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Article

The Impact of Social Interaction and Communications on Innovation in the Architectural Design Studio

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Abstract: Design is a social phenomenon and researchers suggest that social interaction, negotiations and communication between designers are essential to initiate creativity. Within the design studio environment, a number of factors affect the healthy social interaction and design negotiations, such as the teaching style of tutors and the culture that governs a design studio's environment. This may in turn affect the utilization of the outcome of negotiations in the design project. Design studio students from the third to fifth years at the College of Architecture, University of Dammam (UD), the Kingdom of Saudi Arabia (KSA), were surveyed to find out how far the design studio's culture and communication would impact the production of innovative design projects. The results show that frequent communication and the establishment's shared grounds are essential to develop knowledge and positively influence the design outcome. On the other hand, the research found that negative qualities on a personal level and on that of a design studio environment would hinder a student's creativity. However, to develop students' design/innovative abilities, the researcher recommends that certain measures should be considered. These would include transforming the design studio into an interactive and friendly learning environment, adjusting the teaching methodology, and developing interactive communication abilities of students and tutors.

Keywords: creativity; innovative design products; design negotiations; creative environment

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1. Introduction

Education in architecture studios involves a number of varied activities. Before the project begins, the tutor(s) may establish the goals, expectations, general procedure, and assessment criteria he/she will employ for the project. During each semester, tutors meet students, either individually or in groups, for design-related discussions and clarifications. The design studio should not be considered as a safe haven—as one would imagine—as conflicts and miscommunications regarding design ideas are very likely to occur between students and tutors and amongst tutors themselves. This research is driven by growing complaints from the design studios' tutors and the discussions of the board of the Department of Architecture, College of Architecture, UD about the low design abilities of students. Tutors from all academic levels repeatedly claim that students produce design projects but very few of them can actually produce innovative projects [1,2]. Previous research points out possible causes that influence the educational outcome. It indicates that in many instances, the teacher serves as the "fount of knowledge" and the students are the empty open containers, anxiously waiting for knowledge to be poured in. Conversely, teachers may tend to be autocratic and repressive, and do little to encourage individuality or creativity; many classrooms lack democracy, and students fear their teachers [3]. On the other hand, interactive and creative skills play an essential role in initiating/fostering creativity [4,5], thus the absence or the shortage of these skills would diminish creativity.

A number of approaches have been suggested to improve the design studio's teaching. [6-9] have put emphasis on collaboration and the social interaction/dialogue to initiate creativity.

[10] identifies a number of key elements that would improve the interaction between the tutors and students, and thus the architectural education. He emphasizes firstly, the necessity for students to engage in studio-based projects that simulate the complexities of real-life projects and secondly the importance of reflection in the design process that is comprised: reflection-in-action, reflection-on-action and, most critically, reflection-on-action that allows students to observe and to realign their thinking with the 'expert' thinking of their tutors. [11] suggests that the role of the studio tutor is to create an organizational style in studio education and that this would help in developing creative strategies in the design studio. This encourages educators to spark creative ideas, encourage follow-up of creative ideas, and evaluate and reward creative ideas [12]. [13] suggest the Olympic Model that constitutes personal and environmental components and this model can be used in establishing effective communication and the development of creative individuals. This research explores the social factors that would hinder/support the production of innovative design projects. It examines how these factors interact within the design studio's environment to impact innovation.

2. Creativity and the Design Studio

The next paragraphs demonstrate a number of issues that influence the social interaction in the design studio. These can be categorized as the design "environment and culture" and the "communication and design" approach styles. This study highlights the disagreement of experts and academics on the definition of the creative design product, the differences in emphasis and

sometimes conflicting opinions (for instance [14] *vs*. [15, 16] and [4] *vs*. [10]) on various issues that affect creativity.

2.1. Creativity and Creative Design Products' Definition

The term 'creativity' is used to reflect a psychological view of creativity on a personal level, in contrast to 'innovation' as used in the world of business on an organizational level [17]. Innovation has traditionally focused on products and processes. [18] suggests that 'you can have creativity without innovation, but you cannot have innovation without creativity'. [19] examines the work of a number of researchers such as [20-23], and points out that there was no definite consensus regarding how creativity is defined. He discovers that the creative process looks different to different researchers. There is a general agreement among researchers that the act of creation does not occur as a fixed point in time, but that it manifests as a process that extends through time, varying in duration [20]. [24] defines an innovation as 'an idea, practice, or object that is perceived as new by an individual or other unit of adoption'. Diffusion is 'the process by which an innovation is communicated through certain channels over time among the members of a social system' [24]. [25] defines creativity as the production of novel, useful products. In the fields of art and literature, originality is considered to be a sufficient condition for creativity, unlike other fields where both originality and appropriateness are necessary [26,27]. So can we define creative architectural projects as the production of novel, useful and original architectural projects? Such a definition may look too general. Within the design studio context, the definition of creative architectural projects would be constrained by or feature the goals/objectives and prospected outcomes of the design studio course. [14] argue that groundbreaking designs are those which possess innovative and creative qualities and provide solutions that were previously unknown (innovative design) or subsequently produce entirely new products (creative design).

2.2. The Creative Environment

Creative environments are generally described as organizations that enable the production of knowledge and facilitate learning from experience and from one other, thus providing knowledge-sharing [13]. [28] suggests that broad requirements for a creative climate include: open, participative culture (rather than suspicious, closed), having an idea-handling system, whole workforce involved in idea generation, whole organizational endeavor (through which pockets of innovation can emerge and survive), experiment-encouragement, forgiving culture, patience with failure, trust, conflict-handling through debate and insight rather than warfare, networking and sharing systems, system of incentives, multidisciplinary working, research and development investment, and some champions (for any change but particularly for newer ideas).

In her model, [26] has identified five environmental components that affect creativity:

- Encouragement of creativity, which encompasses open information flow and support for new ideas at all levels of the organization, from top management, through immediate supervisors, to work groups;

- Autonomy or freedom: Autonomy in the day-to-day conduct of work; a sense of individual ownership of, and control over, work;
- Resources: The material, information, and general resources available for work;
- Pressures, including both positive challenge and negative workload pressure; and
- Organizational impediments to creativity (including conservatism and internal strife).

2.3. Hindrances To, and Initiatives For Creativity Within the Design Studio Environment

2.3.1. The Design Studio's Culture

[12] observe that in order for creativity to exist, the environment needs to be supportive and rewarding of creative endeavors. The design studio's environment is a unique environment and it is the core of architectural education. To initiate creativity in the design studio, the tutor should show appreciation and approval of the students' courage. Moreover, the teacher must encourage students to integrate production with perception and reflection, to engage in self-assessment and to be open to feedback from teachers and peers [29]. The tutor, as [30] argues, must be sensitive to the students' signals of creative behavior, such as being adventurous and willing to take risk. The design studio, however, assumes the mastery of the instructor and the student has to believe in the power of the instructor [31]. The question remains why they should believe in the design instructors who are—as [32] highlighted—not clear about their studio's goals or objectives and might change them from the beginning of the studio and during the assessment process. Furthermore, tutors tend to consider teaching practice to be an intuitive process based on subjective viewpoints and personal feelings [33]. The teaching and judgment of design creativity inevitably rely on the instructor's subjective understanding of creativity. This, in turn, may potentially diminish transparency and consistency in teaching and assessment practices, and students may find themselves confused as to the requirements of their creative tasks [29]. Ultimately, current studio culture rewards students with the best-looking projects [34].

2.3.2. The Style of Communications and Design Approach

Within the professional context, it is suggested that the cultural communication secures the exchange of experiences, the learning outcome and the innovation in the project, and this is a function, which is strongly de-emphasized in project contexts, both in the literature and in practice (see [35]). Social communication is meant to balance stability and change in order to promote dynamism, creativity and innovation [5]. Knowledge development in itself is crucial for innovation [36].

The development of an architectural project from the initial concept to the end product is an interactive social and psychological process. Through this process, the designer negotiates various solutions of the design problem with his or her self and communicates ideas to colleagues and tutors. [37] describe the design process as: 'Human activity, involving communication and creative thought among a group of participants'. The design process consists of a number of stages and these are suggested as being: analysis, synthesis, appraisal and evaluation [16]. These stages are linked with forward and backward loops. [16] points out that the design process is a simultaneous learning about the nature of the problem and the range of the possible solutions. The designer repeatedly evaluates

and alters the design scheme and can return back to the previous stage or to the start to find/test a solution for the whole or a part of the design scheme (see Table 1).

[15] argues that experienced designers see some kind of underlying pattern or theme and make connections in a design situation (between design aspects) and also make a connection with some precedent in the episodic memory more than inexperienced designers. Expert designers acquire knowledge about solutions rather than necessarily about problems [15]. This design approach style would initiate creativity as: "It is probably commonly accepted in design that creativity involves making use of solution ideas from apparently superficially different situations" (ibid).

Table 1. Potential hindrances to, and initiatives for, creativity.

Context	Negative aspects of a design studio's culture, including tutor's attitude, behavior and way of instruction	Positive characteristics of a design approach's style and communications
Design studio environment	Design instructors are not clear about their studio goals or objectives and will change them from the beginning of the studio and during the assessment process [32] Instructors tend to consider teaching practice to be an intuitive process based on subjective viewpoints and personal feelings [33] The instructor's subjective understanding of creativity can diminish creativity [29] The design studio assumes the mastery of the instructor, thus the student has to believe in the power of the instructor [31] Current studio culture rewards students with the best looking projects [34]	Social communication is meant to balance stability and change in order to promote dynamism, creativity and innovation [5] Following the design approach style of design experts can initiate creativity [15] Designers should explore unfamiliar and unconventional design and the designer should perceive a problem from unorthodox and innovative perspectives [4] The groundbreaking designs are those which possess innovative and creative qualities [14]

[4] argues that designers should explore unfamiliar and unconventional design solutions. However, they need creative skills that enable them to transcend conventional knowledge domain(s) so as to investigate new ideas and concepts which may lead to innovative solutions (see Table 1). This enables the designer to perceive a problem from unorthodox and innovative perspectives [4]. When conventions are challenged, design moves from routine solutions towards innovative, non-routine solutions. Though design activities encapsulate the spectrum from routine to non-routine design, the groundbreaking designs are those which possess innovative and creative qualities; that is, design that changes the design variables in such a way that the results are solutions that were previously unknown (innovative design) or design that introduces new variables and that subsequently produces entirely new products (creative design) [14].

3. The Research Methodology

The literature review has highlighted the degree of complexity of the creative design process, communication and characteristics of the design studio's environment. It illustrated the importance of

a number of possible factors, *i.e.*, the social interaction and the style of design instruction on the exchange of knowledge and development of creative projects.

The field survey's aim was to find out what the most significant factors are, and how they are linked to one another and how they influence innovation in the architectural design studio. This was achieved by testing the possible impact of social factors on innovation in the design studios of the College of Architecture, University of Dammam.

Therefore, the objectives of the research were:

- to explore the social hindrances of and initiators for innovation in the design studio;
- to find out communication routes and techniques that students use to obtain innovative ideas and feedback; and
- to make recommendations.

First, the questionnaire survey was conducted to ascertain the level of general agreement of students on various topics. Thus the interviews were made to explore the hidden causes behind the issues under study, to validate the questionnaires results, and to clarify ambiguous points. There was a use of mixed methods *i.e.*, quantitative and qualitative research methods. This was done in order to have the findings relate to each method and be able to use them to complement one another, as well as enhance theoretical or substantive completeness [38,39].

One hundred and ninety four male third to fifth year students from the Architecture and Building Technology Departments. The first two academic years were excluded as they provide basic design architectural education. Participants were asked about the tools, systems and conditions that would help in producing innovative design projects. Forty-eight students replied. This constituted 25% of the total number of third to fifth year students. Two software programs were used to analyze the quantitative data: SPSS 16 and AMOS. The following statistical tools were used to analyze the data: mean calculation, percentage, and path co-efficient.

Only the fifth year students, who participated in the questionnaire survey, were then invited for a subsequent interview. The reason for choosing solely fifth year students was because they were more experienced with regard to the social interaction problems of the design studio. Nine students accepted the invitation and were interviewed using unstructured interviews. The choice of this type of interview was because it provides a relaxed environment, which would aid the researcher in obtaining valuable information from the interviewees (for the interviews' questions, see Appendix A).

4. The Field Survey Results

4.1. The Questionnaire Survey Results

Respondents considered that a number of types of communication and resources would provide useful information to them and help in producing innovative projects. The most useful types of communication that help produce innovative projects are (see Table 2):

- Communication with their colleagues from the same year
- Projects of higher year students
- Instructor's feedback and advice

- Communication with their colleagues from a higher year.

Table 2. Usefulness of the types of communication and resources in producing innovative projects (*scale: 1: not useful to 5: very useful*).

Type of communications and information resources	(Mean value)
Communication with their colleagues from the same year	3.88
Projects of higher year students	3.83
Instructor's feedback and advice	3.81
Communication with their colleagues from a higher year	3.78
Internet resources	3.69
Their own electronic references	3.59
Their own hard copy references	3.35
Projects of same year students	3.26
The electronic references of the University library	**2.94**
The University hard copy references	**2.93**

The most frequent activities and communications of students that happen in the design studio during term time are the following (ranked from more frequent to less frequent at scale [1] never to [5] very frequently):

- Generation of many sketches before making up one's mind while working on a design problem
- Conducting interactive and useful dialogues with tutors on how to reach a creative design solution
- Capturing innovative ideas of colleagues at a higher academic level from other departments
- Not taking many risks because of the fear of failure.

Whereas the least frequent activities and communications of students are:

- Seeking help from students and staff from different departments in solving specific design problems
- Capturing innovative ideas of colleagues of the same academic year from different departments
- Capturing innovative ideas from other departments' tutors.

It seems that the design studio is governed mainly by two types of activities/behaviors (see Table 3). One of these, which seems positive, is the student's frequent use and integration of different communication activities and techniques to initiate creativity and innovation. The other, which seems negative, is the tutor's dominance of the design process. Students said that tutors mostly encourage them to do many attempts to develop the design solution, to follow various design approaches to reach an innovative solution, and to present a creative design solution. However, around one third of the students said that strategies to motivate and initiate innovation are rarely applied in the design studio and conflicts are hardly ever handled through constructive dialogue.

The most frequent support that students get from the tutors relates to the following cumbersome situations (arranged from more to less support): Attempts to change the whole design solution during the design process, confusion over the nature and context of the design process, attempts to change the approach to a design solution during the design process, and misunderstanding of some project requirements. The least frequent support that students get from the tutors relates to the following

cumbersome situations: students' lack of knowledge regarding one of the design aspects and misapplication of one of the design requirements.

Table 3. The frequency of activities and communications that happen in the design studio during term time *(scale: 1: does not happen, 5: always happens).*

Criteria	Type of communication and activities within the design studio	Mean value
Design studio's culture	The tutor's ideas have the greatest weight in the design process	3.5
	We always use and integrate different tools to initiate creativity and innovation (e.g., brainstorming, group work, *etc.*)	2.77
	The design studio environment is governed with an open, participative culture	2.6
	The design studio environment is governed with a forgiving culture, it is patient with failure and trustful	2.6
Instructors' attitude, behaviour and way of instruction	My tutors encourage me to do many attempts to develop the design solution	3.29
	My tutors encourage me to follow various approaches to reach an innovative solution	3.16
	I am praised and rewarded when I present a creative design solution	3.10
	My tutors work on developing my innovative ideas	3.04
	My tutors give me complete freedom to do innovative work	3
	Strategies to motivate and initiate innovation are applied in the design studio	2.89
	The tutors successfully handle conflict through constructive dialogue	2.875

4.2. The Co-Efficient Path Results

Only co-efficient path relations that have significance value ($P < 0.05$) are reported here. The co-efficient path results show that when the frequency of a tutor's support regarding some cumbersome design situations increases, the student's performance (represented by the final grade) improves. The results show that when the instructors encouraged the student to follow various approaches to reach an innovative solution more frequently, the students are more able to proceed from one design stage to another smoothly and to make radical changes to the design solution. Also, when students hold more interactive dialogues with their instructors on how to reach a creative design solution and more frequently attempt to capture innovative ideas from colleagues at the same and higher academic levels, they are more able to understand the design problem quickly, make a quick analysis of the design problem, set quick conceptual design solutions and carry out fast appraisal of a design solution and improve their own grades. Students who seek help from other students or staff and capture the innovative ideas of colleagues of the same academic level from different departments more frequently are more able to make radical changes to a design solution. Finally, when the design studio environment is governed with a forgiving culture, is patient with failure and is more frequently trustful, the student is be more able to make a quick analysis of the design problem and a fast appraisal of a design solution and proceed from one design stage to another design stage smoothly. On the other hand, the co-efficient path findings revealed some odd results. For example, more frequent support of the tutor regarding the student's uncertainty about a design aspect and misapplication of a design

concept negatively affects the student's ability to make a fast appraisal of a design solution and this is associated with lower final design grades. Further investigations were undertaken to clarify the questionnaire results.

5. Summary of the Interviews' Results

The interviews with fifth year students showed that the following factors affect social interaction and thus innovation in the design studio:

5.1. The Design Studio's Culture

The students claimed that the design studio was governed and restricted with unwritten conditions and laws that hinder innovation. A student said that the atmosphere of the design studio was friendly in general, but that some tutors occasionally intimidated students. This would badly affect the student's attitude and quality of work. In some instances, some tutors did not like the initial design concept and they accused the student of not wanting to learn. The style of instruction was sometimes humiliating and aggressive as some tutors made fun of the student. Students did not feel that they were an integral part of the College, as they were not allowed to participate in the college's decision-making. One student said that he felt that the College was segregated. He continued: "*We do not know what each tutor teaches. Also we do not know which departments other students belong to, and their academic strength areas that we can utilise*". The study found that there is weak and infrequent communication with other departments' tutors and students, which supports the questionnaire results. Despite that, students have frequent communications with their tutors but some of them do not trust the design abilities of their tutors. One student said: "*I take the alterations to my design scheme that are suggested by one tutor to another so I would find out what is the opinion of the other tutor about these alterations, thus try to co-ordinate their opinions*".

5.2. The Design Approach's Style and Communications

5.2.1. The Design Approach's Style

During the design negotiations, some tutors do not clarify the nature of the design problem, and where to start to sort it out. One student claimed that some tutors would guide his students to a certain way of developing the design scheme, but they described it in such a way that students did not get the message and did not know what their tutors were aiming for. They asked students to explore various approaches without giving sufficient guidance as to where and what to explore. The student stated: *"The problem is that the tutor would ask us to change the design concept without giving a convincing reason or point out exactly where the problem exists*".

One student said: "*Tutors might say to you: develop any design scheme and we will help you to develop it further. At the end, you discover that you return to square one as you produced a complicated design scheme that they cannot comprehend and this gives them an opportunity to reject it or to heavily criticise it*". Another student mentioned that a tutor should start from what the student has already designed and he should not impose his own ideas. Tutors should show some design precedents to students and explain various negative and positive aspects of the project's design. Thus students

would have some background information on how professional architects deal with each design problem and how they sort it out. One student said that a tutor might suggest a complicated idea to the student, who would not be able to develop it. The student may misinterpret the tutor's suggestion and thus apply it wrongly.

Students said that some tutors did not have a flexible way of thinking. It is hard to convince them of a design solution, as they perceive that it does not comply with their thinking and approach to sorting out the design problem. Thus they are unwilling to help the student. They would rather ask the student to change the design scheme to something that they are willing to negotiate. Some tutors are also unable to discover the innovative aspects in the student's design and thus to invest in developing the design scheme. They insist on their own ideas and when a student represents his innovative ideas to them, they hesitate to accept them. The interviews revealed that students follow their tutor's opinion not because it is convincing and rational but because the tutor has a substantial input into the total grade.

5.2.2. The Design Communications

The communications and discussions within the design studio would help in developing innovative design schemes. Some students stay and work at the College even during the night. There are daily communications between some students and their colleagues. A fifth year student said: "*When I do a design scheme*, *I show it to another colleague who gives me his feedback. This also happens to me as students from second and third years come to me and seek advice*. *Even if the student did not follow what has been discussed*, *he would utilise the methodology and the way of thinking and how to make judgments etc*." The communications with other students from the same department are good, as a student commented: "*The higher year students would give you a piece of advice and show you another approach or an easier way to sort out design problems*". However, some students, even in the final year, have communication problems with the tutors, as they do not know how to discuss design issues with them.

Guidance at the start of the project development is very important. A student said that intensive guidance is mostly needed at the initial stages of design. However, the guidance is sometimes not clear as some design parameters are missing. This is because some tutors do not explain it in the right way, or they do not even mention it. Some tutors give unclear critiques to the design scheme and demand radical changes. During the design process, tutors—sometimes—provide support at an inappropriate time, *i.e.*, too late or too early, thus affecting the project's quality, the student's psychological wellbeing and his final grade. Tutors should develop awareness of the student's abilities (*i.e.*, weakness and strengths) and thus provide support that is tailored to each student's ability. They should motivate and encourage students, and this can be by way of praise, bonuses and incentives. Some tutors are less able and slower to communicate with students. It is not a matter of the frequency of communication but of communicating ideas, and one student claimed that the tutor's vision of what the design outcome would be was different from that of the student. So a student may reach the end of the semester and the tutor would suddenly say to him that he had a bad design scheme.

Some tutors are committed and helpful whereas others are not. There is support during the start and the end of the project, but it is unstable and changeable at the middle of the project. With regard to the

level of design knowledge, some tutors do not know, for example, how to apply sustainability into the design scheme in a practical way.

6. Discussion

The field survey, supported by the research findings by researchers from various schools of Architecture around the world [3,29,31-33], has shown two main problematic areas that explain why the interaction between the student and tutor is not functioning and design negotiations do not reach a fruitful innovative result, despite the frequent communications between them. This would negatively affect the student's ability to produce innovative design products. These areas are:

6.1. The Design Studio Culture

The study found a number of negative design studio culture aspects. The design studio environment suffers from: (a) the dominance of the tutor's opinion and design approach's style [32,33]; (b) autocracy at the design studio and College levels [3,31]; (c) lack of support from, and communication with, other departments' tutors and students; (d) the student's poor level of trust in the tutor's design ability; and (e) some intimidating practices.

6.2. The Design Approach's Style and Communications

The design approach's style is affected by some tutors' lack of: (a) support, whether as direct support, timing or clarity [32]; (b) performance and clear ways of instruction (ibid) (c) commitment and knowledge (ibid); and (d) flexible thinking and understanding of creativity [29].

7. Conclusion

To improve the design studio environment and help students to produce creative projects, this study recommends that corrective measures should be undertaken on the following fronts:

7.1. The Design Studio's Culture

Tutors should be sensitive to the indications of students' needs, so they can provide them with their support at the right time. Clear instructions and objectives should be set at the start of the course. These should be linked to the creativity dimensions. However, this requires deeper understanding of creativity dimensions in the architectural design and how to assess them. Tutors should clearly define the creativity criteria for a given project and how it should be applied. Also, they should set a clear roadmap on how to apply it during the design project, and thus discuss it with students to reach a common understanding of the application of the creativity dimensions in the design project. Shared understanding regarding creativity is also required with the jurors. Students should be taught how to look for innovative architecture solutions [14], explore the innovative aspects of each case study, experiment with possible links between innovative design aspects/solutions and each dimension of the design problem, in line with expert designers' usual practice. Also, they should experiment with possible links with the ideas that they have obtained from the design negotiations. Tutors should not impose their own ideas on students but introduce them to students and encourage students to explore

how the potential solutions can be integrated with the students' design ideas. The tutors' communication and interactive skills and their ability to perceive students' creative abilities and needs are essential (see also [30]). These can be improved through training courses. The College should set up and apply professional conduct mechanisms that regulate the relationship between the tutor and student and provide the democratic environment that is necessary for initiating innovation (see, for instance, [28]).

7.2. The Design Approach's Style and Communication

Students should be encouraged to communicate frequently with their tutors and other students and explore the potentiality of various design solutions. Keeping a record of the design negotiations and innovative design precedents would be useful as it may help the student to track the progress of the design, explore new links between design negotiations at the various stages of design, and the design problem. Students should frequently discuss design ideas with colleagues and tutors, as this would substantially improve their design abilities. Students should be open-minded and 'think outside of the box', have a flexible attitude and negotiate design ideas. This would help them find new design variables like the expert designers do, and this subsequently produces entirely new products [14]. However, frequent communication and learning from experts would not lead to them achieving their objectives without them being provided with solid foundations and a change of the way of teaching instruction and methodology. The teaching instruction in the design studio and the assessment of design projects should not focus on form issues as it does nowadays at the College of Architecture, UD or elsewhere [31,34]. Previous research suggests that junior designers should follow a solution-based approach to find new solutions for design problems, and this paper stresses that the focus should be on adopting innovative-based design approaches and on how to find innovative solutions rather than merely new solutions to the design problems. Future research should explore how to apply creativity dimensions in design projects at different levels of architectural education. With regard to the design process and innovation, it would be useful to find out how to devise the design process/ decision-making process to initiate innovation. Some problematic social communications between the students and the tutor, such as mistrust, misinterpretation and misunderstanding, affect the student's learning, hence these should be explored further.

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Appendix A

Interview questions

Check the following points with students:

- Whether the student feels comfortable with the design studio's atmosphere and tutors' way of instruction and communications during all stages of the project.
- Whether the student gets the right help and support that is necessary during all stages of design.
- What type of help is required at each stage of the design project.
- Whether the student's communications' activities affect negatively/positively his performance and grades.
- When the support is provided and when it is not, whether it is efficient and sufficient all the way through or not.
- Whether the student talks the same design language as the instructor'(s).
- Whether the student has the common understanding and vision as the instructor'(s).

Check odd results: some odd data links found in the field survey's findings such as the links between the tutors' support, frequency and type of support with the student's ability to develop the design scheme and produce creative design outcome.