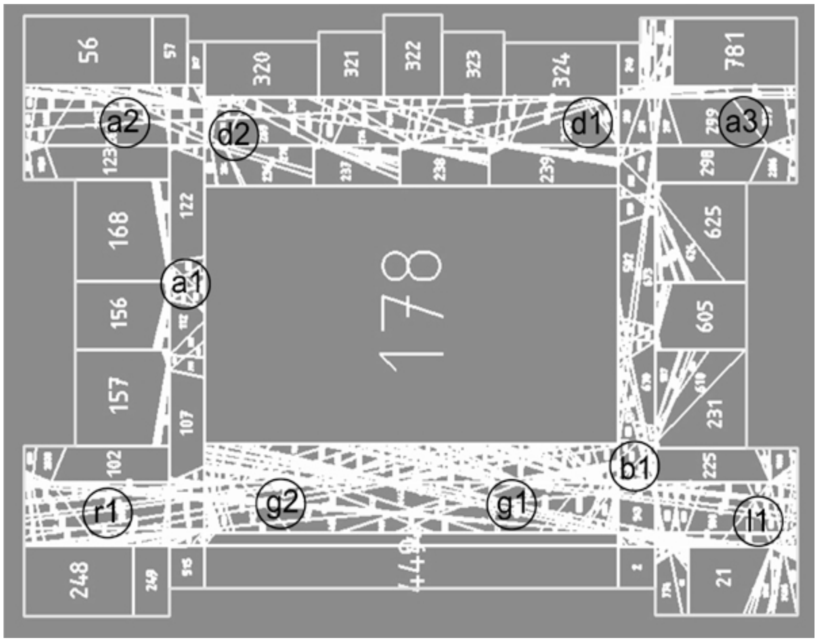
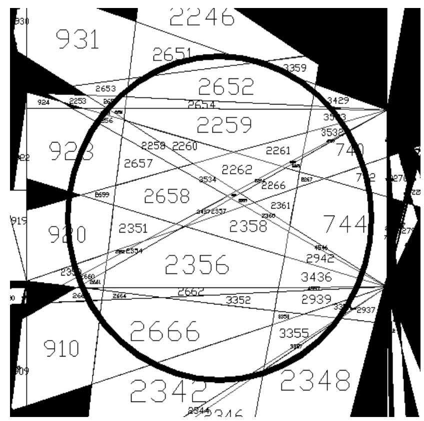


Fig. 4. E-partition shapes of first floor and selected bubbles

Fig. 5. E-spaces in a bubble



Since the e-partition analysis provides detailed information about the intersection of visual edge lines, as indicated in Fig. 5, each bubble has many convex shapes in the determined circle. The bubbles give us precise information about visual stimulation in selected settings such as real integration, relative integration and depth levels of shapes. The mean values of convex lines in the selected bubble also reinforce the visual potential level of the bubble. The values shown in Table 1 and Table 2, are the mean values of convex shapes situated in the selected bubbles.

Social Interaction Analyses:

The last stage is based on observational data. At this stage, the parameters such as density of the occupants, and the social interaction between users due to specific periods in a daily time are taken into consideration. The density value is related to the passers by counted in a determined period on the selected zone. The observation period is set to be two times in a day, before and after noon at the peak hours selected between 10.00 - 12.00 and 14.00 – 16.00. Observations are executed within 30-minute intervals on the selected zones. The interactions less than 1 minute are eliminated from the records, and postures are also indicated in accordance with behavioural modes. The observations are also shown in Table 1 and Table 2.

Table 1 : Social Interaction at Ground Floor

No	Bubbles	Space	Hours	Total Social Activity (per 30 min.)	Sitting Mode (per 30 min.)	Standing Mode (per 30 min.)	Density Passers by (per 30 min.)
1	W1	entrance hall	10.30-11.00	37	3	34	195
2	W2	exhibition hall	11.00-11.30	14	0	14	214
3	T1	grand amphi-109	14.30-15.00	4	0	4	124
4	S1	computer c. corridor	10.30-11.00	0	0	0	95
5	S2	computer centre	15.00-15.30	8	3	5	136
6	T2	library hall	10.00-10.30	2	0	2	204
7	E1	research centre	14.00-14.30	3	1	2	91
8	E2	courtyard exit	10.30-11.00	7	3	4	79
9	E3	social sci. institute	14.00-14.30	0	0	0	146
10	T3	kiosk hall	10.30-11.00	14	11	3	67
11	M1	stationery-photocopy	15.00-15.30	41	0	41	61
12	T4	foundation hall	10.00-10.30	0	0	0	57
13	N2	hall	13.00-13.30	2	1	1	79
14	CY1	courtyard exit	10.30-11.00	28	13	15	54
15	CY2	courtyard exit	14.30-15.00	56	26	30	108
16	CY3	courtyard-pool	10.30-11.00	54	21	33	97
17	CY4	courtyard exit	14.00-14.30	39	20	19	117
18	W3	CEC corridor	10.30-11.00	2	1	1	55

No	Bubbles	Space	Hours	Total Social Activity (per 30 min.)	Sitting Mode (per 30 min.)	Standing Mode (per 30 min.)	Density Passers by (per 30 min.)
1	G1	grand studio corridor	10.30-11.00	35	7	28	123
2	G2	grand studio corridor	14.30-15.00	33	3	30	137
3	R1	president's office hall	10.30-11.00	12	0	12	65
4	A1	amphi corridor	14.00-14.30	28	0	28	97
5	A2	tower hall	10.30-11.00	6	2	4	84
6	D1	studio corridor 217 a	14.00-14.30	17	5	12	112
7	D2	studio corridor 217 d	10.00-10.30	13	2	11	105
8	A3	tower hall	14.30-15.00	8	2	6	77
9	B1	studio corridor 212	10.30-11.00	21	0	21	98
10	L1	library hall (sinan)	14.30-15.00	15	0	15	95

Table 2. Social Interaction at First Floor

Consequently, the results of the case study are evaluated based on analysis of three stages, e-partition analysis, the bubble analysis and the social interaction analysis of the selected zones. Although, the functional effectiveness of spaces may be another determinant of the level of social interaction, this issue is eliminated in the data collection due to already occurred social interactions.

4 Data Analysis / Visual Field and Social Interaction

The visual analysis and the social interaction level of zones provide the information about floor plans (Table 3 and Table 4). In the ground floor, visually integrated areas are mainly found in courtyard, entrance hall, and some specific zones such as stationery, photocopy room and the most densely used settings such as studios or their extensions on circulation areas. These results also prove that the general spatial configuration of the building does not provide "sociopetal" settings in circulation towers. The lower levels of visual integration indicate lower levels in social interaction, in other words, lower visual stimulation creates lower social interactive spaces, and higher visual stimulation creates more sociopetal spaces. The analysis indicates that there is a correlation corresponding $r^2=0.47$ between real integration values of e-partition lines and the level of social interaction (Fig.6). The values indicated in Table 2, shows that the first floor emphasises strong correlation between visual e-partition lines and social interaction levels. The correlation between real integration value and social interaction level is found as $r^2=0.74$ (Fig. 7). The reason of high accordance in this floor is based mainly on the studios located here and sociopetal characteristics of design studios extending even into the corridors.

Table 3 : Interrelationship between Syntactic Values and Social Interaction at Ground Floor

No	Bubbles	Space	Relative Integration	Real Integration	Depth	Total Activity	Sitting	Standing	Density
1	W1	entrance hall	52,160	0,220	44,525	37	3	34	195
2	W2	exhibition hall	48,532	0,204	47,785	14	0	14	214
3	T1	grand amphi-109	39,572	0,166	58,360	4	0	4	124
4	S1	computer c. corridor	46,996	0,198	49,293	0	0	0	95
5	S2	computer centre	39,969	0,168	58,659	8	3	5	136
6	T2	library hall	36,672	0,154	62,893	2	0	2	204
7	E1	research centre	42,846	0,181	53,983	3	1	2	91
8	E2	courtyard exit	44,204	0,186	52,257	7	3	4	79
9	E3	social sci. institute	39,531	0,166	58,419	0	0	0	146
10	T3	kiosk hall	34,917	0,147	66,000	14	11	3	67
11	M1	stationery-photocopy	48,204	0,203	48,090	41	0	41	61
12	T4	foundation hall	37,384	0,157	61,723	0	0	0	57
13	N2	hall	46,835	0,197	49,467	2	1	1	79
14	CY1	courtyard exit	52,276	0,220	44,406	28	13	15	54
15	CY2	courtyard exit	52,223	0,220	44,459	56	26	30	108
16	CY3	courtyard-pool	52,615	0,222	44,334	54	21	33	97
17	CY4	courtyard exit	50,517	0,213	45,926	39	20	19	117
18	W3	CEC corridor	49,372	0,208	46,990	2	1	1	55
		mean	45,268	0,191	52,087	17,278	5,722	11,556	109,944

No	Bubbles	Space	Rel Integ	Real Integ	Depth	Soc Interact	Total Activity	Sitting	Standing	Density	T.Act./Fun.Eff
1	G1	grand studio corridor	43,784	0,294	30,830	4	35	7	28	123	105
2	G2	grand studio corridor	40,802	0,274	33,034	4	33	3	30	137	99
3	R1	president's office hall	31,005	0,208	43,136	2	12	0	12	65	12
4	A1	amphi corridor	32,690	0,219	40,955	2	28	0	28	97	56
5	A2	tower hall	25,505	0,174	51,506	1	6	2	4	84	6
6	D1	studio corridor 217 a	28,127	0,189	47,436	2	17	5	12	112	51
7	D2	studio corridor 217 d	30,167	0,166	44,307	2	13	2	11	105	39
8	A3	tower hall	28,072	0,189	47,515	2	8	2	6	77	8
9	B1	studio corridor 212	37,069	0,249	36,233	3	21	0	21	98	42
10	L1	library hall (sinan)	33,980	0,228	39,440	2	15	0	15	95	15
		mean	33,120	0,219	41,439		18,8	2,1	16,7	99,3	

Table 4 : Interrelationship between Syntactic Values and Social Interaction at First Floor

In the analysis of two floors, selected bubbles show the importance of edge lines of spaces. The visual stimulation and more openings to main halls and corridors enhance the occurrence of social interaction between occupants. This consideration also supports the importance of functions, especially concentrated around the public halls. Thus, the functions on spatial configuration may cause high intersection of visual e-lines indicating high level of social interaction. If there is a functionally attractive point for occupants, social interaction is a natural outcome in the selected setting, reversibly, low integration values indicate low social interactive settings. This example, the syntactic e-partition analysis, reinforces the findings of lower values at specific time intervals in functionally less attractive spaces and at spaces indicating higher depth values such as circulation towers.

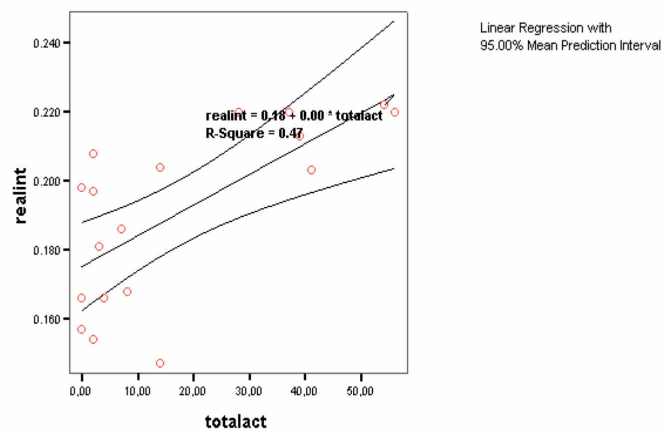


Fig. 6 Scatterplot of Ground Floor

6 Conclusion

The outcomes obtained from the three stages of analyses provide many hints about the design performance of the overall spatial configuration of the building. Although, the building historically has faced many alterations in the past, existing conditions still expose many problems about the essence of sociopetal meaning of the space. The width of corridors and more "institutional" appearance of public halls or corridors reinforce avoidance of social interaction between students. However, social interaction between students in an inevitably urgent issue especially in educational facilities emphasising informal education based on face to face relationships such as the architectural education itself. The model in here that is extracted from "space syntax" brings out helpful data for implementation of e-partition analysis that may be considered as an evaluation base for testing visual stimulation and its effects on the level of social interaction. The reason is simple in this model, indicating that the social interaction is an outcome based on visual occurrences derived from the spatial configuration.

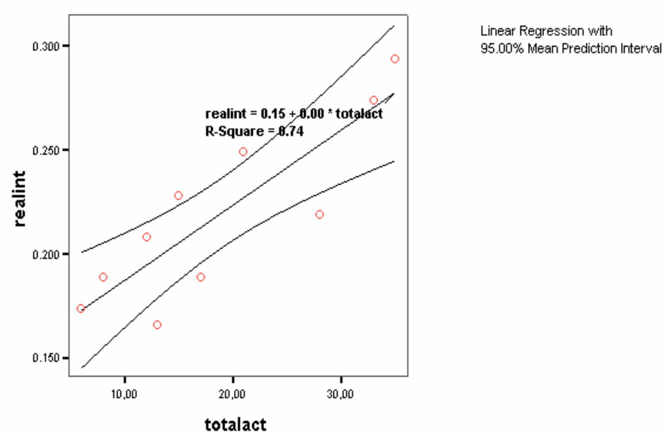


Fig. 7 Scatterplot of First Floor

The e-partition analysis, which is undertaken as a case study in two floors of a university building, indicates that sociopetal spaces extract more information about settings; they enrich the settings, and define the spaces as being more memorable and descriptive. As indicated in this university building, socially interacted settings have been found to be more visually integrated settings. Therefore, space syntax model proves that the social interactive settings are not selected randomly, and their allocation is also in accordance with the capacity of visual field. This view also brings out that we implicitly accord our behaviours due to visual stimulation and we go into social interaction with actors in the setting that is based on occurrences and spatial configuration. The issue of visual stimulation in here is based on topological characteristics of spatial configuration, and it also relies on the level of social capacity in a specific setting.

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