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ABSTRACT

A class of 37 in-service government school teachers from the Nablus (Palestine) district was studied to investigate the effects of 18 hours of training in Instructional Designer's Competencies (IDC) on teachers' planning routine, and their students' academic achievement. A questionnaire measured IDC in five domains: analysis, design, implementation, management, and evaluation. It was administered to the teachers before and after training. Results indicate that training teachers on instructional designer's competencies enhanced their planning routine and their students academic achievement; using true experimental designs like a pretest-posttest control group design is recommended in future research. (Contains 20 references.) (AEF)

Title:

The Effect of Training in Instructional Designer Competencies on Teachers' Planning Routine and their Students' Academic Achievement

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ABSTRACT

An entire class of (37) of in-service government schools teachers at Nablus district was taken to investigate the effect of 18 hours of training in Instructional Designer's Competencies (IDC) on teachers' planning routine, and their students' academic achievement.

A questionnaire measures (IDC) in five domains: analysis, design, implementation, management and evaluation, administered to the teachers twice: once before the training, and once after. At the same time, teachers were asked to teach two lessons of the subject-matter they teach in their schools in one week, and to test their students in the following week immediately. This process of teaching and testing was also administered twice: once before training and once after.

t-test for dependent samples showed that the overall mean of teachers' planning routine was enhanced significantly after receiving the training {t(29),= -2,86, p<.007}.

Lindquist Type 1 ANOVA and the "Scheffe" test showed the following results:

1- The general (F) showed a significant main effect for IDC's domains {F(4:145)=3.15, p>.01}, but the post-hoc ANOVA by using the Scheffe test did not show such significance among domains.
2- Teachers practiced significantly (p<.05) the annual type of planning better than the monthly and seasonally ones, but there was no differences between the annual and daily types.
3- Teachers practiced significantly (p<.05) the written form of planning better than practicing both forms: written and mental together, but there was no differences between the written and mental types.
4- Only the mental form of planning was enhanced significantly from before training to after.
5- There was no significant main effect between subjects, considering each of these independent variables: gender, number of years of teaching experience, number of training programs that the teachers have taken during in-service, teachers' college specialization, and the level of learning stage that the teachers teach in.
6- There was a significant main effect at (.01) level of significance for within subjects, the repeated measure, for each of the above mentioned independent variables which indicated that teachers' planning routine was enhanced significantly after training.
7- There was no significant interaction between the repeated measure and each of the above mentioned variables except for the learning stage (p< 0.007). This interaction indicated that the planning routine of elementary school teachers was increased after training. Whereas, the planning routine of teachers who teach all grades (1-12) was decreased, and vice versa before the training.

The "Pearson correlation coefficient" between teachers' planning routine and their students' academic achievement was (-.09) before training, whereas, this correlation was improved significantly after training (r = .51, p< .02). t-test between the two correlations was significance {t(18)=-8.9, p>.001}.

Nevertheless the overall results indicated that training teachers on instructional designer's competencies enhanced their planning routine and their students academic achievement, using true experimental designs like a pretest-posttest control group design is recommended in future research.

Introduction and Review of literature:

Instructional designers have hypothesized that the potential for learner achievement is enhanced when teachers practice Instructional Designer Competencies (IDC) during the planning of their instruction (Branch, Darwazeh, & El-Hindi, 1991,1992). In fact, instructional designers believe that teachers' planning routine is enhanced when teachers receive a kind of training on how to design instruction systematically (Branch, Darwazeh, & El-Hindi, 1992; Branch, 1993,1994; Darwazeh, 1993; Earle, 1991; Martin, 1990; Reiser & Mory, 1991; and Wilkerson, & Scheffler, 1992) (See Figure 1).

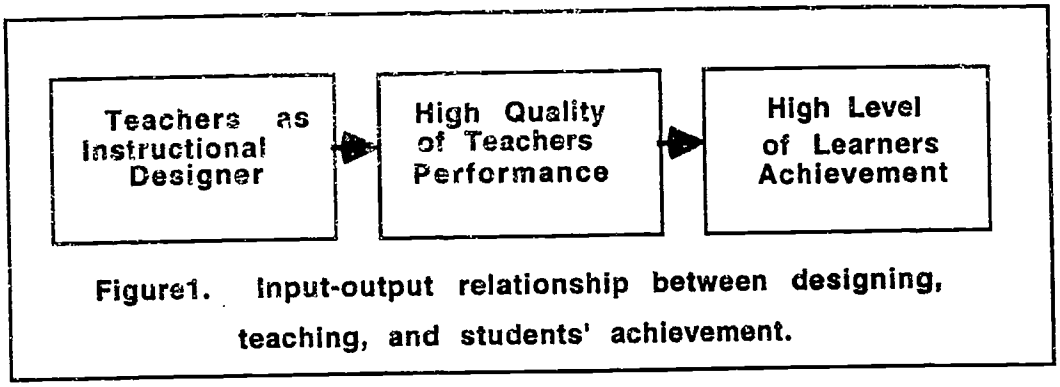

Figure1. Input-output relationship between designing, teaching, and students' achievement.

The systematic design of instruction, however, is defined as a discipline concerned with decision making and developing instruction through processes of selection, analysis, sequencing, implementation, management, and evaluation (Briggs & Wager, 1981, Darwazeh, 1986; Dick & Carey, 1990; Gagne, Briggs, & Wager, 1992; Merrill, 1983; Reigeluth, 1983, pp. 7-9). The role of instructional designer, accordingly, is defined as one who understands and practices the activities of the instructional design science in order to accomplish a specified purpose under a certain condition (Darwazeh, Branch, & El-Hindi, 1991; Martin, 1984, Reigeluth, 1983).

Some educators (e.g., Darwazeh, 1993; Reigeluth, 1983; pp. 7-9) have viewed the systematic design of instruction as being comprised of five major domains. They are: 1) Instructional Analysis, 2) Instructional Design or Sequence, 3) Instructional Development and Implementation, 4) Instructional Management, and 5) Instructional Evaluation. Each domain has certain activities in which all together comprised the Instructional Designer Competencies (IDC) (See Appendix 1)

Based on the concepts of Instructional Design and its activities, several models have been drawn for designing instruction (e.g., Dick & Carey, 1990; Gagne, et al. 1992; Merrill, 1983; Pratt, 1980; Reigeluth, 1983). Dick and Carey's model, in particular, has received a great deal of attention by professionals specially who work on teachers' education and care about their professional development. In some cases, this model was used as a guide for training teachers on how to plan for their teaching systematically (e.g., Applefield & Earle, 1990; Branch, Darwazeh, & El-Hindi, 1991,1992; Branch, 1993, 1994; Earle, 1985;1992). The current study is one of those cases which used Dick and Carey's model for the same purpose (See Figure 2).

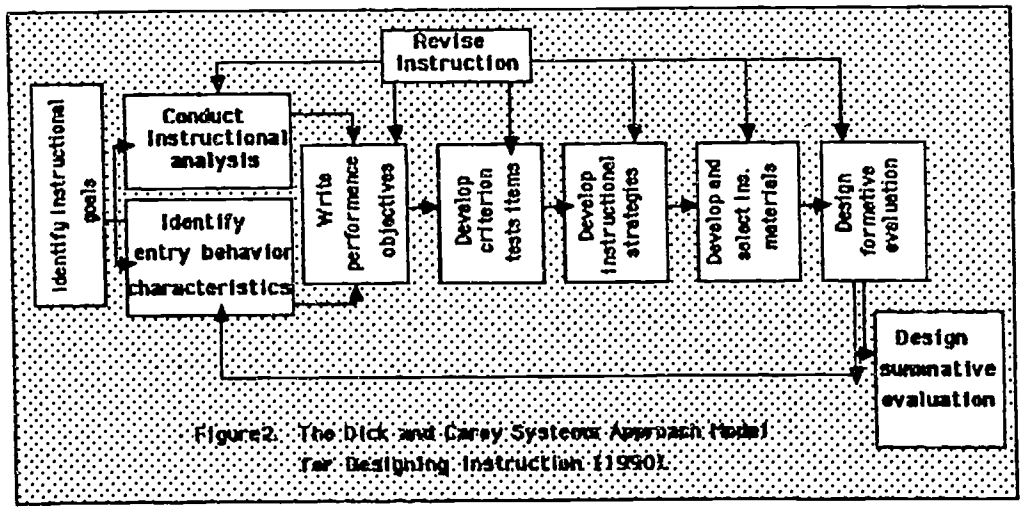

Figure2. The Dick and Carey Systems Approach Model for Designing Instruction (1990).

The assumption behind using Instructional design models for training teachers to plan their teaching systematically is that: teachers, in fact, do engage in many instructional design practices when they plan for teaching. Clearly the roles of classroom teachers are like that of instructional designers. And taking on the role of instructional designer, on the part of classroom teachers would have a great influence on the quality of the teachers' professional performance, hence, on the level of their students' academic achievement.

To verify this assumption, educators have raised two questions:

1- To what extent do teachers practice Instructional Designer Competencies while they plan their teaching?

2- Is there a relationship between teachers who practice instructional designer competencies and their students' academic achievement?

The first question was addressed by a small number of studies. These studies tried to compare between teachers who had a knowledge or a kind of training in instructional design skills, and teachers who did not have such knowledge or skills. Martin, for example, (Martin, 1990) compared between two groups of teachers: One group consisted of five teachers who have a formal educational background in instructional systems design (ISD), and the other group consisted of five teachers who did not have such knowledge. An open and closed item questionnaire was sent to each subject and follow-up interviews were conducted. Teachers were asked about their general planning practices, written planning procedures, mental planning, and how they implement instruction based on their plans.

Results indicated that nine of the ten teachers use general ISD skills in planning. Teachers reported that they: analyze learners' need and abilities, and use objectives to guide the instructional process, specially for selecting learning activities and evaluations. Martin also found that the teachers with ISD were more specific in their responses about the use of instructional design for some aspects of planning, such as, using hierarchies and taxonomies to sequence instruction, checking the consistency among objectives, learning activities, and evaluation. In addition, she found that four of the five ISD teachers believed that knowledge of ISD has improved both their planning processes and their teaching.

Reiser and Mory (1991) have reached similar results to the above one when they conducted a study to examine the extent to which systematic planning techniques (SPT) were incorporated into the written and mental teachers planning practices. They took two experienced teachers: one had received a formal training in the use of those techniques, and the other had not. A questionnaire was administered to the teachers and they were interviewed and observed as they went about planning and implementing an instructional unit.

Results indicated that the teacher who had been trained to use (SPT) did employ them, Whereas the untrained teacher just adhered to the principle that instructional activities should be planned with objectives clearly in mind. Reiser and Mory also found that the trained teacher focused on a written plan as well as on mental one, whereas the untrained teacher focused on a mental plan only. The trained teacher also put emphasis on the consistency between the objectives and the activities she used during teaching. In addition, the trained teacher spent more time in implementing the written plan than the untrained teacher.

Branch, Darwazeh, & El-Hindi (1992) sustained the above results in some aspects. They found that the planning activities of classroom teachers correlate with the practices of instructional design professionals, and this correlation is influenced by the subject taught. Sixty-one public school teachers from the northeast United States, and a 35-item, two- part questionnaire were used for the purpose of their study.

Recently, Branch (1993,1994) tried to specify which practices teachers do more while they plan teaching, and which ones they do least. The general results of his studies were that, secondary school teachers tend to engage in some systematic instructional design practices but are selective in which instructional design practices they routinely employ. While there is a correlation between teachers' planned activities and instructional design practices, there are several instructional design practices still beyond the realm of teachers manipulation. The most important practices to all teachers were: determining course goals, breaking down curriculum goals into learning tasks, organizing the content of each lesson around central themes, and making sure the lesson fits within the entire curriculum. Whereas, the least important practices to teachers were: discussing lesson plans with others, establishing media selection criteria, soliciting input from subject matter experts, and coordinating cooperative efforts among other teacher.

By taking preservice teachers, Earle (1991, 1992) identified graduates (1980-1990) from UNCW undergraduate preservice teacher program and asked them to respond to a four- part survey which covered demographics, general information, yearly planning, unit planning, and daily planning. The results of his survey were as follows:

a) 81% of teachers felt that a knowledge of ID processes had improved their planning.

b) The crucial elements of the ID process were goals, learner analysis, objectives, tests, activities/strategies, and revision of instruction. Some other elements were considered helpful, if time allowed, such as: task analysis, classification of learning, instructional plans, and tried-out instruction.

c) Although teachers regarded mental and written planning forms as almost equal in importance at the yearly, unitary, and daily levels, they favored mental planning form overall.

d) Teachers in their planning types deviated more from yearly plans and less from unit and daily plans.

e) 52.6% of teachers do plan for their instruction formally, whereas 47.4% do plan informally.

Klein (1991) also conducted a study on preservice teachers to examine their success in acquiring and applying principles of learning and instructional design. 105 teachers enrolled in a professional teacher preparation program were taken for this purpose. They were taught the essentials of learning and competency-based instruction and were required to plan a lesson using these concepts.

Klein found that most of the preservice teachers, regardless of their specialization, were successful in acquiring and using the principles of learning and instructional design.

On the other hand, Wilkerson & Scheffler (1992) found an opposite result to Klien's. Wilkerson & Scheffler in their study tried to test the assumption that preservice teachers who are trained to develop a lesson plan, will with equal acumen, be able to implement that plan. Twenty-six preservice teachers in an early childhood practicum developed and implemented a mathematics lesson plan. The lesson plans were evaluated according to specific criteria set forth in the National Council of Teachers of Mathematics' Curriculum and Evaluation Standards for School Mathematics. The implementation of each plan was also assessed using a Likert Scale reflective of similar criteria. They found that the correlation between the scores on the lesson plan checklist, and the scores on the observation checklist was not significant.

The finding suggest that it cannot be assumed that preservice teachers will automatically make the transition from written lesson plan to classroom implementation of those plans.

Purpose of the study:

As we can see from the above results, teachers who have a previous knowledge or got some training or a course in instructional designer competencies, would plan their instruction more systematically and accurately than those who did not have such knowledge, hence the quality of their teaching performance is improved.

But the question that remains unanswered is: Do teachers who have a knowledge in instructional design, influence positively the level of their students' academic achievement?

By looking at the previous studies, none of them tried to address this issue. Therefore, the **purpose** of the current study was to address this question by investigating two kinds of relationships: 1) The relationship between instructional designer competencies and teachers' planning routine, and 2) relationship between teachers who receive a training in IDC, and their students' academic achievement.

Research Questions:

The current study tried to answer the following questions:

1- Does a training on IDC have a significant effect on in-service teachers planning routine?

2- Are teacher's practices of IDC's Domains (Analysis, Sequences, Development and Implementation, Management, and Evaluation) differ significantly from before to after training?

3- Are teacher's practices of IDC's Types (daily, monthly, seasonally, and yearly) differ significantly from before to after the training?

4- Are teacher's practices of IDC's Forms (Written, Mental, and both: mental & written forms together) differ significantly from before to after training?

5- Does the training on IDC have a significant effect on teachers' planning routine with regard to the following independent variables:

a) Gender.
b) Years of teaching experience.
c) The number of training programs that the teachers have taken during in-service.
d) Teachers' college specialization.
e) The level of learning stage that the teachers teach in.

6- What are the IDC that teachers practice (90%) or more in their planning routine?

7- What are the IDC that teachers practice (10%) or less in their planning routine?

8- Does the relationship between teachers' planning routine and their students' academic achievement differ significantly from before receiving the training to after?

Methodology

Sample:

An entire class of (37) in-service government school teachers who hold a bachelor degree in different specialization at Nablus district was taken for this study. Those teachers were enrolled in a course titled "Curriculum Design and Development" at An-Najah University as a requirement of a diploma certificate in educational training. They have different number of years of teaching experience ranging from 3 to more than 25 years of experience. They also teach grades from first through twelve.

Seven teachers were excluded from analyzing the data because they were not government school teachers rather they were either affiliated to private or UNRWA schools. Thus the final sample of this study was (30) government teachers.

Experimental Design:

One group pretest-posttest pseudo-experimental design was used for this study.

Statistical Design:

Several statistical designs were used to analyze the data in order to answer the questions of this study. They were:

1- t-test for dependent samples at (.05) a priori level of significance was used to compare between the overall mean of teachers' planning routine before and after receiving the training on IDC.

2- Lindquist Type 1 ANOVA with repeated measures on one factor was utilized separately for each of the following independent variables:

a) Instructional Designer Competencies' Domains.
b) Instructional Designer Competencies' Types.
c) Instructional Designer Competencies' Forms
d) Gender.
e) Years of teaching experience.
f) The number of training program that the teachers have taken during in-service.
g) Categories of teachers' major specialization.
h) Subject-matter groupings
I) The level of learning stage that the teachers teach in.

3- A "Scheffe" test was used whenever F-test showed significance at .05 level.

4- The "pearson r correlation" was computed twice between the overall mean of teachers planning routine, and the average mean of their students achievement test: Once before the training, and once after. t-test for dependent samples at .05 a priori level of significance was also used to compare between the two correlations.

Questionnaire:

1- Questionnaire Construction:

Based on Dick and Carey's model of the systematic approach of instruction (Dick & Carey, 1990), and Reigeluth's classification of instructional process domains, and by referring to the questionnaire of IDC which was developed by Branch & Darwazeh (Branch, Darwazeh, & El-Hindi, 1991, 1992), A 41-item Likert scale-type questionnaire of 1-5 points measured instructional designer competencies (IDC) was constructed. The questionnaire covered five domains: 1) seven items for analyzing instruction, 2) seven items for designing or sequencing instruction, 3) nine items for developing and implementing instruction, 4) five items for managing instruction, and 5) six items for Evaluating instruction.

Another seven items were added to the questionnaire: Four of them asked teacher about the type of planning they practice: yearly, seasonally, monthly, and daily. The rest of the items have asked about the form of planning the teachers use: a written form, mental form, or both: written and mental forms together. Questions about demographic information was also included but excluded from this report (See Appendix 1).

The reason behind measuring five domains of instructional design was that teachers are expected to plan for the whole instructional process while they teach. And this process of instruction is not confound on teaching and evaluating students (Branch, Darwazeh, & El-Hindi, 1991). In fact, this process includes five domains: analyzing and sequencing, developing, implementing, managing, and evaluating instruction (Reigeluth, 1983).

On the other hand, the real world of teaching tells us that a lot of teachers have mastered some skills of instructional design. Thus, training them on all activities of instructional design is a waste of time and effort. For this reason, the current came to identify five sub-measures of instructional design in order to determine the domain that the teachers lack of, hence to give them the training they need in that domain. By doing that, time and effort will be saved specially in this age which is characterized by rapid technological and information advances.

2- Questionnaire Validation:

The questionnaire was validated with 10 experts in instructional design who are located in six Universities: Syracuse University, The University of North Carolina at Wilmington, The University of Georgia, The Pennsylvania State University, The Florida State University, and An-Najah National University. Also 40 in-service teachers of (1-12) grades have read the questionnaire and made some changes and comments on it to be understandable from teachers' jargon. All the changes and comments that have been provided by those experts and teachers were considered. Thus, the content validity of IDC questionnaire was secured. On the other hand, the "Cronbach Alpha coefficient" was computed for the reliability of the questionnaire. It was (.91).

Procedure:

The IDC questionnaire was administered to the sample of the current study one week before teachers start to receive training on IDC. Teachers, next day of the administration, were asked to design a written plan, in the way they used to, for two lessons of their regular subjects they teach in their schools, and submit it to the author. Then, they were required to teach the two lessons in one week as needed, and to test their students in the following week immediately. Teachers who teach the same subject-mater to the same grade were asked to teach the same lessons and use a unified test, and to grade the test according to the unified model of solution. The author was reviewing the achievement tests to make sure that they measure all concepts, principles, procedures, and facts that the two lessons included. This process of teaching and testing took around ten days.

Immediately after that process of teaching and testing, teachers start to receive training on how to design instruction systematically. 18 hours were devoted for this training out of (48) hours put for the whole course. Teachers were trained theoretically and practically in three consecutive weeks. The training based on Dick and Carey's model for the systematic approach of instruction, and was taught by the author herself. by using Merrill's Component Display Theory (Merrill, 1983). Basically, teachers were given generalities of each component of the Dick and Carey's model (See Figure 2 again), then examples, practices, feedback, and a test.

Therefore, the practice section of the training was focused on involving teachers in the activities of each domain of instructional design which in sum comprised the IDC questionnaire.

In the domain of **analysis**, teachers were asked to engage in analyzing activities such as: analyzing the classroom environment, determining its constraints and facilities, determining the educational goals, describing students' learning ability, social economic class, academic aptitude etc., conducting content analysis, determining behavioral objectives, and identifying learning prerequisites etc.

In the domain of **design** (or sequence), teachers were asked to engage in designing activities such as: sequencing educational and behavioral objectives hierarchically, identifying relationship among topics, match educational goals to performance objectives; match instructional strategies to performance objectives; match performance objectives and instructional strategies to lessons content; match performance objectives, instructional strategies, and lessons content to test items etc.

In the domain of development and **implementation**, teachers were asked to engage in teaching activities such as: selecting or developing primary teaching strategies; selecting or developing alternative teaching strategies; determining cognitive strategies for supporting student learning such as organizers, questions, note-taking etc.; selecting strategies for recognizing individual differences, for motivating students learning, and for dealing with student who are above or below average; identifying available and potential resources relevant to a planned instructional episode such as textbook, periodicals other important references; selecting relevant media etc.

In the domain of **management**, teachers were asked to engage in managing activities such as: outlining a time line for accomplishing the lessons objectives; coordinating with school's principal, superintendents, administrators, teachers and parents when necessary; consulting with the appropriate specialists, supervisors, subject matter experts, business and industry groups, educational organization, educational technology experts when necessary; planning for classroom management; planning for dealing with disruptive behavior in the classroom; keeping records of students' progress, achievement, attendance, special needs etc.

And in the domain of **evaluation**, teachers were asked to engage in evaluating activities such as: developing achievement tests; developing a plan for formative evaluation; developing a plan for remedial instruction or enrichment activities; developing a plan for summative evaluation etc.

We should note here that teachers were required to submit a written report for each domain's activities.

Then, a take-home exam test was administered to the teachers by giving them a new written lesson, and asking them to do all the above activities that have learned and practiced, but now by using a new lesson.

At the end of the eighteen hours of training, the same subject-matter groups of teachers were asked to submit a written plan for another two lessons for the second teachir g. Teachers were reminded to pull them out from the same unit that they taught before the training, but this time they should follow in their planning the principles they have learned and practiced during training processes.

One week later, teachers were asked to teach the two lessons in one week as needed, and to test their students in the following week immediately. As it was in the first time, teachers who teach the same subject-mater to the same grade were asked to teach the same lessons and use a unified test and to grade the test according to the unified model of solution. The author was reviewing the achievement tests to make sure that they measure all concepts, principles, procedures, and facts that the two lessons included. This process of teaching and testing took also around ten days.

After that process of teaching and testing, IDC's questionnaire was administered to the teachers for the second time, two weeks after receiving the training. Thus, four averages of scores were collected: Teachers average scores on the questionnaire: one before the training and one after. Students average scores on the achievement tests: one before their teachers received the training, and one after.

It should be noted here that teachers who teach the same subject-matter to the same grade, and form a group of three persons or more were only considered for computing the correlation between their scores on the questionnaire, and their students' test scores. The aim of this process was to reduce the variation among teachers

who teach different subjects to different grades. Accordingly, the computation of the correlation has been done only on 19 teachers who formed groups with respect to the subject-matter and grade. They came in an arbitrary way as follows: 4 teachers teach Science to tenth grade, 4 teachers teach Arabic to the twelve grade, 4 teachers teach English language to the tenth grade, 4 teachers teach Arabic to the second grade, and 3 teachers teach History and Geography to the twelve grade (See Table 6).

Results

The results of this study were the following:

1- t-test for dependent samples showed a significant enhancement in teachers' planning routine from before receiving the training on Instructional Designer Competencies (M = 3.7)to after (M = 4.10); {t(29) = -2.86, p<.0077}. (See Table 1).

2- A 5x2 factorial analysis of variance for repeated measure design with two factors: One for between-subjects (Teacher planning domains: analysis, design, devolopment and implementation, management, and evaluation), and one for within-subjects (Before training & After training) showed a significant main effect for between-subjects {F(4:145) = 3.15, p<.01}, and for within-subjects {F(1:145) = 28.56, p>.0001}, but did not show a significant interaction.

The Post-hoc ANOVA by using a "Scheffe" test at (.05) a priori level of significance failed to show any differences among domains. On the other hand, it showed differences for within subjects which indicated that teachers' planning routine was enhanced from before training to after in all domains except the implementation one (See Table 2:A & 2:B).

3- A 4x2 factorial analysis of variance for repeated measure design with two factors: One for between-subjects (Teacher Planning Types: daily, monthly, seasonally, and yearly), and one for within-subjects (Before training & After training) showed a significant main effect for only between-subjects {F(3:116) = 5.41), p<.001).

The Post-hoc ANOVA by using a "Scheffe" test at (.05) a priori level of significance indicated that the annual planning (M=4.93) was practiced better than the seasonally planning (M=4.45) and the monthly planning (M=4.35), but not than the daily one (M=4.73) (See Table 3:A & 3:B).

4. A 3x2 factorial analysis of variance for repeated measure design with two factors: One for between-subjects (Teacher planning forms: written, mental, and both, written and mental forms together), and one for within-subjects (Before training & After training) showed a significant main effect for between-subjects {F(2:87) = 4.64, p<.01}, and for within-subjects {F(1:87) = 5.63, p>.01}, but did not show a significant interaction.

The Post-hoc ANOVA by using a "Scheffe" test at (.05) a priori level of significance indicated that the written form (M=4.25) was practiced better than the mental and written form together (M=3.68), but not than the mental form (M=3.81). For the within-subjects, Scheffe test indicated that the only mental form was significantly enhanced from before training to after (M =3.43 vs.4.2) (See Table 4:A & 4:B).

5- Lindquist Type 1 ANOVA with two factors was utilized **separately** for each of these independent variables: a) gender, b) years of teaching experience, c) number of training programs that the teachers had taken during in-service, d) teachers' college specialization, e) subject matter groupings, f) the level of leaning stage that the teachers teach in.

The analysis revealed the following results:

a) There was no significant main effect between-subjects for each of the above independent variables.

b) There was a significant main effect for within-subjects, the repeated measure, ranging from (.01) to (.0007) level of significance for each analysis of the above independent variables. It indicated that the teachers planning routine was enhanced significantly after receiving the training (See Table 5).

c) There was no significant interaction between the repeated measure and each of the above independent variables except for the learning stage (p<.007). This interaction indicated that the elementary schools teachers planning routine was increased after training, whereas the teachers planning routine who teach all grades (1-12) was decreased and vice versa before training .

6- The items that had been practiced 90% or more as follows:

Question # 26.	Develop a time line for accomplishing the course goals (M = 4.86).
Question # 34.	Prepare records that document student progress, achievement attendance. or special needs (M = 4.83).
Question # 5.	Analyze the learning task in order to identify the primary and secondary content that I plan to teach (M = 4.60).
Question # 32.	Develop an instructional management plan to make sure that events take place as they were planned (M = 4.6)
Question # 29.	Design an evaluation plan to determine students' strengths and weaknesses in mastering the performance objectives (M = 4.56).

Whereas, the items that had been practiced (10%) or less specially as follows:

Question # 4.	Analyze student history and characteristics (M = 2.86).
Question # 21.	Select the media that are relevant to implementing the course (M = 3.06).
Question # 28.	Consult with resources, specialists: administrators, supervisors, content experts, or people from business and industry, while I plan for the course (M = 3.26).
Question # 27.	Coordinate activities and events with school administrators, other teachers, or parents to manage or run the course smoothly (M = 3.36).

7- The "Pearson correlation coefficient" between teachers' planning routine and their students' academic achievement was almost zero (r = -.09) before training, whereas this correlation was improved significantly after training (r = .51, p< .02). t-test between the two correlations was {t(19) = -8.9, p>.001} (See Table 6).

Limitation of the study

Before discussing the results of this study, it is worthwhile to bear in mind that the experimental design of this study was a pseudo-experimental design which might threaten, somewhat, the internal validity of this study such as history, maturation, testing, and mortality variables. At the same time, considering that the study dealt with teachers aged over thirties, and submit them to a short period of time of training (three weeks), the effects of

maturation and history are relatively reduced if it is not controlled. In addition, the mortality extraneous variable is controlled by taking the same number of teachers before and after the training. Nevertheless, we still recommend other researchers to use true experimental design like a pretest-posttest control group design in their future studies.

Discussion

The overall mean indicated that training teachers on instructional designer competencies enhanced significantly ($p>.0007$) their teaching planning routine, hence, their students' academic achievement. This results showed clearly the importance for the teachers to use the systematic approach of instruction while they plan for teaching. This result is in consistence with the results of most of previous studies that had investigated the same theme and reached to similar results (e.g., Branch, Darwazeh, & El-Hindi, 1992, Martin, 1990; Reiser & Mory, 1991; Earle, 1991, 1992).

The most interesting finding of this study was the significant correlation ($r = .51$, $p< .02$) between teachers who received training on IDC and their students' academic achievement. This correlation was zero before training, and became moderate and significant after training (See Table 6).
This finding showed the importance and effectiveness of acquiring IDC skills not just for enhancing teachers' planning routine, but also to improve their students' academic achievement. Since, this is the only study that have investigated this kind of relationship, the author strongly recommends other researchers to conduct more studies to validate this result. The author also recommends the ministry of education in Palestine and in any country to submit their teachers, who still do not have any knowledge or skills in instructional design, to a training program or give them a course related to it.

With respect to the types of planning, results of this study showed that the annual planning was practiced most, whereas, the monthly and seasonally planning were practiced least with no differences between the annual and daily planning. This could be interpreted that Palestinian teachers do care to plan for either the whole curriculum or each lesson of it, but not for each course or unit which was expressed in a seasonally or monthly plan. This result contrasts, somewhat, to the Earle's results (1991,1992) which indicated that teachers deviated more from yearly plans and less from unitory (monthly) and daily plans. This could also be interpreted by the differences might be existed between the Palestinian and the United Sates' educational systems. Cross culture studies are greatly recommended on this issue.

With respect to the planning forms, the results indicated that the written plan was practiced most, whereas, the written and mental plan form together was practiced least with no differences between the written and mental forms. This result is in agreement with Reiser and Mory's ones (1991) which indicated that trained teachers on using the systematic planning techniques have focused on a written plan as well on the mental one.

Other interesting finding of the current study was that the mental form of planning was the only form which improved significantly from before training to after. This could show the training process succeeded in attracting teachers' attention to the systematic approach of instruction and letting them think about it.

Other surprising finding of this study was the significant interactions between the students learning stage and the repeated measure ($p<.007$). This interaction indicated that the elementary schools teachers' planning routine was increased after training, whereas, teachers' planning routine who teach all grades (1-12) was decreased and vice versa before training.

This result could be interpreted by saying that teachers who teach all grades may get confused when they plan for all grades simultaneously. Whereas, teachers who teach in a defined stage know exactly what they are going to do. Why the elementary stage not other stages? The reason could be that teachers of elementary stage can transfer the principles of instructional design more easily than those who teach in the other stages like preparatory or secondary; because they deal with less complexity of subject-matter than the other two stages. However, considering that there was one teacher in the cell of all grades (See table 5), we can not trust this result. Thus, further research is recommended to take bigger sample in each stage.

Before signing off, it is worthwhile to note that the general (F) showed a signicant main effect among teacher's practices of the five domains, though the "Scheffe" test could not reveal such significance. The means of design and analysis domains were higher than the implementation, management, and evaluation ones respectively ($M = 4.06$ vs. 4.01 vs. 3.76 vs. 3.76 vs. 3.79). These means could tell us that teachers have already

had some knowledge and skills in planning instruction. Thus, it is very beneficial to measure teachers' planning routine in each domain rather than measuring it as a whole. This process could help us, as instructional designers, to give teachers the training they need in the domain they lack of.

Accordingly, instructional designers are recommended to work more on IDC's questionnaire and its five domains, so, it can be used as a diagnostic tool for identifying the domain that the teachers lack of. In this way we can save a lot of money and effort when we give teachers the training they need in the domain they lack of, rather to give them training in all domains they have already mastered some of them.

In sum, instructional designer competencies are very important to acquire by teachers in order to improve the quality of their teaching, hence, the level of their students' academic achievement. More research is greatly recommended to investigate the relationship between teachers who had instructional designer skills and their students' academic achievement by using true experimental designs like a pretest-posttest control group design.

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Tables 1 - 6 and Appendix 1 appear below.

	x	(SD)	df	t-test	P
Teachers Planning Routine Before Training	3.7	(.52)	29	- 2.86	0.007
Teacher Planning Routine After Training	4.1	(1.46)			

Table 1. t-test for Teachers Planning Routine Before and After receiving training in Instructional Designer Competencies.

Source	df	Sum of Square	Mean Square	F-test	P value
Planning Domains (A)	4	4.497	1.124	3.153	.0161
Subjects w. groups	145	51.707	.357		
Repeated Measure (B)	1	12.723	.138	28.56	.0001
AB	4	.551	.445	.309	.8715
B x subjects w. groups	145	64.593			

Table 2:A Lindquist Type 1 ANOVA Summary Table for Instructional Designer Competencies' Domain.

IDC's Domains

		Before Training	After Training	Total
Analysis	x	3.79	4.23	4.01
	(SD)	(.71)	(.51)	(.61)
	n	30	30	60
Design	x	3.88	4.25	4.06
	(SD)	(.61)	(.53)	(.57)
	n	30	30	60
Implementations	x	3.63	3.9	3.76
	(SD)	(.71)	(.67)	(.69)
	n	30	30	60
Management	x	3.56	4.06	3.76
	(SD)	(.56)	(.53)	(69)
	n	30	30	60
Evaluation	x	3.55	4.03	3.79
	(SD)	(.80)	(.58)	(.69)
	n	30	30	60
Total	x	3.68	4.09	3.89
	(SD)	(.67)	(.56)	(.62)
	n	150	150	(300)

Table 2:B Teachers Means, Standard Deviations, and Samples for Instructional Designer Competencies' Domain Before and After Training.

Source	df	Sum of Squares	Mean Square	F-test	P value
Planning Type(A)	3	13.012	4.337	5.411	.0016
Subjects w. groups	116	92.983	.802		
Repeated Measure(B)	1	1.504	1.504	1.493	.2242
AB	3	4.146	1.382	1.372	.2549
B x subjects w. groups	116	116.85	1.007		

Table 3:A Lindquist Type 1 ANOVA Summary Table for Instructional Designer Competencies' Type.

		Before Training	After Training	Total
Daily	x	4.7	4.8	4.73
	(SD)	(.70)	(.55)	(.62)
	n	30	30	60
Monthly	x	4.06	4.63	4.35
	(SD)	(1.46)	(.96)	(1.21)
	n	30	30	60
Seasonally	x	4.53	4.36	4.45
	(SD)	(1.1)	(1.4)	(1.25)
	n	30	30	60
Annually	x	4.86	5	4.93
	(SD)	(.43)	(0.0)	(.21)
	n	30	30	60
Total	x	4.54	4.7	4.62
	(SD)	(.92)	(.73)	(.82)
	n	120	120	240

Table 3:B Teachers Means, Standard Deviations, and Samples for Instructional Designer Competencies' Type Before and After Training.

Source	df	Sum of Squares	Mean Square	F-test	P value
Planning Forms(A)	2	10.533	5.267	4.642	.0122
Subjects w. groups	87	98.717	1.135		
Repeated Measure (B)	1	7.606	7.606	5.631	.0199
AB	2	3.378	1.689	1.25	.2915
B x subjects w. groups	87	117.517	1.351		

Table 4:A Lindquist Type 1 ANOVA Sammary Table for Instructional Designer Competencies' Form.

		Before Training	After Training	Total
Written Form	x	4.2	4.3	4.25
	(SD)	(.99)	(.75)	(.87)
	n	30	30	60
Mental Form	x	3.43	4.2	3.81
	(SD)	(1.27)	(.84)	(1.05)
	n	30	30	60
Both W & M	x	3.5	3.86	3.68
	(SD)	(1.45)	(1.1)	(1.27)
	n	30	30	60
Total	x	3.71	4.12	3.9
	(DS)	(1.23)	(.89)	(1.06)
	n	90	90	180

Table 4:B Teachers Means, Standard Deviations, and Samples for Instructional Designer Competencies' Form Before and After Training.

The Independent Variables		Before Tr. M (SD) n	After Tr. M (SD) n	F(df)	P
Gender	Male	3.7 (0.47) 23	4 (0.49) 23	F(1,28)=4.3	0.05*
	Female	3.5 (0.67) 7	4.3 (0.34) 7		
Years of Teaching Experience	(1-4)	3.5 (0.0) 1	3.5 (0.0) 1	F(1,22)=9.2	0.005*
	(5-9)	3.7 (0.48) 9	3.9 (0.66) 9		
	(10-14)	3.4 (0.78) 7	4.2 (0.22) 7		
	(15-19)	3.7 (0.44) 4	4.4 (0.29) 4		
	(20-24)	3.7 (0.22) 6	4.0 (0.44) 6		
	(25 - or more)	3.5 (0.0) 1	4.5 (0.0) 1		
No. of Training Programs	(one)	3.7 (0.33) 7	4.2 (0.33) 7	F(1,22)=10.1	0.005*
	(2-3)	3.6 (0.38) 1	4.1 (0.43) 1		
	(4 - or more)	3.9 (0.0) 1	4.4 (0.0) 1		
College Specialization	Science	3.7 (0.52) 8	3.8 (0.50) 8	F(2,27)=4.1	0.05*
	Literature	3.6 (0.67) 21	4.1 (0.42) 21		
	OTHERS	3.9 (0.0) 1	4.4 (0.0) 1		
Subject-Matter Grouping	Arabic	3.6 (0.48) 8	4.6 (0.48) 8	F(1,26)=7.18	0.01*
	English	3.6 (0.48) 7	4.1 (0.38) 7		
	Science	3.5 (0.29) 4	3.7 (0.29) 4		
	Math	3.5 (0.22) 2	4.1 (0.14) 2		
	History and Geography	3.5 (0.22) 4	3.9 (0.44) 4		
	OTHERS	3.5 (0.29) 3	4.1 (0.29) 3		
Learning Stage	Elementary	3.6 (0.22) 4	4.5 (0.29) 4	F(2,18)=11.32	0.001*
	Preparatory	3.5 (0.00) 2	4.0 (0.00) 2		
	Secondary	3.6 (0.28) 22	4.0 (0.24) 22		
	Trainees teach in all stages	4.4 (0.0) 1	2.6 (0.0) 1		

Table 3: Trainees Means, Standard Deviations, Samples, F-Test, df, and level of significance for repeated Measures (Before & After Training) with respect to Gender, years of teaching experience, No. of Training programs, College specialization, Subject-matter grouping & the learning stage that trainees teach in.

	Teachers' means on IDC Ques. B. Trainging	Students' means on the achievement Test B. Training	"Pearson r" between teachers and students' scores B. Training	Teachers' means on IDC Ques. A. Training	Students' means on the achievement Test A. Training	"Pearson r" between teachers and students' scores A. Training	The No. of students in each class	Subject-matter & Grades Level
1	2.530	7.530	- .09	2.600	8.520	.513**	(30)	Sci,10
2	3.530	8.420		3.900	6.530		(33)	Sci,10
3	3.740	8.860		4.440	9.770		(33)	Sci,10
4	4.180	7.100		3.880	8.020		(25)	Sci,10
5	3.180	10.700		3.900	9.670		(28)	Am,12
6	4.340	13.730		4.690	11.580		(17)	Am,12
7	3.060	13.440		4.830	11.670		(27)	Am,12
8	3.900	10.750		4.230	10.830		(20)	Am,12
9	3.740	7.740		4.200	6.510		(25)	Eng.10
10	3.670	8.290		3.830	8.060		(34)	Eng.10
11	4.250	9.050		4.440	9.550		(36)	Eng.10
12	3.650	9.180		3.880	8.210		(25)	Eng.10
13	3.900	11.960		4.060	12.680		(42)	H&G,12
14	2.230	11.680		3.530	8.720		(25)	H&G,12
15	3.340	10.230		3.790	10.650		(28)	H&G,12
16	4.020	8.030		4.270	10.500		(31)	Elem 4
17	3.530	11.220		5.000	12.190		(31)	Elem 2
18	4.440	9,800		4.230	11.860		(33)	Elem 5
19	4.480	10.180		4.600	10.500		(36)	Elem 3

Table 6: "Pearson r" between teachers means on IDC questionnaire and their students' academic achievement Before and After Training

Appendix 1.

Instructional Designer Competencies' Questionnaire.

The items:

As I plan for teaching, I do the following:

1. Analyze the school setting in which the course would be delivered.
2. Review the goals for my course that are stated in curriculum guides or course manuals.
3. Determine the constraints that I may face during teaching.
4. Analyze student history and characteristics, including past academic patterns and levels, age and maturity, special aptitudes or disabilities, and socioeconomic characteristics.
5. Analyze the learning task in order to identify the primary and secondary content[1] that I plan to teach in the course.
6. Organize the course content, including the concepts, rules, procedures, and facts, hierarchically from simple to complex.
7. Determine how items of the course content are related to each other.
8. Identify the prerequisite learning or characteristics that students should have in order to learn what I plan for the course.
9. Specify performance objectives for each lesson in the course, or decide what the objectives will be.
10. Organize performance objectives hierarchically from simple to complex.
11. Match the course goals to performance objectives.
12. Select or produce the teaching methods that are <u>essential</u> for the course.
13. Select or produce the teaching methods that will be used as <u>alternatives</u> for the course.
14. Match teaching methods to the learning stated in the performance objectives.
15. Match performance objectives and teaching methods to the course content.
16. Determine the aids to thinking that are needed to support learning by the student; such as organizers, related questions, summaries, note taking, analogies, stories, or outlines.
17. Select or develop methods for recognizing differences among the students.
18. Select or develop methods for motivating students to engage in learning the course.
19. Make plans for using methods of reinforcement during teaching.

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1 "Course Content" when used in any item refers to all the concepts, rules, procedures, and facts that might be the intended learning for a course.

20. Determine the available textbooks, reference materials, periodicals, or other resources that are suitable to a planned course.

21. Select the media that are relevant to implementing the course.

22. Plan for facilitating verbal and non-verbal interactions between the teacher and students.

23. Develop the achievement tests that would be used for the whole course.

24. Match performance objectives, teaching methods, and the content of the course to the test items that are being considered.

25. Develop or adopt evaluation procedures besides achievement tests to evaluate other student learning

26. Develop a time line for accomplishing the course goals, with a consideration given for holidays and other interruptions of the instruction.

27. Coordinate activities and events with school administrators, other teachers, or parents to manage or run the course smoothly.

28. Consult with resources, specialists (administrators, supervisors, subject matter experts, or people from business and industry), while I plan for the course.

29. Design an evaluation plan to determine students' strengths and weaknesses in mastering the performance objectives.

30. Design a plan for remedial or enrichment instructional activities.

31. Design an evaluation plan for assigning final grades.

32. Develop an instructional management plan to make sure that events take place as they are planned.

33. Make plans for dealing with disruptive behaviors in the classroom.

34. Prepare records that document student progress, achievement, attendance, or special needs.

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35. I use the above activities yearly when I plan for the whole academic year.

36. I use the above activities seasonally when I plan for the whole course.

37. I use the above activities monthly when I plan for each unit of the course.

38. I use the above activities daily when I plan for each lesson of the course.

39. I plan for these activities mentally.

40. I plan for these activities in written form.

41. I plan for these activities both: mentally and in written form.

Note:		
	Analysis Domain	=Items #1+2+3+4+5+8+9
	Design or Sequence Domain	=Items #6+7+10+11+14+15+24
	Development & Implementation Domain	=Items #12+13+16+17+18+19+20+21+22
	Management Domain	=Items #27+28+32+33+34
	Evaluation Domain	=Items #23+25+26+29+30+31