The Practice of Research for Architectural Learners in Higher Education Shaping the Architectural Senior Project

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Abstract: As a part of the teaching and learning process via research/programming, this paper will introduce results of using special research methodologies for the senior research project- architecture, and the outputs of these methods on their senior project.

The Paper will question the role of the research/programming practice for architectural senior learners' during the research/programming preparation process and the practiced research as a base on which to develop architectural senior project considering that architecture as discipline has particular type of knowledge base and special procedures.

Thus, the paper aims to highlight the effectiveness of using the scientific research methods addressing different aspects of architectural knowledge for senior learners as a preparation for the final senior project/portfolio.

In addition, the paper will focus on the advantage(s) and disadvantage (s) of using the research methodologies at higher education, to find a different analysis for the research activity especially for learners who study architecture, by using new methodologies in teaching and learning process via research, the study expects effective and successful action research.

Keywords: Action research- Design methodologies –Peer Review- Design process - Programming -Spatial relationships –Flipped classroom- Systematic Analysis-Qualitative Method-Design science-Research method-Formative study.

1. INTRODUCTION

The disciplinary of architecture is different if compared with other disciplines, in which the research/programming in architecture is different from other types of research even in the process.

On the other hand, design a research is not as quantifiable as in science and engineering, and "interpretive" research is a form of qualitative research, which is better suited to the behavior and sensitivities of human beings, relying more often on insight for the interpretation of human actions. Interpretive research accepts data and findings as containing bias, and it is inevitable that many human cultural values embedded in the interpretation of phenomena. This is much closer to the designer's personal interpretive analysis of problems, and the creation of potential solutions based on individual insight.[2]

The research as an activity in the architectural disciplinary is important to assess the undergraduate learners especially the seniors in the field of "Architecture" to improve their research performance in the teaching and learning system performing their researches. The learners prepare a research during the semester and present their work to evaluate, where they conduct & present their ideas to the audiences in front of specialist jury members.

2. LITRARURE REVIEW

This paper is arguing and examining the importance of applying the research methodologies in higher education to the senior learners on their senior project introducing the outputs of combining the methods of preparing learners' senior portfolio with the scientific methodology.

The paper will also focus on the productivity of the research for the learners' design approaches, in which it helps them specially the seniors to develop their final projects their as well as the design, and help them to gain knowledge and experience.

In the theoretical and practical courses, the added activities were to develop the process of the teaching and learning, considering the pedagogical actions in the teaching and learning process, the main aim of having these activities as part of the syllabus and grading assessment is to achieve the basic course objectives and course learning outcomes. Theoretical approaches and critical reflections added with relevant to the instructor's experiences.

A studied (CLOs) Course learning Out comes framed the course activities, such as flipped classrooms, freehand sketches, and software as illustrator / Photoshop.

In addition to other digital programs, such as Auto-CAD 2D and 3D Max, and drop box to submit their work in addition to LMS system, all used to finish and present their final course portfolio for the semester's work, and a final presentation as well.

A research design is "an action plan for getting from here to there", where here describes the investigator's research question(s), and there describes the results or knowledge derived from the research. [7]

2-1 DESIGN THE ARCHITECTURALRESEARCH:

The course "Senior Research/Programming Project-I" is a preparation and pre-requisite for the final studio "Senior Project-II", it depends on multi-dimensional aspects of analyzing design problems of advanced complexity, focusing on creativity and its integration into previous experiences utilizing systematic design methodologies, research, programming, estimating, and detailing all phases of the design process.

In addition to other, course information such as: detailed course objectives, course learning outcomes, course materials, grading assessment, and class regulations. The main scope of this architectural research divided into three phases: research process, performance, and product.

The course objectives designed to assess the learner's ability to use systematic analysis of similar projects to their senior project, dealing with functionality, the interior spatial relationships, site selection/location and settings, physical and human environments, use of precedents, provision of synthesis, and alternative concepts of design. Teaching learners some, skills help them to present a granted research project and present a professional visual presentation.

2-2 RESEARCH QUALITY:

The course senior Project-I "Architectural Research/Programming" focuses on the physical outcomes of the design; and the research in the process of design and practice, in addition to the significance of using the computer programs/soft ware and technology in different research phases of the research design is important in response to the architectural practice.

The major problem(s) for the learners is to outline the gaps between the research activities and the existed teaching and learning methodology. Therefore, teaching the senior learners "research" as a course at higher education level is important towards finding a different systematic analysis for the research activity, especially for the architectural senior projects.

Since the action research arises from a problem, dilemma, or ambiguity in the situation in which practitioners find themselves. A practical research methodology usually described as requiring three conditions to be met. First, its subject matter normally is situated in a social practice that needs to be changed; second, it is a participatory activity where the researchers work in equitable collaboration; and third, the project proceeds through a spiral of cycles of planning, acting, observing, and reflecting in a systematic and documented study. [3]

Having established parameters for defining architectural research, and research in general, the challenge of clarifying "methods" becomes central. In his classic book, "The Conduct of Inquiry, Abraham Kaplan defines methods as the study

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of the process, rather than the product, of inquiry. [1] More specifically, he argues for using the term methodology for the "mid-range" aspects of the research process that are common to a broad range of disciplines.

2-2-1 COURSE DESCRIPTION/CONTENT:

The course syllabus includes the course topics and materials upon the teaching weeks and the scheduled presentations (Flipped Classrooms), Pre-final Juries, and other activities as shown in table-1.

The overall organization of the learners' portfolio, many changes considered as significant approach to the research design and quality respecting the following:

- **Part I:** Theoretical Study: The learners write, organize, and add contents to the research based on writing the Abstract, and the Literature review (The problem, Goals, and methodology).

- **Part II:** Applied Study: The portfolio's work divided on to four `phases (Case Studies Analysis, Programming and Space analysis, Site Analysis, and Design Consideration.

Table -1-: Course Syllabus of the Case Study -Source: Researcher

Weeks	Topic	Task
-1	Introduction & syllabus distribution	-
-2	Case Studies	projects Search for similar
-3	Programming & Analysis	Analyze the data
-4	The site analysis & Environmental analysis	Analyze the site, soil, environmental studies
-5	Design Considerations	Design principles, Inspirations, concept

2-2-2 Case Studies and Research Strategies:

The case study used in each research chose as a scheme of study in order to address research methodologies in higher education through presenting the new methodology for this kind of research. During the semester, the learners arrange presentations according to the type of their research project. The grading assessment and the criteria of evaluation were clear from the beginning in the syllabus measuring their research skills, and the depth of knowledge they gained through their readings, and presentations.

Table -2-:Table of Assessment -Source : Researcher

.No	Assessment Task	Week Due	%Proportion of Final Assessment
1	Case Studies Presentation	6-Week 2	%10
2	Final Presentation jury-Pre [st]1	Week 6	%10
3	Programming & site analysis	11-Week 10	%15
4	Research Proposal	Week 14	%10
5	Final Presentation jury-Pre [nd]2	16-Week 15	%10
6	Final Submission	18-Week 16	%5
7	Final Research Jury	As scheduled	%40

The course is one of the non-interesting courses for most of the architectural students, because they prefer the practical as well as the theoretical courses that have required book(s), to gain the knowledge, rather than searching for that knowledge.

2-3 REFLECTION OF PRACTICE:

Learners were asked to search on similar case studies and collect the needed data, study, and analyze. To address the main problem(s) area(s) such as the weakness in using scientific research strategy producing differences through the research process within the educational environment, to show the importance of reflection, the taken actions were implicated and the results were evaluated periodically according to a given criterion. At the beginning of the course, learners used un-scientific methods that learners use to receive the knowledge, in addition to use any other source of information and knowledge like published papers/proposals, or any other materials.

From this perspective, it was necessary to focus on the course learning outcomes, and examine them in each course activity to increase the students' interest to learn.

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To change the learners' behavior in preparing a research by providing strategies to improve the way they complete their work and the way of submission, the study suggested improving one of Rogers' Peak Learning ways of assessment strategies and the knowledge wall.

.Fig.1:The action research cycle

Source:mixhackathons.org

.Fig.2: Lewin's model of action research

Source: Smith, 2001

The portfolio designed to help the architectural senior learners to improve their senior research, design and research skills, and emphasize on the research quality as well as the senior project.

When the learners write thoroughly about their projects' concept, adding details to their class presentations, and home works, they were able to answer the questions on the final assessment jury with greater clarity, which could show the strong relationship between their work and the course assessment questions during semester.

Moreover, using this strategy could increase the learner's skill in research, motivate and lead to increase their achievement in their final projects based on the research done. This led to an important research question: "What is the importance of teaching research methodology to the architectural learners?" focusing on their study skills and academic performance, it provides learners the ability to design their research activity, which either was related to the main course /program or something has indirect relation to it.
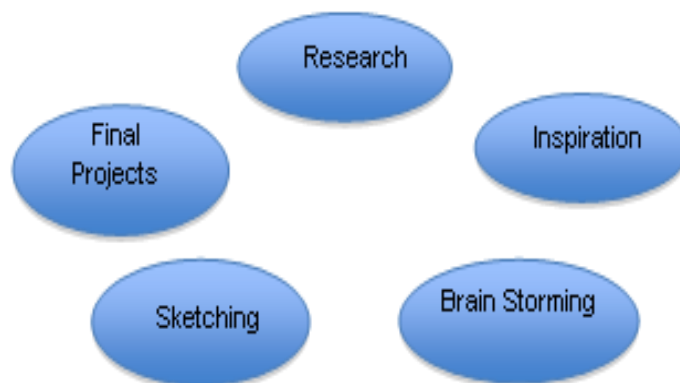
Shows the process of the senior project- research

Figure: 3

This activity started with outlining the gaps between the research activities and the existed teaching and learning methodologies in higher education, considering this as a practical approach for the research new methodologies, addressing those gaps and respecting the disciplinary. It will focus on the techniques of producing differences through the research process, to show the importance of the research on the students' academic as well as the practical life, in addition to reveal the importance of both privilege in the academic and practical fields. The main contribution is that research practice before the design, can make a great impact on the creative design activity especially in this domain.
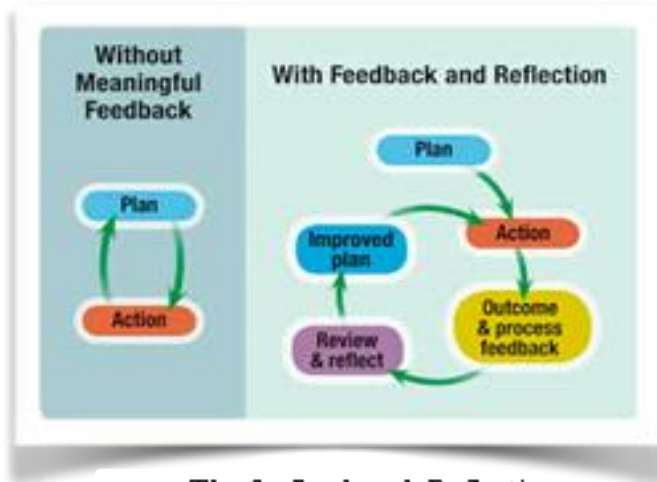
:The feedback and Reflection

Source:Anaesthesiology.pubs.ashag.org

Figure: 4

:The spiral cycle for Reflection

Source:Koreabrid.com

Figure: 5

2-4 COURSE ASSESMENT:

The tables (1,2,&3) show the schedule of assessment and the assessment tasks that clarify the research /course assessment methods, the following schedule shows the assessment tasks in which the learners will be graded during the semester, the schedule was distributed through the course syllabus and was discussed with learners at the first week of the term.

The effect of the research activity using the research scientific methodology was significant for my learners' knowledge, and presentations in each phase of their researches, examining their sensibility for the data they collected and analyzed, and whether they had a solid base of knowledge or not.

Table -3-: The Assessment Task- Source : Researcher

Domain	Assessment Task
Knowledge	Using Assignments, Research paper
Cognitive Skills	Project Presentation and Jury for project, Design Individual design Project&Process for their Project
Interpersonal Skills & Responsibility	Individual Project, research, team work research
Numerical& Communication Skills	(Research papers (portfolio ,Presentation and Jury

Moreover, providing learners with assessment tasks as seen in table (3), teaching strategies, research process, and presentations, the rubric and the criteria of evaluation well as, covering all the CLOs assist the learners to gain attractive and well knowledge. This strategy assists them also to be well prepared for the flipped classroom and the open discussion with the jury members, with the same background architecture or similar, to focus on the strengths and weaknesses in their projects.

Another technique was taking the peer-reviewing feedback, to examine the amount of knowledge the learners received from the course.

They were advised to have a clear approach(s) depends on the projects' type, expressing their ideas to achieve better results; and to find good research examples, to create their own professional ways of preparing the portfolios and the presentations, concentrating on better understanding for the knowledge.

3.   PLAN FOR THE INTERVENTION

The strategy of collecting and analyzing the research data helped the learners to verify the usefulness of the research portfolio's strategy in helping and improving their meta-cognition and motivation. These portfolios evaluated based on the collected data through the course instructor's follow-up and the grades after multiple-pre final juries, learners' surveys, and the course instructor's observational notes, total work and presentation, face-to-face meetings during the office hours, and the final jury presentations.

Learners at the beginning of the semester clearly informed that they will have two pre-final juries, in addition to a revision for each phase, separately each will include discussions to understand the amount of deep knowledge, and they obtained from working by themselves on collecting the data. Several classes were assigned focusing on the chosen topics, the research's thesis, objectives, methodology, expected results and conclusion, and the presentations.

The peer-reviewer role was important too, she attended one of the pre-scheduled classes, according to the action research activity as a case study; the class was flipped classroom. In addition, the peer observation and the juries, the criteria was clear before they start.

Moreover, the course depended on many phases that offered a variety of knowledge including the data collecting analysis, programming, site selection and analysis, and the design considerations. This strategy helped the learners to concentrate on how they could pass the research phases with successful results, being able to think with creativity on their senior project, and have accepted researches. They enjoyed the writing and analysis process and they became more confident in their presentation skills during the semester, which was the duration time of the research.

Since the plan of the intervention is not a general plan, it has to be specified and contain a list of suggestions as the work plan.

## 4. EXAMINING THE CONTEXT

During the process of examining the case studies using the assessment tools and the peer observation, the course designed to encourage and develop the learners 'ability to design and prepare the research portfolio. In addition to give regulations and instructions to the learners showing the importance of the process of collecting the data using different sources for the information in each phase to enhance the research portfolios and presentations.

The data analysis in the researches helps to understand the research action plan, process, and the approach considered which depended on both the type of collected information, that and the research problem(s), and methodology through deep data analysis presenting different approaches for their researches.

"You can use quantitative survey data but beware of adopting a positivist approach which might lead you to think about proving the effectiveness of your action; remember that your data should help you understand".[5]

Multiple Pre-final juries before and after the implementation of the portfolios and presentations assessed to support the grades out of 60% while the final jury was graded out of 40% (60% -final 40%). The graph in Figure 6 shows the class test averages before and after implementation of the portfolios' and the presentations' assessment. The graph in Figures 7,8,9 show the improvement of the weakest students of 2014-2015, the performed quantitative and qualitative data analyses on learners' surveys by the end of the semester.

By the mid of the semester, an announced pre final jury was conducted to examine the learners' work and the collected data focusing on their performance, the results were satisfactory (Fig. 6) and reflect their active class performance.
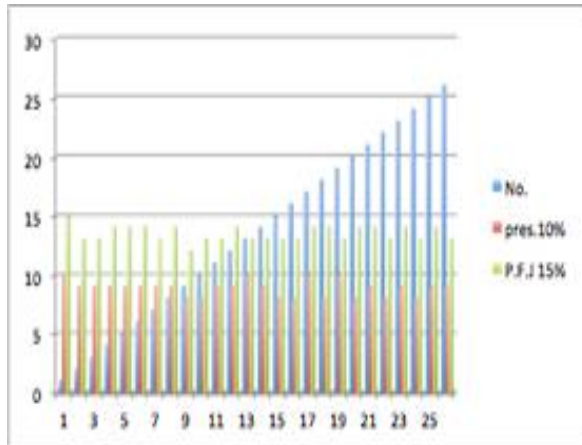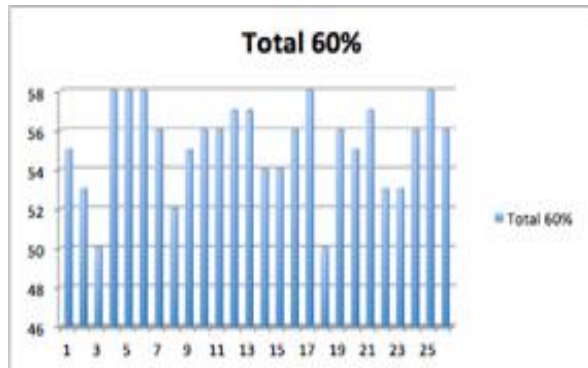
shows the total 255 of the term work

Figure: 6
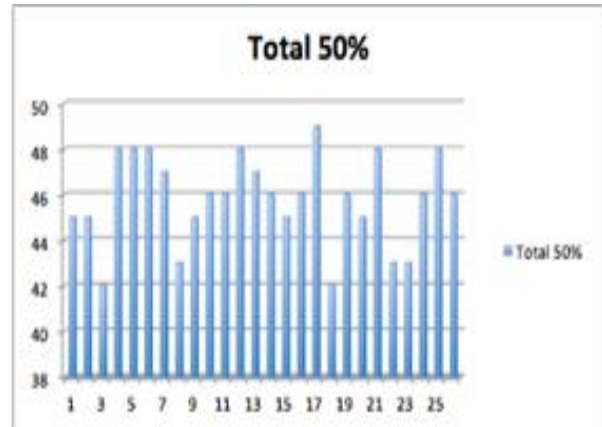

shows the total 50% from the term work

Figure: 7

Intensive lectures were given to them concentrating on the research developing, the results seen in (Fig.7) shows a positive indication on their performance.

Fig.11 mainly measures their performance during the semester and total work out of (60%), which gives another indication on the improvement, by the end of the semester, learners were doing well with respect to home assignments/ tasks, class pre final juries and flipped classrooms practice through the research presentations, (Fig.9) shows the final evaluation for the final jury.

:shows the total 60% for the total term work

Figure: 8
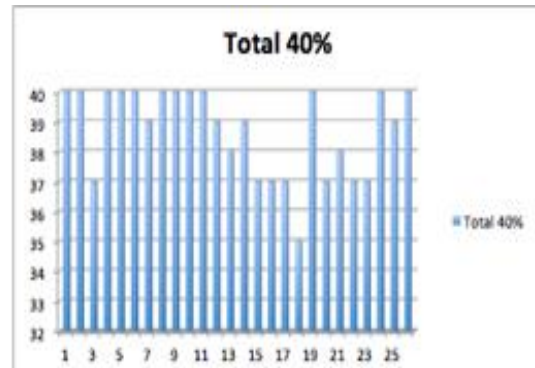
:shows the total 40% for the final jury evaluation

Figure: 9

5. COURSE FEEDBACK

The new research methods focus on isolated and specific aspects of building science, engineering systems, or occupant interface undertaken in the highly controlled environment of the laboratory or evaluated with simulation tools have done much to advance our understanding of individual components that might comprise the next generation of high performance buildings.

The course highlighted some research design principles of critical pedagogy, on which the research activity mainly designed and planned as a base that responds directly to the existing critiques of research design to improve it.

Focusing on the concrete examples taken as feedback from the class activity results, and given by the course instructor to were important to address the course research activities design.

The review of the researches in each phase done by the course instructor, the two pre-final juries feedback, and the peer observer, helped to correct the research phases' direction.

The learners were responsible towards better preparation for their research activity; most of them had high commitments towards the deadlines, taking the instructor's feedback and regularly, either by sending their work by e-mail to evaluate their progresses on each phase, or by the flipped classrooms during the pre-final juries, during the instructor's office hours.

The paper included the learners' surveys, regarding their personal study habits after the knowledge folder assessments had been submitted by the end of the semester. Figure 3 shows the results of the student surveys as a reflection for their feedback and course evaluation.

6. REFLECTION ON THE INTERVENTION

As the discipline of architecture becomes ever more concerned with the development of high performance, sustainable buildings and systems requiring an increasingly complex set of interrelated and closely integrated technologies, assemblies, and material methods, the questions of what forms of research approach and what project contexts might best facilitate the advancement of related research are critical.

However, given the complexity of integrated architectural research projects that address environment, performance and interaction, requiring multiple cycles of research and development, large interdisciplinary teams, and project cycles discordant with curricular duration, new research formats may be required. Within this context, the practices of 'action research' methodologies for interdisciplinary collaboration and the construction of physical prototype test beds as both a focus for applied research and as living laboratories for evaluation, measurement and testing, offer a compelling pairing of practice and product. [4]

This action research was designed to develop the origin format applied on the architectural undergraduate senior projects-research practice. The mentioned strategies offer specific advantage to the architectural researchers, those who work often with required methodologies outside the traditional scientific research and strategies.

Learners were asked to specify from the beginning of the semester the areas where they will work on major type of projects, in addition to special specification for the senior graduation project. Moreover, the design fields intend to add it to their senior graduation project if they did a perfect research portfolio.

The planned research activity was a challenge considering the learners' backgrounds about preparing a research paper, which made this experiment hard to be performed.

The results accomplished after regular meetings face to face with the learners for corrections and follow up. Luckily, the majority of the learners especially those who had high commitment towards the course, the submissions, and meeting the deadlines developed their performance, and by the end they were proud with the results.

Table:4 The survey- PSU

NO	Top of Form aCriterBottom of Form	Strongle Agree	Agree	Disagree	Strongle Disagree
1	The course outline/syllabus was made clear to me.	34.6	15.4	15.4	7.7
2	Assessment tasks and their criteria were made clear to me.	30.8	7.7	7.7	15.4
3	The course conduct and assignments were consistent with the course	26.9	26.9	15.4	3.8

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	outline/syllabus.				
4	The instructor was fully committed to the delivery of the course.	34.6	19.2	7.7	11.5
5	The instructor had thorough knowledge of the content of the course.	38.5	11.5	11.5	7.7
6	The instructor was enthusiastic about the course.	34.6	38.5	3.8	3.8
7	Technology was very effectively used to support teaching and learning.	30.8	34.6	3.8	3.8
8	The instructor encouraged me to ask questions and develop my own ideas.	34.6	30.8	7.7	7.7
9	The amount of work I had to do in this course was reasonable for the credit hours allocated.	34.6	23.1	7.7	11.5
10	Grading of my tests and assignments was fair and reasonable.	30.8	15.4	15.4	11.5
11	What I learned in this course is important and will be useful to me.	34.6	30.8	3.8	3.8
12	This course improved my ability to communicate effectively.	30.8	19.2	7.7	7.7

Learners' response towards the course was perfect; they started their preparation directly after receiving the order of work. They were divided into groups; each had assigned mentors in order to monitor the group's members' progress in preparing this activity, and report the instructor with the progress within the group as a kind of organization to check the learners' performance until we reach the results.

Later on, the research and course activity was successfully performed, to document the results of this course; senior faculties were invited to give their feedback about the final product/research presentation, as another perspective from professionals in the same discipline. To measure the achievements in the course, a questionnaire was done to measure the students' satisfactory on the course contents, evaluating the methodology followed in the course during the semester.
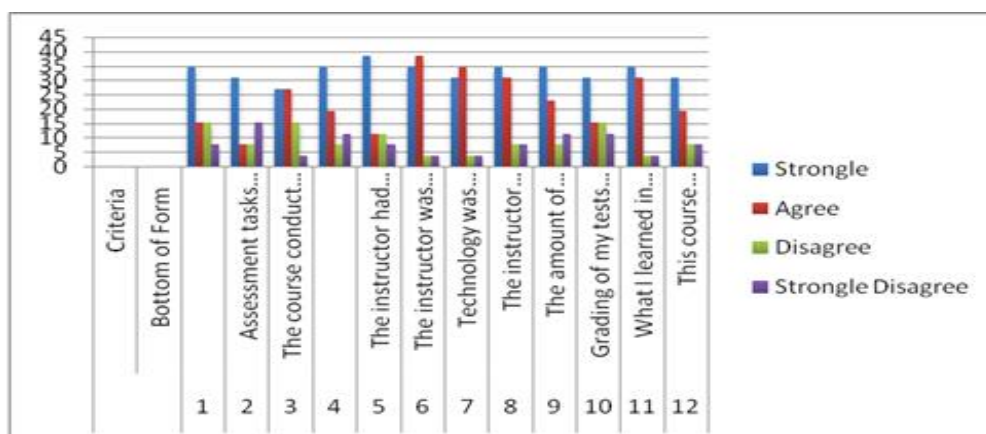

Figure: 10

It is now generally accepted that there are many forms of interpretive research. The "critical" version is a further development that identifies more vehemently the potential for subjectivity to distort the understanding. Critical research often is applied to throw a spotlight on the vested interests of those who own or commission the research, although it also is recognized that it can liberate the researcher and the researched (Marxist or feminist research, for example, fits into this category). There is a multitude of ways to construct personal knowledge, and a pluralistic approach that recognizes these dimensions is now preferred to the former positivist paradigm that sought to prescribe a universal truth. However, this paper planning to have a research approaches that suites the nature of the research activity. [2]

7. THE BRIEF CONCLUSION

The action research project had proved that it is rewarding and important learning experience for both the instructor as well as the students. New methods were followed in this course during the semester to motivate the learners especially in the area of their research. However, the course also prostrated by the duration allowed for the students to prepare and present the research that was designed and planned for the course. In addition to the duration time and it is constraints, the mini research sessions were new concepts for the learners, featuring new ideas in the course especially when it is the first time for them.

Therefore, the course instructor allowed using the digital technology like videos, paper work exercises, and other methods to teach in classes to achieve the main course's goal(s), by motivating the learners to write and prepare a portfolio as the basic study for their senior graduation project.

The Reflective Practitioner, Schon formulates an epistemology of practice based largely on an examination of the way in which practitioners reflect on their actions during and following their work. Reflection "in action" and reflection "on action" are key concepts in Schon's scenario. Schon talks about how problems are framed, how a situation can be changed, what norms are given priority and what possibilities are offered, quite intentionally showing a relationship to the design process. Reflection "in action" and reflection "on action" lead to "action research." This comparatively recent evolution of a methodology of research in the social science field has significant elements that could be assimilated into design practice. [2]

The traditional research methodology rarely practiced by instructors in their classes, that refers to the current technological development in communication facilities, which affected most of the traditional practices negatively, substituting them with more enhanced facilities that are much easier to use and providing attractive results, but unfortunately, drawn practitioners away from having the solid bases of knowledge.[6]

8. DISCUSSION

The table below shows the designed course objectives achieved during the semester in the course and the evidences to proof the great achievements done by the whole team.

Action Research is an excellent approach to use in educational system. AR conducted in a classroom provides an accurate insight into pattern of student response and teaching strategies over the entire teaching session, not just a matter of days or two. It seeks to answer questions and solve problems that arise from the daily life of the classroom and to put findings into immediate practice. [6]

It is suitable because of its characteristics: systematic inquiry, reflexivity & focus on the practical as identified by McCutcheon &Jurg (1990). Usually it is driven by the practitioner's desire to improve its own practice with respect to a specific set of students, thus students reap immediate benefits. [9]

Table -5: The Self-Assessment- Achieved objectives and it is evidences- Source: Researcher

.Seq	Objectives	Achieved	Not	Evidence
-1	Teach students how to search and organize their thoughts before starting the design process.	*		they brought based case studies The group of .on the type of the field they work in

-2	Help students to collect data related to building specification, and architectural design, according to design conditions and constraints.	*		Semi Presentations about the ideas and using the when they present and share <u>flipped classrooms</u> their thoughts about their projects with their colleagues. - Conduct original research on a significant communication or media topic.
-3	Help students to analyze the architectural styles and develop artistic unity proposed interior design solution.	*		- Use the <u>analytical approach</u> to specify the needed information for their project by criticizing the case study to show the strengths to follow and weaknesses to avoid.
-4	Teach students how to develop a design, the design concepts and the final project programming.	*		- Each student learned how to design a study for <u>programming</u> their project which they have to follow to apply on their research.
-5	Assist students to complete a research as pre-requisite for a large-scale project using design methods, research, planning, design and evaluation.	*		Students were able to write their thoughts in the <u>abstract</u> and search for the case studies in addition to the matrix they designed to show the certain needs in their projects.
-6	Enhance students' creativity and design abilities.	*		Students were asked to specify the <u>design school</u> they will follow in the architectural design process.
-7	Enhance personal confidence in the students' professional competence and examine the visual experience by teaching student how to develop visual and verbal skills for the communication of design concepts.	*		- In the <u>pre-final Juries</u> they presented their work and took notes as feedback from the senior instructors. - Complete each of the assignments that build to the research proposal.
-8	Teach students the data, including human factors, program requirements, and code and budget consideration and apply them.	*		- Students learned how to reference their data to the <u>standard books</u> and collect the data from other sources.
-9	Use critical and creative thinking to formulate a research question or problem.	*		- Students learned how to specify and <u>formulate</u> The Hypothesis, research objectives, and <u>methodology</u>.
-10	Make effective use of library, Internet, and other research resources.	*		- When they <u>collected the data for their research</u>.
-11	Develop and apply research methodologies to conduct original research.	*		- The students learned in the <u>face-to-face classes</u> how to formulate their <u>and weekly correction</u> methodology.
-12	Employee effective writing skills in summarizing past research on the topic and explaining the methods that will be used to answer the research question or test the hypothesis, and makes an effective oral presentation.	*		- Complete each of the <u>assignments</u> to finish the following: - Portfolio (Research papers) - Three Research Presentation Submission - Final Presentation - <u>CD</u>

9. FINDING AND RESULTS

The main purpose of this paper is to illustrate how "Action Research" can be used in higher education, the learners feel satisfied when the instructor add some modifications on the teaching & learning strategies in order to help them gain knowledge in a proper way, in order to develop their work, concentrate on their weaknesses, and the appropriate solutions.

The learners responded to the research methodology showing high commitment, and the course assessment showed the positive change in their interests, and fully understanding of the subject as well as an example of a successful course design for undergraduates "senior learners", addressing the importance of the research strategy to their area of discipline " Architecture".

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10.   CONCLUSION AND RECOMMENDATIONS

-Conclusion:

This paper gave a clear example of the effective and successful action research, which could be designed to improve the process of teaching/learning and the course learning outcomes especially for the courses that have the same type of this one. Thus, the course instructor should previously practice it, or it can be based on his/her previous experiences, which is important to improve the educational process. By the end, each learner learned how to design a study for their project programming, which they had to follow and apply on their researches. Students were also able to write their thoughts in the abstract, and search for the case studies in addition to the matrix they designed to show the certain needs in their projects, which helped them to use oter sources for the knowledge.

-Recommendations:

- The paper recommended having group of case studies for each research, based on the type of the project.

- Semi presentations were highly recommended about the ideas using the flipped classrooms, to share their thoughts about the projects with their colleagues,

-The paper also recommended conducting the original research on a significant communication or media topic.

- Analytical approach was recommended too, to specify the needed information for their project by criticizing the case study to show the strengths to follow and weaknesses to avoid.

- The paper also recommended to have a well prepared methodology for the research/ programming course, since it is the prerequisite for the final design studio senior graduation project, focusing on different dimensional aspects of the analyzed problems, examining the learners' skills specially creativity. In addition to it is integrated utilized systematic design methodologies, research portfolios design, programming, and details of all phases of the research and project design process.

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