Study of Project-Based Learning to Improve the Instructional Design Process of Pre-service Early Childhood Teachers

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***Abstract*—The study aimed to identify the importance of training female early childhood teachers in educational design processes through project-based learning in order to improve their educational design processes. In addition, the study sought to identify the pros and cons of training on instructional design through project-based learning from the students' perceptions, and to provide recommendations and suggestions to overcome any negatives. A mixed-method research design was used in this study, in which a questionnaire was distributed to (40) female students in the early childhood major in the College of Education, Imam Abdul Rahman bin Faisal University, Saudi Arabia, and interviews were conducted with (12) of them to get a deeper understanding of possible areas of improvement in the instructional design processes, and the pros and cons of training. The results of this study revealed a clear improvement in the educational design processes represented in analysis, design, development, experimentation, and evaluation. The students also showed positive improvement and development in 1) the cognitive and skill aspects of instructional design processes, 2) social skills, such as communication skills, leadership skills, exchange of experiences, and appreciation of teamwork, and 3) emotional skills, such as reducing anxiety and tension. At the end of this study, the researchers have presented some recommendations and suggestions in light of the improvement aspects suggested by the participants.**

***Index Terms*—Early childhood teacher, instructional design process, pre-service teacher' perceptions, project-based learning.**

I. Introduction

One of the educational issues that countries have given great attention to is teacher preparation programs because of the improved quality of educational performance that results from them, and because they provide teachers with the necessary educational skills and capabilities. Therefore, teacher preparation is a major focus of most teacher preparation programs around the world [1]. The student-teacher application of modern teaching methods that he/she is trained in within the practical courses inside and outside the college qualifies them to engage in the teaching profession and prepares them psychologically to carry out their professional responsibilities after graduation [2], [3].

Integrating instructional design and its programs into professional preparation programs for teachers and trainers contributes to developing teachers' capabilities and brings about change for the better. Instructional design plays a major role in the design of learning and teaching activities, where all steps are thought out, carefully selected, and arranged in a purposeful manner. The designer must also collect reliable data about the students, their background, and their basic learning because they play a prominent role in teaching outcomes [4].

Thus, it is the responsibility of teacher preparation programs to design impactful experiences to enhance and hone the instructional design skills of candidates as teachers, so that they, in turn, can pass on these competencies to their future students from early childhood through the upper grades. However, there is a dearth of research on the effects of pre-service student teacher training on instructional design processes and how to systematically reinforce those designs through learning strategies such as project-based learning.

A. Study Problem

The Ministry of Education in Saudi Arabia has launched a number of projects and programs in the field of teacher development. Among the most prominent of these programs is what was stated in the telegram of the Minister of Education directing universities to adopt general frameworks for the development of teacher preparation programs in Saudi universities [5], [6]. All of these projects and programs aim to provide good professional preparation and vocational training for teachers during the university study period and during service, especially because most teacher education programs around the world still do not provide pre-service teachers with the knowledge and realistic skills to teach in this rapidly changing era [7], [8]. This was confirmed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) on the need to improve teachers' competencies by adopting policies and measures, the most important of which is pre- and in-service training, achieving sustainable education through developing their skills [9].

Therefore, the Early Childhood Program was one of the programs that the Saudi Ministry of Education was interested in developing, where the Ministry decided to integrate the kindergarten and lower grades of the primary level into a single stage of study that it called the Early Childhood Level [10]-[12]. Despite the efforts made by the Ministry and educational institutions, there are still weaknesses among students. Several studies [13], [14] conducted on the level of Saudi society emphasized in their recommendations the importance of developing teacher preparation programs.

The study problem is based on how to benefit from the employment of PBL in training student teachers in

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instructional design, which may contribute to enhancing students' capabilities for developing instructional materials. This benefit might be reflected in their ability to analyze the elements of lessons according to the needs of the various levels of early childhood.

The study problem was formulated in the following main question: Does the project-based learning strategy improve instructional design processes for students of the College of Education?

The following sub-questions are derived from the main question:

1) What is the viewpoint of early childhood student teachers about the importance of training on instructional design processes through project-based learning in improving their instructional design processes?
2) Did project-based learning help improve instructional design processes for early childhood student teachers?
3) What are the most important advantages of training in instructional design through the project-based learning strategy from the students' point of view?
4) What are the most important negatives of training on instructional design through the project-based learning strategy from the students' point of view?

B. Study Objectives

The current research aims to identify:

1) The improvement of the performance of female student teachers in the instructional design processes through training on the use of the project-based learning strategy.
2) The advantages of training in instructional design through the project-based learning strategy.
3) Any disadvantages of training in instructional design through the project-based learning strategy.

C. Study Importance

The importance of the current study rests on the following:

1) Shedding light on the field of educational design, and emphasizing its role in the educational field as a major and important element in the development of the educational system.
2) Enhancing the skills of student teachers in the field of instructional design.
3) Drawing the attention of educational program planners in colleges of education, professional development programs, and educational development to the importance of benefiting from the project learning strategy to train pre-service teachers and in-service teachers in educational design.

D. Study Terms

Instructional design: It is a process that takes learning objectives as input and leads to the modeling of the learning system in terms of activities and learning content [15]. Instructional design refers to a series of systematic processes that translate principles of learning and teaching into practical plans for the development of instructional materials, activities, information sources, and assessment [16].

Project based learning: Projects are complex tasks based on challenging questions and problems that engage students in design, problem-solving, decision-making or investigation activities, which gives students the opportunity to work with relative independence over extended periods of time culminating in outputs or presentations [17].

II. Theoretical Framework and Literature Review

A. Instructional Design

Instructional design is an integrated systematic process that reflects the translation of teaching and learning theories, principles, plans for educational materials, activities, information sources, and assessment tools [18]. Instructional design practices include the processes and activities that instructional designers follow as they develop instructional experiences [19]-[21] indicates that educational design goes beyond the teacher's teaching role to planning and management processes, where its principles are based on learning theories and the extent to which education can be implemented within the characteristics of the target group, their abilities, available capabilities, and the objectives of the educational content. Among the most prominent principles of instructional design: 1) Learning centered on the learner and meets his/her needs, 2) Objective-based learning, 3) Performance-based learning, and the ability of learners to transfer knowledge and skills to different contexts, and 4) Outcome-based learning, which is concerned with the evaluation process, correction and development [22]-[24].

Ref. [25] believes that the role of the teacher as an instructional designer is to develop a product (educational unit) that will systematically improve performance and learning. [26] emphasized that effective instructional design aids effective human learning, where it includes a set of performances that include processes, product, and creation of an effective learning environment. The larger goal of instructional design is to meet learning needs, student success through effective presentation of content, and enhanced student interaction [27], [28].

There are many models of instructional design and their components differed based on the objectives for which they were designed. However, they all derive from the general model of instructional design (ADDIE) (See Fig. 1), which includes the five main processes of instructional design: Analysis, Design, Development, Implementation, and Evaluation [21], [29].

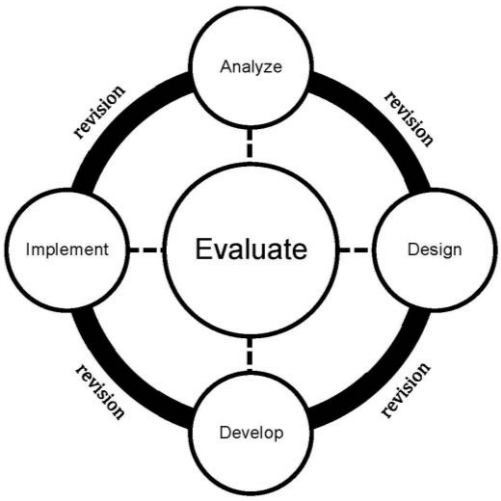

Fig. 1. The ADDIE concept [30].

According to [27], [30], instructional design processes include five main processes:

Analyze: Before starting any content development, it is necessary to analyze the current situation in terms of knowledge gaps, etc.

Design: In this step, learning objectives are defined (what specific skills and knowledge does the teacher want students to have?), and learning outcomes are defined (how will the teacher know that students have achieved their learning objectives? How will learning be evaluated?).

Develop: The design phase is closely related to the development phase, but it can be distinguished. At a certain stage of planning, it becomes necessary to shift from brainstorming and creating a blueprint or storyboard (i.e., the design stage) to building the learning materials (i.e., the development stage), which means that the educational design development stage is concerned with the allocation and assembly of educational materials and learning tasks.

Implement: The phase of implementing the instructional design includes transforming the planned educational activities into practice. This phase is carried out under strict supervision through formative evaluation.

Evaluate: Assessment as part of implementation is necessary to try to understand why the education system is working or not working, and what other factors (internal and external) operate within the learning environment.

Several studies [31]-[35] have been conducted that dealt with describing teachers' experiences in the field of instructional design. [34] study shows that teachers use instructional design concepts and some strategies implicitly in their daily lesson planning processes, but do not use all of the instructional design principles that provide coherence and alignment between a teacher's real tasks. [32] explained that training in instructional design skills helps in enhancing the educational and professional competencies of the teacher. [35] suggested creating a simple CAFE (Content, Activities, Facility, and Assessment) model to help K-12 teachers teach remotely during the COVID-19 pandemic. [33] noted that teaching instructional design is a necessary introduction to accelerating student-teacher progress toward teaching for global competence. [31] demonstrated the effectiveness of a training program on the ADDIE instructional design model to enhance teachers' perceived skills in solving educational problems from the teachers' point of view.

B. Project-Based Learning

Project-based learning is an approach to developing teaching and learning to enhance a student's ability to function in a professional environment [36]. [37] sees it as a teaching and learning model that focuses on learner-centered learning by conducting instructional tasks that allow the learners to build their own learning by working in small collaborative groups. In this learning, students apply the knowledge they previously acquired to the current educational situation, with the focus on producing the final product of the project as the basis for assessment [38]. Learning tasks are organized around an open-ended question with the goal of creating the need to answer the question while acquiring a basic skill through a realistic context that drives the student to learn, problem solve, and be creative [39]-[41].

The stages of project-based learning are as follows:

1) Choosing the project: It is one of the most important stages. It begins with the teacher raising a topic for discussion among students about a problem, difficulty, or activity [42].
2) Project planning: Here the students, under the supervision of the teacher, develop a plan for the implementation of the project, taking into account some of the conditions [43].
3) Implementation of the project: the theoretical aspect is translated in the light of the project plan into a tangible reality. The group members implement the action plan, and each student plays his/her assigned role [44].
4) Project evaluation: The evaluation process is carried out continuously as the project progresses from its beginning to its end. The project is evaluated in its final form by the teacher, and the students may participate in the evaluation process [45].

Studies in the field of PBL [46]-[53] have shown the importance of this strategy in providing learners with cognitive and practical skills, developing achievement, and focusing primarily on the learner in the educational process. The study of [48] revealed the effectiveness of PBL in self-directed learning skills for students in a systems-based learning course offered at the Department of Educational Technology at Arak University in Iran. [49] explained the importance of PBL in the twenty-first century by having students control their own learning using inquiry, research, collaboration, and project creation skills. [50] demonstrated the effectiveness of PBL in teaching the assessment and diagnosis course in special education on the academic self-concept and academic achievement of female students in Saudi Arabia. [53] also demonstrated the effectiveness of the PBL strategy in providing student teachers with some skills of the twenty-first century. [51] found that students participate more actively when performing activities involving science practices in the form of projects by collaborating on the project's main question. [52] confirmed the effectiveness of using project-based learning unit co-design as one of the teachers' professional growth methods in enhancing students' participation and their attitudes towards practical practices in the science lab.

III. Methodology

In order to obtain adequate data and contribute to solving the study problem, a mixed method design was applied. In quantitative part, a quasi-experimental research design, one-group pretest-posttest design, was used, through the use of the pre- and post application of the questionnaire with a group of female student teachers to measure the extent to which they improved in the instructional design processes. In qualitative part, interviews were conducted to find out the extent of improvement in the instructional design processes, and to identify the most important pros and cons of training students on design processes through project-based learning (PBL).

A. Research Population

The research population consists of all student teachers specializing in early childhood in the Eastern Province, Saudi Arabia, in the first semester of the academic year 2021-2022. They are all female because the early childhood major is limited to females only in Saudi Arabia.

B. Research Sample

The study sample consisted of 40 female student teachers in the third level in the specialization of early childhood, enrolled in the course of building and developing curricula at the College of Education in Imam Abdulrahman Bin Faisal University, Saudi Arabia. The sample was selected purposively. Participants were trained in the process of designing instructional units through PBL. The questionnaire tool was used on the sample members, and interviews were conducted with 12 of them to determine the extent of improvement in their instructional design processes.

C. Instrumentation

The current research used the following study tools:

The pre-application of a questionnaire according to the five-point Likert scale (always, often, sometimes, rarely, never) was used on 40 female students before training them on the instructional design processes using PBL. Then, the post-application of the questionnaire was used on the same sample to identify the extent to which participants improved in instructional design processes using PBL. The questionnaire's items were formulated from [16], and [19]. The questionnaire was presented in its initial form to a number of arbitrators chosen from faculty members specialized in the field of curriculum and instruction in order to express their observations and suggestions in terms of the appropriateness of the tool to achieve the goal for which it was developed, the validity of the content, its adequacy, and the integrity and clarity of phrases. The amendments were made in light of the opinions of the arbitrators to reach the final image of the questionnaire. Therefore, the validity of the tool was confirmed by what is known as the face validity. In addition, the validity of the internal consistency of the Instructional Design Processes questionnaire was verified by calculating the Pearson Correlation Coefficient for the strength of the correlation of each dimension of the questionnaire with the total score of the questionnaire (see Table I).

TABLE I: RESULTS OF THE PEARSON CORRELATION COEFFICIENTS

Dimension	Correlation coefficients	Sig.
Analysis	0.89	0.000
Design and Development	0.73	0.000
Implement and Evaluation	0.80	0.000

Table I shows that the values of the questionnaire dimensions correlation coefficients with the total score are statistically significant ($p < 0.01$).

To calculate the reliability of the tool, the questionnaire was applied to a group of female student teachers who were not participating in this study. The value of the Cronbach's alpha coefficient is provided in Table II.

TABLE II: RESULTS OF THE CRONBACH'S ALPHA COEFFICIENTS

Dimension	Item number	Cronbach's alpha
Analysis	13	0.81
Design and Development	8	0.73
Implement and Evaluation	7	0.80
Total	28	0.86

Table II shows that the Cronbach's alpha coefficient of the whole questionnaire is 0.86, which indicates that the questionnaire has a good degree of reliability for its application to the members of the study sample.

An interview form was prepared, and it was applied to 12 female students of the study sample. The purpose of the interview was explained to the participants, and the place and time of the interview was determined. Audio recording was used to accurately record their answers because the purpose of the interviews is to obtain qualitative data from the participants. The validity of the interview form was verified by presenting it to a group of faculty members in the curriculum and instruction specialization. The interview form included a set of questions about the advantages of the students' experiencing of instructional design training through PBL in terms of design processes, social aspects, or emotional aspects. Also, the interview form included questions about what are the most important aspects in which the students' performance had improved, what are the most important difficulties that the students faced during training in instructional design processes, and what are the most important proposals to overcome these difficulties. Interview questions were tested with four female early childhood student teachers who were not participating in the study to ensure clarity of the questions and to estimate the time required to complete the interviews. Each interview took approximately (30) minutes.

D. Procedures for Training Student Teachers on Instructional Design Processes through PBL

The application of the current study took a full semester (16 weeks), during which time the participants engaged in the curriculum building and development course. This course is one of the main courses in the Early Childhood Program Plan at IAU, and it aims to train female students on instructional design processes. Participants were trained in instructional design processes through the design of PBL units, where early childhood units were proposed as follows: moral values, environment, numbers, letters, food, space, family, health and safety, linguistic phenomena, and the four seasons. Work on these projects required the students to pass a number of sequential stages starting from the stage of analysis, then continuing to design and implementation, and finally evaluation, as shown in Fig. 2. The participants received feedback at each stage from peers and from the course professor (the researchers). They were given an opportunity to modify and develop the educational project according to the following steps:

1) Choosing the topic of the educational unit: This was done through analyses of the needs of children and society.
2) Planning of educational units: This is done through the processes of designing instructional units (objectives - educational content - strategies - means - activities - evaluation methods), and the development processes

were done by presenting the designed instructional units to a committee of arbitrators.

3) Project execution: Some of the lessons of the instructional units were tested on some children at the kindergarten level to ensure their effectiveness and validity.
4) Project evaluation: The evaluation process was carried out continuously during the progress of the instructional design processes, and the project was evaluated in its final form by the researchers according to specific criteria.

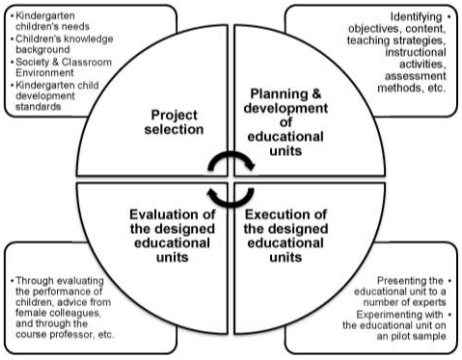

Fig. 2. Stages of training participants on instructional design processes using a PBL strategy.

The performance of the participants was evaluated structurally according to the objectives of each stage, taking into account the adherence to the list of instructional design processes. The questionnaire was applied to the female student teachers. They were asked to fill it out according to their personal point of view and their belief in the contribution of the method of teaching the course through PBL to the development of their instructional design processes. Also, personal interviews were conducted with some participants to find out the extent of their impression about the instructional design processes through PBL and the performance benefit that was gained.

IV. Results and Discussion

To answer the first study question, which stated, "What is the viewpoint of early childhood female student teachers about the importance of training on instructional design processes through project-based learning in improving their instructional design processes?" The frequencies, means, and standard deviations of the study sample's answers were calculated on each dimension of the instructional design. In Table III, an educationally acceptable criterion was relied upon to judge the level of expressions: a low level (1 – 2.33), a medium level (2.34 – 3.67), and a high level (3.68 – 5) [54].

TABLE III: Descriptive Statistics for The Dimensions of Instructional Design, and T-test Results

Dimension	Pretest		Posttest		t	df	p
	M	SD	M	SD			
Analysis	3.73	0.55	4.23	0.414	7.94	39	0.00
Design & Development	2.63	0.807	3.51	0.318	5.41	39	0.00
Implement & Evaluation	3.28	1.036	4.10	0.579	5.15	39	0.00
Total	3.21	0.524	3.95	0.346	9.86	39	0.00

Table III shows that the educational design processes in post application of the analysis dimension is high ($M = 4.23$), where the mean scores range between (3.68 – 5). This dimension indicates that training the students in the analysis processes through PBL helped to enhance the modern concept of the curriculum, and their understanding of these components easily ($t = 7.94$, $df = 39$, $p < 0.001$). Also, the dimension shows the development of students' performance in a number of analysis processes, such as: analyzing the needs and characteristics of learners, formulating general and specific goals, and defining strategies, means, and appropriate activities that help achieve the goals.

In addition, Table III provides that the educational design processes in post application of the design and development dimension is medium ($M = 3.51$). The mean scores of this dimension's statements range between (2.34 – 3.67). This dimension indicates that the students' ability to formulate goals in its three areas (cognitive - emotional - skill), and their ability to link unity with cultural aspects in society after training on instructional design processes using PBL strategy has improved ($t = 5.41$, $df = 39$, $p < 0.001$). Looking at the results of the mean scores on the design and development dimension, one can see the importance of this skill in improving and enabling the female student teachers to design well and organize their lessons.

Moreover, Table III shows that the educational design processes in post application of the evaluation dimension is high ($M = 3.95$), where the mean scores range between (3.68 – 5). This dimension indicates the importance of exchanging experiences with colleagues. This result is similar to what [55] emphasized, namely that learning from colleagues by observing and simulating their performance, and benefiting from the exchange of notes and feedback is one of the methods of training and developing teachers' performance. On the other hand, the dimension indicates that the female student teachers at the third level need to master teaching skills in realistic situations. This result is similar to what [56] emphasized, that being able to apply the principles of theoretical frameworks in the educational process needs extensive and continuous training.

To answer the second study question, which stated, "Did project-based learning help improve instructional design processes for early childhood female student teachers?", the paired sample t-test was used to identify the significance of the difference between the mean scores of the female students on the pre- and post-application of a questionnaire, as shown in Table III.

Table III shows that there are statistically significant differences ($p < 0.001$) between the mean scores of female students in the pre- and post-application of the instructional design processes questionnaire in favor of the post application. This result might indicate the effectiveness of PBL in improving instructional design processes for female early childhood students because this strategy integrates students into research and investigations about real problems, which ultimately leads to real production. This was explained by [57], who found that PBL consolidates the knowledge obtained by the students through research, real experience, and comparison with the information that they obtained through traditional methods based on memorization. The

result of the second question agrees with the findings of many studies [47]-[52] which emphasized the effectiveness of PBL in improving performance of the students. This result is also consistent with what [58] indicated about the importance of adopting PBL for early childhood female teachers in forming their information competence.

To answer the third study question, which stated, "What are the most important advantages of training in instructional design through the project-based learning strategy from the female students' point of view?" we analyzed the results of the interviews, and the majority of the students showed that there are many positive aspects of training in instructional design processes through PBL in the three design stages, which are as follows:

1) Analysis process: The participants emphasized that the use of PBL supported the depth of thinking about how to design an educational curriculum, contributed to the practice of brainstorming skills, and increased access to specialized references in the field of early childhood. This in turn enabled them to better familiarize themselves with the content of the curriculum, receive helpful experiences, and choose appropriate activities, methods and assessment methods for the lessons and the age stage. The students also mentioned that one of the advantages of using PBL in their course is to help them know the contents of the foundations of curriculum construction, to become aware of its importance in relation to the different curricula, and to understand the components of the curriculum in detail. The students emphasized that this type of learning was a useful and informative educational opportunity. They intended to use it and to apply it in other courses. The foundations of the curriculum and its components helped students define educational experiences in the light of analyzing the characteristics of learners such as the age group, the growth characteristics, the educational environment, and the importance of choosing the right and appropriate content efficiently for the target group. The objectives were collected in line with the customs and traditions of the society, taking into account the age group including individual differences, and in line with the faith foundations.
2) Design and development processes: The participants showed that they gained many useful experiences in terms of formulating the general objectives of the curriculum, the procedural objectives of the lessons, and defining teaching methods, activities, and means in proportion to the age stage. The majority of students indicated that they have the ability to choose content for early childhood, diversifying assessment methods in line with the characteristics of early childhood and consistent with taking into account individual differences between children. The students also worked on the continuity of the knowledge presented in the unit in line with the cognitive basis, and the inclusion of the social and philosophical foundations. Some students indicated that PBL made them more experienced in the field of early childhood, and made the design process valuable and impactful, not just theoretical information.
3) Implementation and evaluation processes: The majority of participants indicated that they gained distinct educational experiences, especially in the process of implementing the educational unit with children in the classroom in a way that opened the way for female students to better absorb the lessons that were designed, and then modify it in light of the feedback provided by the learners and colleagues. This in turn made the students more able to design innovatively. This type of learning also helped the students to enrich their experiences in the field of instructional design by linking the learning environment with its variables and the lessons that were designed, and obtaining feedback during the experiment from the course professor and peers. Implementation has contributed to the female students' acquisition of real experiences rather than information based on memorization.

From the above, it is noted that the female students acquire experiences and skills in the processes of analysis, design, development, implementation, and evaluation through the application of PBL. This finding is consistent with the result of [59], [60] regarding the cognitive experiences of pre-service teachers during the project-based learning (PBL) process, in which participants noted that they acquired skills and knowledge in teaching and learning, such as acquiring strategies for learning, managing time, and analyzing scientific books.

The majority of the female students indicated that they acquired social skills through training on instructional design process by using PBL, where the students stated that PBL helped develop communication skills, leadership skills, exchange of experiences, and appreciation of teamwork. PBL also helped develop thinking skills, linked the learners to the educational environment in which they will work in the future, and encouraged the learners to take an active role in the educational process. PBL also helped the learners to educate themselves, gain self-confidence, and take responsibility for completing the tasks required of the work team on time. This result is in agreement with the results of [60]-[62] which indicated that the use of PBL in pre-service teacher training increases many social skills, the most important of which is the emergence of friendships among group members, and taking responsibility for team learning.

The students indicated that they gained many emotional strengths through training in instructional design process by using PBL, where they developed positive attitudes towards their future career. Some students also indicated that by implementing the educational unit and applying its teaching in practice, the rate of anxiety and tension that the students felt from the teaching process decreased. The experience has contributed to controlling the students' emotions by their working in a team. The experience also has increased students' motivation for perseverance and determination to search for the best methods and activities, and to design them in a way that suits the children at the early childhood stage. This result is in agreement with [60], [63]-[65] who indicated that the use of PBL in pre-service teacher training increases many of the teachers' personal skills such as, helping the participants to be more confident in their own abilities in early childhood teaching, despite the teachers' feeling of anxiety at the beginning of the implementation.

To answer the fourth study question, which stated, "What

are the most important negatives of training on instructional design through the project-based learning strategy from the female students' point of view?" we analyzed the results of the interviews. A few participants showed that there are some negative aspects of using the PBL strategy, including: 1) difficulty engaging in the experience because it was the first experience that students had in learning through PBL, 2) difficulty formulating behavioral goals and the need for longer training time, and 3) difficulty accessing early childhood information resources.

Also, one of the challenges pointed out by the female students when using PBL is that the preparation of educational aids and activities, and the implementation of teaching strategies that suit the early childhood level require huge expenditures in terms of financial resources, references, tools, devices, and others. In addition, there was not enough time to adequately implement this type of learning. This result is consistent with the result of [66], which emphasized that most teachers are committed to using only the sources and references provided by the educational institution due to the lack of preparation time provided for teachers that limits the teacher's creativity in looking for external sources.

A. Limitations

A limitation of this research is that a control group was not used because the researchers didn't have access to enough participants.

Also, the results of this research indicate that the students instructional design processes improved; however, we cannot deduce the reason for the improvement with a high degree of certainty if it was from the effectiveness of PBL or other reasons. Because a control group was not used in the current research, there may be other explanations for why the posttest scores may have changed.

Furthermore, the small sample size is another limitation in the current study.

V. Recommendations and Suggestions for Future Research

The study recommends the benefit of teaching early childhood courses using projects, as the students showed that PBL clarified the course's importance and usefulness. The students gained practical experiences, contributed to the development of their performance in design processes significantly, and linked the students to the reality of education in the Kingdom through the implemented projects. The study also recommends the importance of training students in instructional design processes in all professional development and teacher preparation programs in Saudi Arabia.

The current study suggests conducting another similar study that focuses more on training in-service early childhood teachers to employ PBL, and measuring its impact on their teaching competencies. It is also suggested that further studies be conducted to verify the credibility and effectiveness of PBL in developing other variables, such as reducing teaching anxiety, and developing positive attitudes towards early childhood teaching. Additionally, it is recommended to conduct a pilot study as an extension of this study to test the effectiveness of training in Instructional Design Process through PBL in enhancing the teaching performance of early childhood teachers in Saudi Arabia. Last but not least, this study recommends conducting another similar study with a larger sample and a control group.

VI. Conclusion

The current study aimed to reveal the extent of improvement in the performance of female student teachers in the instructional design process through the use of the project-based learning (PBL) strategy, and the most important pros and cons of training on this type of learning from their point of view. The quantitative data showed the development of female students' performance in a number of design processes such as: analysis, design and development, and implementation and evaluation, in addition to the effectiveness of PBL in improving educational design processes for female early childhood teachers when comparing the pre- and post application of the questionnaire. The results of the qualitative data also supported the results of the quantitative analysis, where training the female student teachers helped in their understanding of the components of the curriculum in detail. The performance of the projects made students more experienced in the field of early childhood, made the design process valuable and impactful, not just theoretical information, and helped to gain real experiences rather than memorized information [67]-[69]. PBL also helped develop communication skills, leadership skills, exchange of experiences, appreciation of teamwork, self-confidence, and a sense of responsibility for completing the tasks required of the work team on time. This result was confirmed also by the study of [70]-[72]. PBL also helps to develop emotional aspects such as: positive attitudes, low anxiety, motivation, persistence, perseverance, and teacher self-efficacy [3], [41], [73]-[75]. These results can be interpreted as the PBL environment provided meaningful projects in which female students participate to develop real products (learning units), which helps the students to exercise leadership roles and focus on learning goals and thus integrate knowledge with practical application, in addition to providing appropriate feedback in order to improve performance [76], [77]. The researchers suggest conducting research similar to this research on other disciplines in the College of Education, and testing the effectiveness of PBL on students' perceptions and attitudes in various fields.

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