Journal of Educational and Psychological Sciences
Volume (3), Issue (20) : 30 Sep 2019
P: 141 - 163

ISSN: 2522-3399

مجلة العلوم التربوية والنفسية
المجلد (3)، العدد (20) : 30 سبتمبر 2019 م
ص: 141 - 163

ENHANCING PERFORMANCE AND ATTITUDES TOWARDS INSTRUCTIONAL PLANNING AMONG HIGHER DIPLOMA SCIENCE TEACHERS USING COGNITIVE APPRENTICESHIP MODE

Suzan Mahmoud Abu-Hudra

Imam Abdulrahman Bin Faisal University || KSA

Abstract: The focus of the expert interaction in a cognitive apprenticeship is on developing cognitive skills of reflection through discourse and application of knowledge. The propose of this study explanatory a method for enhancing the effectiveness of cognitive apprenticeship theory for improving personal science teaching efficacy beliefs of higher diploma preservice teachers. The research is based on the study of the impact of cognitive apprenticeship in studying science materials. The study involved 22 teachers (20-30 years) enrolled in 14-week Science teaching strategies course in the high general diploma in Science and Humanities College-Jubail, Imam Abdulrahman Bin Faisal University, Saudi Arabia. The instrument contained 23 items and divided into two sub-scales: 13 items measuring personal science teaching efficacy PSTE and 10 items measuring science teaching outcome efficacy STOE. The quantitative findings showed a continuous statistically significant linear increase between before and after course measures of PSTE. However, a slight decrease in their PSTE was observed in the final post-course measure that is a commonly observed long-term effect after many educational interventions. A t-test determined that the decline was not statistically significant, indicating that teaching internship had no significant effect on the preservice teachers' science teaching efficacy beliefs. The study provides a significant evidence to suggest that the preservice teachers perceived that their learning experience in the Science teaching strategies course by cognitive apprenticeship methods was unique when compared to before teaching methods courses taken.

Keywords: Cognitive apprenticeship, Science teachers, STOE, PSTE.

تعزيز أداء واتجاهات طلبة الدبلوم التربوي تخصص معلم علوم نحو التخطيط للتدريس باستخدام نموذج التلمذة المعرفية

سوزان محمود أبو هدرة

جامعة الإمام عبد الرحمن بن فيصل || المملكة العربية السعودية

الملخص: ينصب تركيز التفاعل لدى الخبراء في التلمذة المعرفية على تطوير المهارات الإدراكية للتفكير من خلال الحوار وتطبيق المعرفة. تقترح هذه الدراسة طريقة توضيحية لتعزيز فعالية نموذج التلمذة المعرفية من أجل تعزيز أداء واتجاهات طلبة الدبلوم العام في التربية تخصص معلم علوم نحو التخطيط للتدريس لتدريس العلوم. ويستند البحث على دراسة تأثير التلمذة المعرفية في دراسة المواد العلمية. تضمنت الدراسة 22 معلماً (20-30 سنة) مسجلين في مقرر استراتيجيات تدريس العلوم لمدة 14 أسبوعاً في الدبلوم العام التربوي في كلية الجبيل، جامعة الإمام عبد الرحمن بن فيصل، المملكة العربية السعودية. احتوى المقياس على 23 صنفًا وقسمت إلى محورين فرعيين: 13 بنداً يقيس فعالية تدريس العلوم الشخصية PSTE، و10 بنود تقيس فعالية نتائج تدريس العلوم .STOE أظهرت النتائج الكمية زيادة خطية مستمرة وهامة من الناحية الإحصائية بين مقاييس PSTE قبل وبعد. ومع ذلك، لوحظ انخفاض طفيف في PSTE في الإجراء النهائي بعد انتهاء تديس

المقرر وهو تأثير طويل الأجل شائع بشكل ملحوظ بعد العديد من التداخلات التعليمية. وقد تبين من اختبار t-test أن الانخفاض لم يكن ذو دلالة إحصائية، مما يشير إلى أن التدريب الداخلي للتدريسي لم يكن له تأثير كبير على معتقدات فعالية تدريس العلوم لدى معلمي العلوم. تقدم الدراسة دليلاً هامًا يشير إلى أن معلمي العلوم قد أدركوا أن خبرتهم في التعلم في مقرر استراتيجيات تدريس العلوم من خلال أساليب التلمذة المعرفية كانت فريدة بالمقارنة مع استراتيجيات التدريس الأخرى التي كان يتم استخدامها، وما قبل التحاقهم بالمقرر.

الكلمات المفتاحية: التلمذة المعرفية، معلمين العلوم، برنامج كفاءة تدريس العلم (STOE).

1. Introduction

Science education has gained the reform of science education issues of global importance in recent decades. This sense of urgency is reflected in the promotion of science education, as foreshadowed by the United Nations Educational, Scientific and Cultural Organization (UNESCO). John Dewey is the leading of international scientific organization. He was the famous American education philosopher, who posted that the goal of education should be to train students to live and work in a progressive society, which is one that is continuously evolving and advancing for the better. To this end, it is essential that Governments provide appropriate education to citizens specifically geared towards economic and social progress, as well as to meet national needs. Despite the need for more scientists and engineers worldwide, there has been a marked drop in the number of students obtaining careers in science in recent decades. UNESCO noted, "The steady decline in the enrollment of young people in science is a matter of concern" (Science Education, para. 1). As a result, this trend has prompted many countries around the world to channel increasing resources towards improving science education. (Cooper T. , September, 2013)

Accordingly, science education was taught either in traditional ways or in apprenticeship education, but what is Apprenticeship?

Apprenticeship is considered a branch of education; they are a way of social education in nature with a long history of achievement and help the novice to become an expert in one of the areas such as construction, midwifery, law and other fields. The apprenticeship center is a more experienced concept of helping less experienced people, providing a structure and examples to support the achievement of goals. Traditionally apprenticeship has been associated with learning in the context of possessing the necessary skills in the profession or craft- a task that usually requires both the acquisition of knowledge, and concepts, and perhaps for motor skills, and the development of the ability to apply knowledge and skills in the appropriate context in a way that is far ahead of formal education as is known today. In most non-industrialized countries, apprenticeship remains the primary mode of teaching and learning. (Cooper T. a., 2008)

1.1 Professional Development and Instructional Coaching

Increasingly, professional development literature and research continue to emphasize the significant link between teacher quality and the continuing gains in student achievement. (Warren, 2013)

Recognizing that genuine educational change occurs at the classroom level, decision makers worldwide are investing more resources in the professional development of conserve and service teachers as a means of improving educational practices in order to ultimately improve student achievement. The professional development of teachers has become a critical focus because service teachers during this period have found that they participate in the minimum professional development. For example in the United States, "reported that 9-15% of primary teachers participating in more than 35 hours of professional development in the past three years" (Wicker, 2016)

According to (Knight, 2009), an instructional coach "partners with teachers to help them integrate research-based instructional practices into their material which; they are studying and that help students learn more effectively" (p. 30). So far, large-scale of instructional coaching programs have been implemented in educational districts throughout the United States in 2008. (Cornett, Knight, 2008) noted "there are currently more than 2,100 full-time coaches instructors in Florida alone" (p. 2). In some school districts instructors work with teachers in various disciplines, and others they provide specific educational support only in content areas. Some initial research on educational training has indicated several advantages, including its ability to: provide a link between teachers and administrators (Baker, 2010), and improve their self- subjectivity, improve teacher reflection (Reed, 2015), enhance teachers' emotional intelligence (Avant, 2012), and foster effective collaboration in communities of practice. However, in other studies, instructional coaching programs were found to have fallen short of their intended goals due to several missteps and important oversights during implementation process. (Denton, 2009)

1.2 Cognitive Apprenticeship

Cognitive apprenticeship is defined as "learning through instructional experience on cognitive and metacognitive, and not physical, skills and processes to be acquired by a student or teacher." This definition by Collins has origins in social learning theories. (Burner, 2015)

Cognitive apprenticeship, one can not only participate in cognitive apprenticeship but also rather rely on expert demonstration (modeling) and mentoring (coaching) in the early stages of learning. Challenging learners with a little more difficult tasks than can be achieved on their own and must rely on the assistance provided by and cooperate with others to achieve these tasks. In other words, learners must work with others more experienced and with the time move from the observation site to one active practice. The learning tasks in cognitive apprenticeship are more than holistic in nature and are more complex and varied over time as learners become more experienced than at other level. The main advantage of learning through cognitive apprenticeship rather than traditional classroom-based methods is the opportunity to see subtle, implicit elements of expert practices that may not otherwise be articulated in a lecture or form of knowledge dissemination. (Liu, 2015)

1.3 Instructional Strategies and Models Associated with Cognitive Apprenticeship

Although cognitive apprenticeships easily occur on its own, and without interference, some educational strategies are the theory of attributes, and can be implemented deliberately to support learning. Intentional teaching and learning through cognitive apprenticeship requires that implicit processes be made visible to learners so that they can observe and then practice them. (Burner, 2015)

The strategies containing the basic model are

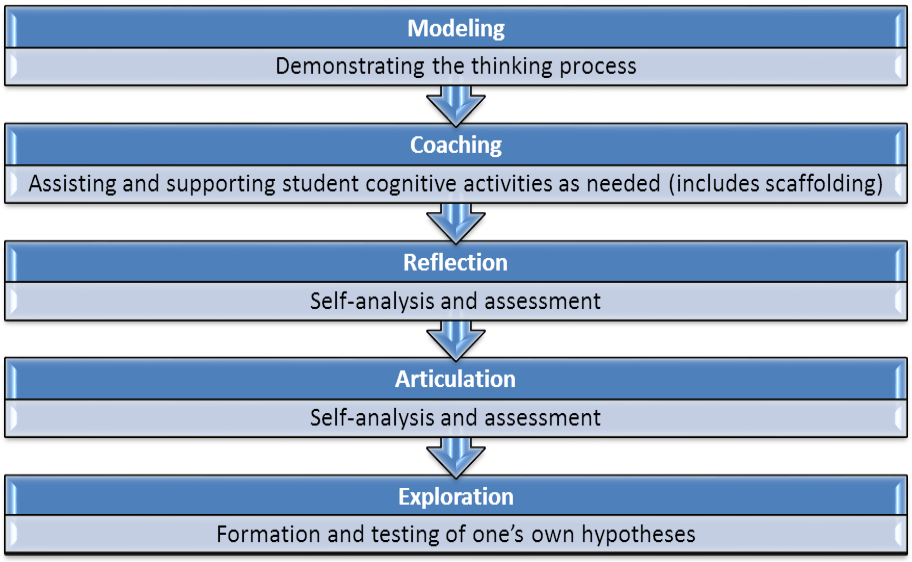

Figure (1) Strategies of CA

Observe that these strategies refer to teacher or expert actions. Learners participate in cognitive apprenticeship (CA) are responsible for observation, practice and reflection.

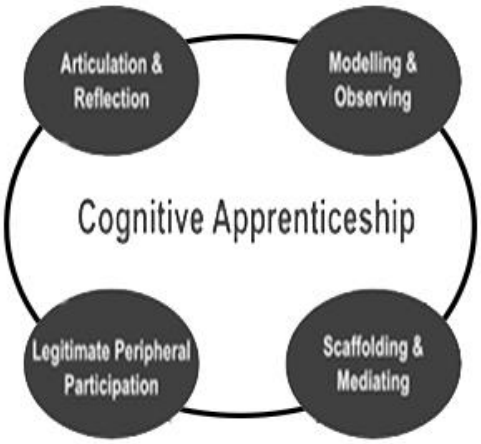

Figure (2) CA

The theory of cognitive apprenticeship (Burner, 2015) provides a strong theoretical model for the design and implementation of mentoring the science teaching strategies course preservice teachers. "Cognitive apprenticeship," according to Burner, "refers to the focus on learning by directing experience, on cognitive and cognitive, rather than physical skills and processes." It is designed to teach relevant

thinking and problem-solving skills to be able in a particular field using six methods: modeling, coaching, scaffolding, articulation, reflection, and exploration. Burner explains these methods as follows:

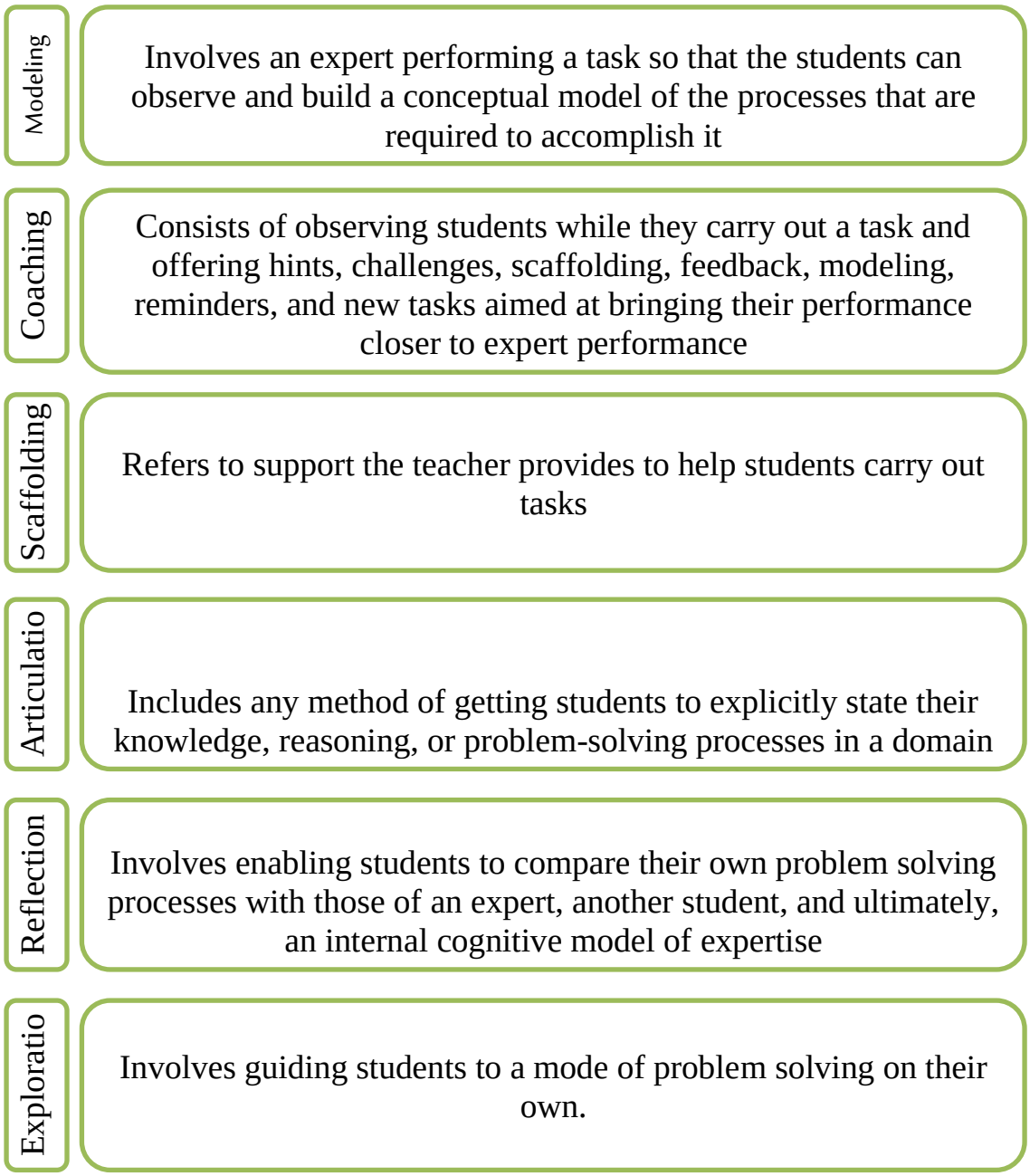

Figure (3) Burner methods

1.4 Important and Objective

The implementations of these methods of cognitive apprenticeship are required to be situated in the local context of instruction, because "apprenticeship embeds the learning of skills and knowledge in their social and functional context" (Burner, 2015)

Ultimately, "the focus of the expert/novice interaction in a cognitive apprenticeship is on developing cognitive skills of reflection through discourse and application of knowledge" (Borman, 2006).

So the research is based on the study of the impact of cognitive apprenticeship in studying science materials.

1.5 Research Questions

The purpose of this study is to enhance performance and attitude towards instructional planning using a cognitive apprenticeship to improve the science-teaching efficacy of preservice higher diploma teachers.

The major research questions of this research are:

1- Is there a change of using cognitive apprenticeship to beliefs of the effectiveness of teaching science?
2- How do cognitive apprenticeships provide experiences of science teachers?
3- How did the participants in the cognitive apprenticeship program impact on their science education efficiency?

2. Methodology

This research used sequential methods of mixed design research. This research contained qualitative and quantitative branches. First, the quantitative data collection and then analysis occur. Second, the collection and analysis of qualitative data occur to determine the results of the quantitative section. Therefore, the conclusions regarding the utility of the cognitive apprenticeship (CA)-based instructional coaching methods derived from the analysis of both strands.

Data analysis and statistical analysis using SPSS were analyzed using Chi-Square and z-proportional tests. The significance of statistical was set as 5 % ($p < 0.05$).

The study involved 22 teachers (all females gender, age: 20-30 years) enrolled in 14-week teaching science strategies course in the general high diploma. During the semester, the researcher, as the instructor, assumed the role of the instructor coach. This mentoring approach provided a framework for supporting the preservice teachers as they learned reform-based practices in science education, in instructional decision-making skills, and the utilization of evidence-based tools to implement an inquiry-based curriculum. The instructor-coach modeled curriculum implementation through a 6-week, 1-hour unit and lesson-planning workshop integrated within the class time.

2.1 Data Collection

The research included the amount of chains and independent quantitative / qualitative. This quantitative question addressed the first research question using pre-test design prior to the pilot test. These designs pre-trial lacks the control group. (Shadish, W. R., Cook, T. D., & Campbell, D. T., 2012)

The design of the pretest-posttest used by a single group, which uses repeated measurements of statistical analysis with reasonable control of internal threats, has been determined to the maximum extent possible, followed by a series of paired samples t-tests to be sufficient for this survey.

Quantitative data were collected by managing the revised beliefs tool for science teachers - Form B (STEBI-B). Reliability estimates of the instruments for this population were determined by calculating the alpha coefficients after each administration. The composite variables were calculated for the effectiveness of personal science teaching efficacy (PSTE) and science teaching outcome efficacy (STOE) for each measurement and analysis using repeated measures analysis of variance statistics to determine whether the variance in the four means were statistically significant. The quantitative administered at equal intervals at the beginning of the method, at week 7 after their microteachings, at week 14 after their field experiences, and measure was taken one weeks after the method. The instrument contains 23 items and is divided into two sub-scales: 13 items measuring PSTE and 10 items measuring STOE. According to developers, they adopted Alpha degrees coefficients reliability of 0.90 and 0.76 for both sides of the efficiency of personal science teaching and results. Finally, a series of paired samples t-tests were employed to determine if the differences, if any, in the means for PSTE between each administration periods were statistically significant.

Qualitative data were collected through document analysis of the end-of-method reflections in the preservice teachers' final portfolio and from 50-60 minute individual interviews with six preservice teachers purposively selected to re-arrange of ability levels. The preservice teachers' final method grades were used as the sole sampling criteria, as they were selected to reflect the range effectiveness and overall levels of mastery as measured by the final achievement results. During the interviews, participants were asked a number of open-ended questions about their experience, and which aspects of the method they perceived contributed significantly to any changes in their PSTE efficacy belief.

The method of data analysis in this study is based on the use of separated t-tests to compare the mean pre versus post-test scores for both the PSTE and STOE data. The quantitative data from the STEBI-B was coded on a 5-point Likert scale with strongly agree being “5”, and strongly disagree being “1”. The ten negatively worded items from the instrument were reversed coded. Numerical data were analyzed using general linear model repeated measures analysis of variance in SPSS 21. For this purpose, composite variables for PSTE and STOE were calculated for each time period. Second, a series of paired samples t-tests were used to determine whether the differences between the resulting means of each time period were statistically significant.

3. Results

The quantitative data from the STEBI-B was coded on a 5-point Likert scale with strongly agree being “5”, and strongly disagree being “1”. (See appendix A)

3.1 First Day

Table (2) Answer of test in 1st day

Item	Answers				
	Strong Agree	Agree	Uncertain	Disagree	Strong Disagree
1	0	2	3	11	6
2	0	3	4	6	9
3	0	2	6	7	7
4	0	4	3	10	5
5	0	0	2	8	12
6	0	1	1	12	8
7	0	2	0	8	12
8	0	1	1	9	11
9	0	1	2	9	10
10	0	1	2	9	10
11	4	0	1	8	9
12	3	0	1	12	6
13	3	1	3	11	4
14	1	3	5	8	5
15	0	4	5	4	9
16	1	3	5	4	9
17	0	0	2	12	8
18	0	2	1	11	8
19	1	0	0	9	12
20	0	2	4	9	7
21	0	3	3	6	10
22	0	5	6	4	7
23	0	5	5	6	6

Table (2) Reliability Statistics for answers 1st day

	S.A	Agree	Uncertain	D. Agree	S.D. Agree
Mean	0.57	1.96	2.83	8.39	8.26
S.D.	1.16	1.58	1.87	2.54	2.34

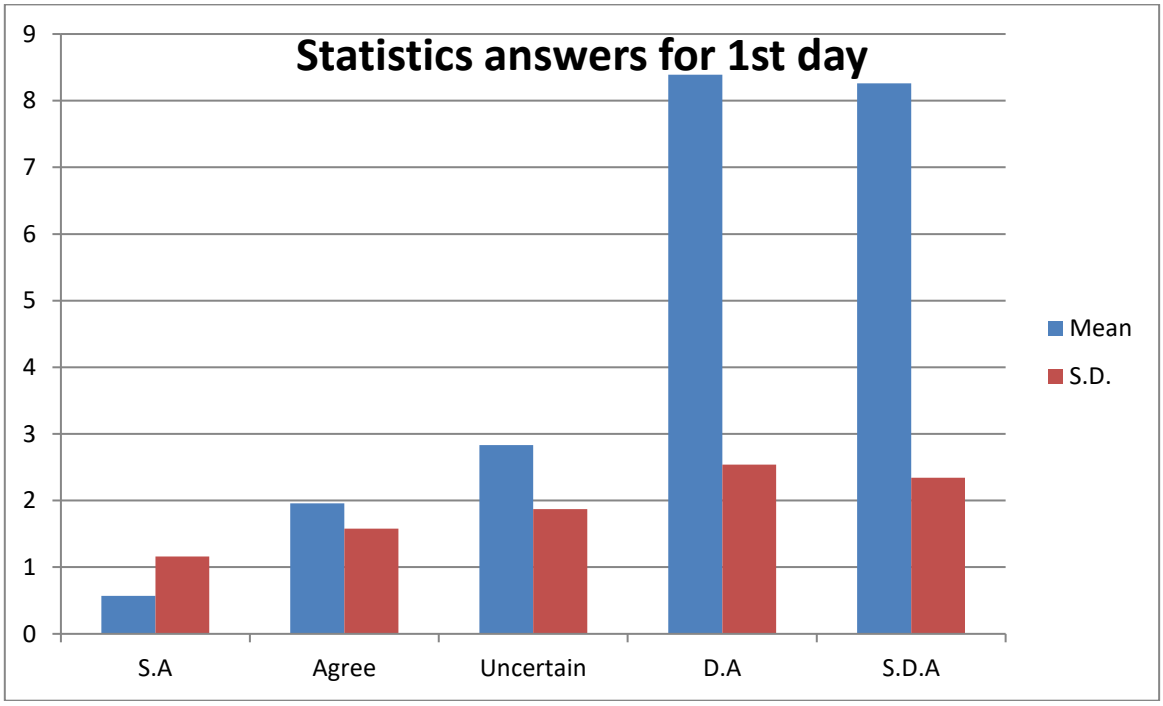

Figure (4) Statistics answers for 1st day

Statistical in 1st day

Table (3) PSTE and STOE in 1st day

S.D. (PSTE)	4.068937208
S.D. (STOE)	3.516723893

The table above showed the PSTE and STOE in first day with result 4.06 and 3.52

Table (4) Statistical in 1st day

Statistical	Result
Count	115
Mean	4.4
SD	3.822371818
SE mean	0.35643801
Skewness	1.683322158
T	0.047524684
Coefficient of variation	86.87208677

The results of the analysis showed that the coefficient of variation with the beginning of the method is equal to 86.8% and t-test was 0.04. This indicated the level of the sample participants before enhanced the methods of learning the science teachers of the higher diploma, and results showed that the rate of PSTE was 4.06 while STOE was 3.52. The researcher predicted a significant difference would appear during the study.

3.2 After 7 weeks

Table (5) Reliability Statistics for answers after 7 weeks

	S.A	Agree	Uncertain	D. Agree	S.D. Agree
Mean	0.00	1.96	8.26	8.39	3.39
S.D.	0.00	1.58	2.34	2.54	1.97

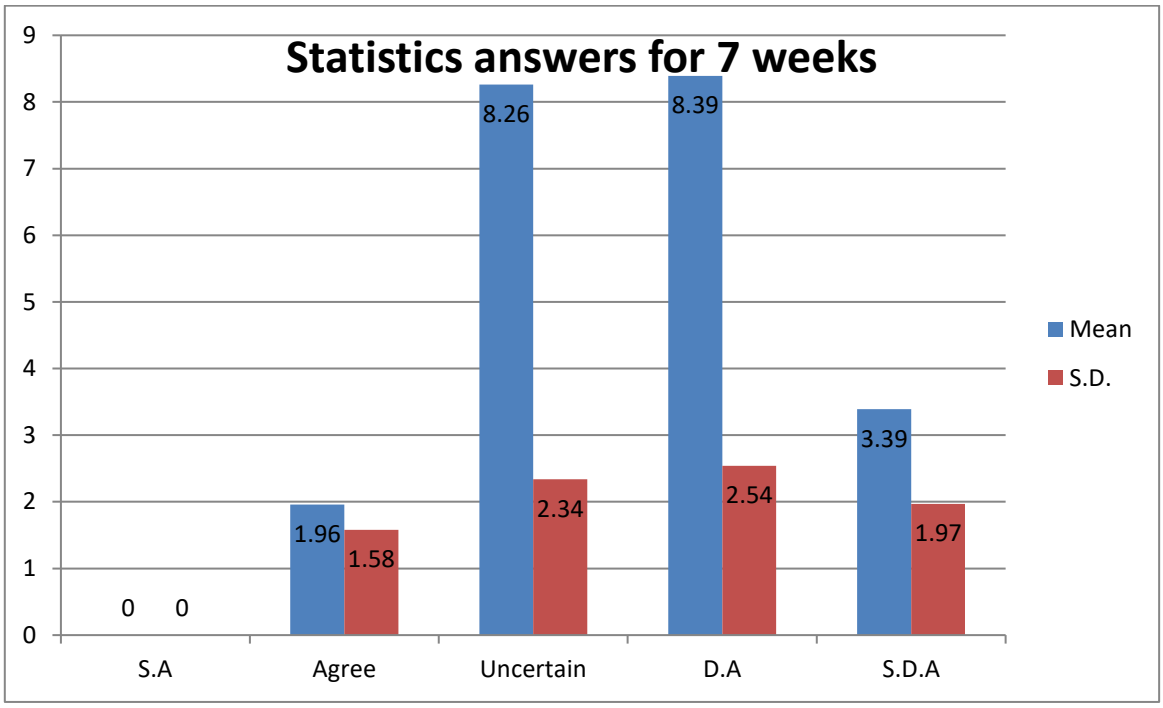

Figure (5) Statistics answers for 7 weeks

Statistical in 7 weeks

Table (6) STEP and STOE in 7 weeks

S.D. (PSTE)	**3.98**
S.D. (STOE)	3.75

The table above showed the PSTE and STOE in first day with result 3.98 and 3.75

Table (7) Statistical in 7 weeks

Statistical	Result
Count	115.00
Mean	4.40
SD	3.88
SE mean	0.36
Skewness	1.66
T	0.05
Coefficient of variation	88.22

The results of the analysis showed that the coefficient of variation with 7 weeks of training is equal to 88.22% and t-test was 0.05. This indicated the level of the sample participants before enhancing the methods of learned the science teachers of the higher diploma. Moreover, results showed that the rate of PSTE was 3.98 while STOE was 3.75. This indicated the evolution of education and the benefit of cognitive apprenticeship.

3.3 After 14 weeks

Table (8) Reliability Statistics for answers after 14 weeks

	S.A	Agree	Uncertain	D. Agree	S.D. Agree
Mean	10.0870	5.4783	2.9130	3.5217	0.0000
S.D.	2.4292	1.8798	1.7033	2.0420	0.0000

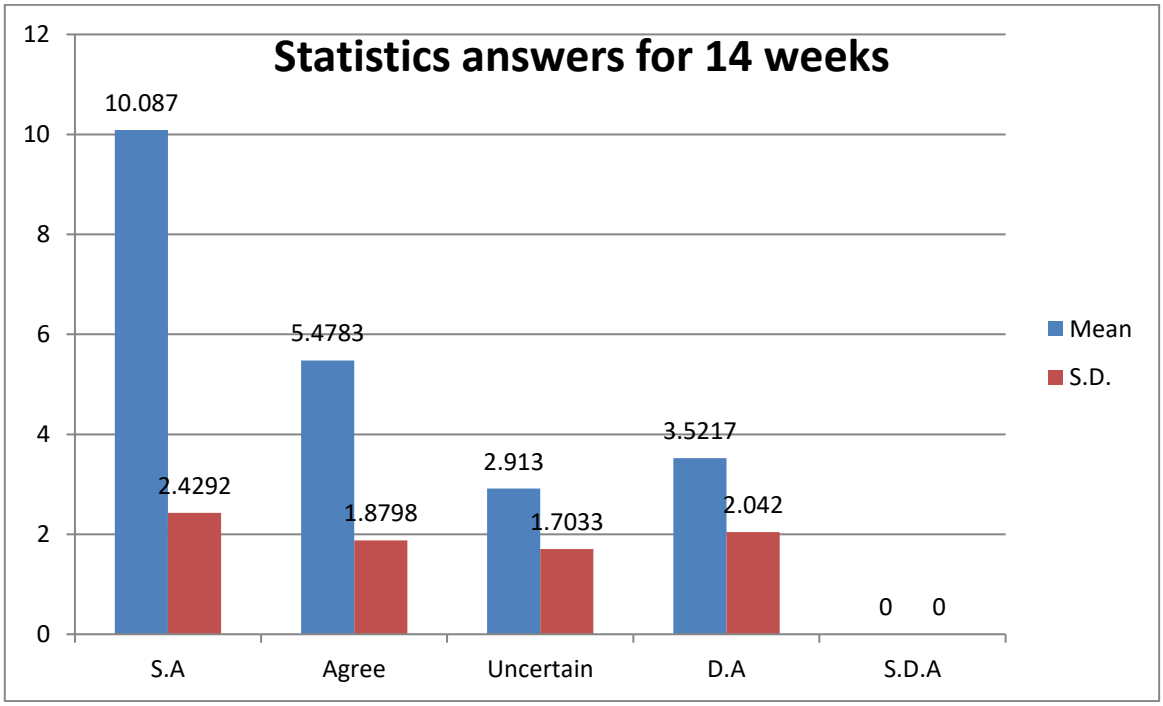

Figure (6) Statistics answers for 14 weeks

Statistical in 14 weeks

Table (9) PSTE and STOE in 14 weeks

S.D. (PSTE)	4.07
S.D. (STOE)	3.47

The table above showed the PSTE and STOE in first day with result 4.07 and 3.47

Table 1 Statistical in 14 weeks

Statistical	Result
Count	115
Mean	4.4
SD	3.801661687
SE mean	0.35450678
Skewness	1.692492312
T	0.046641763
Coefficient of variation	86.40140197

The results of the analysis showed that the coefficient of variation with 14 weeks of training is equal to 86.4% and t-test was 0.04. This indicated the level of the sample participants before enhanced the methods of learning the science teachers of the higher diploma. Moreover, results showed that the rate of PSTE was 4.07 while STOE was 3.47. This indicated the evolution of education and the benefit of cognitive apprenticeship.

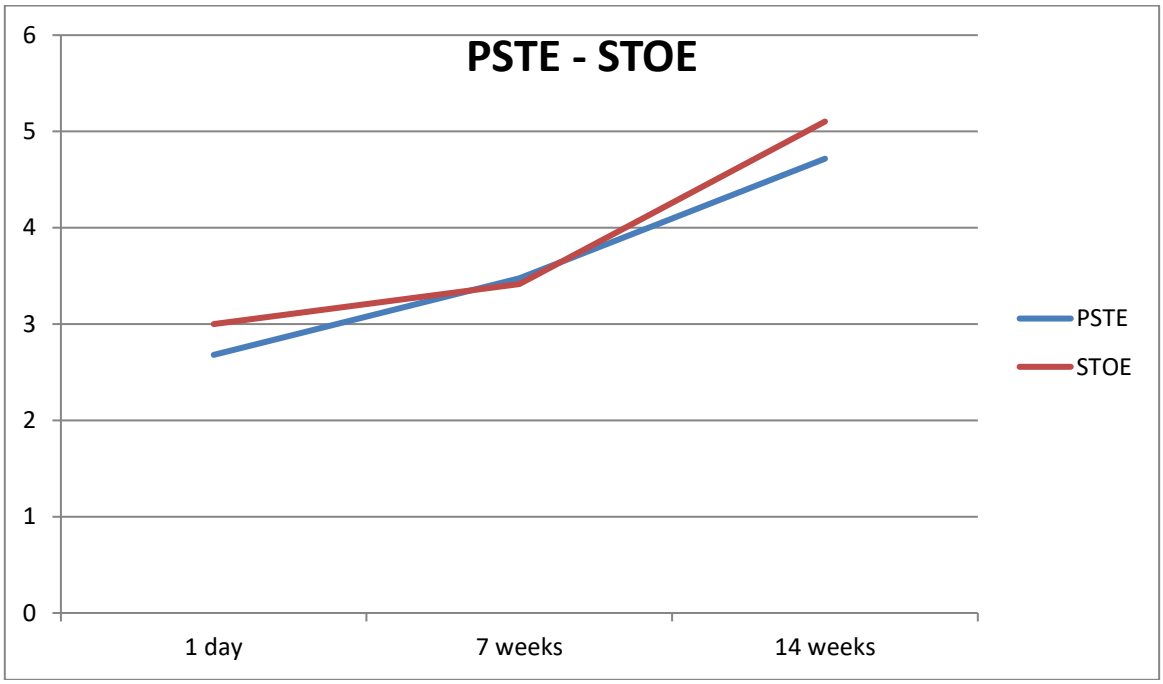

Figure (7) Statistical line for method

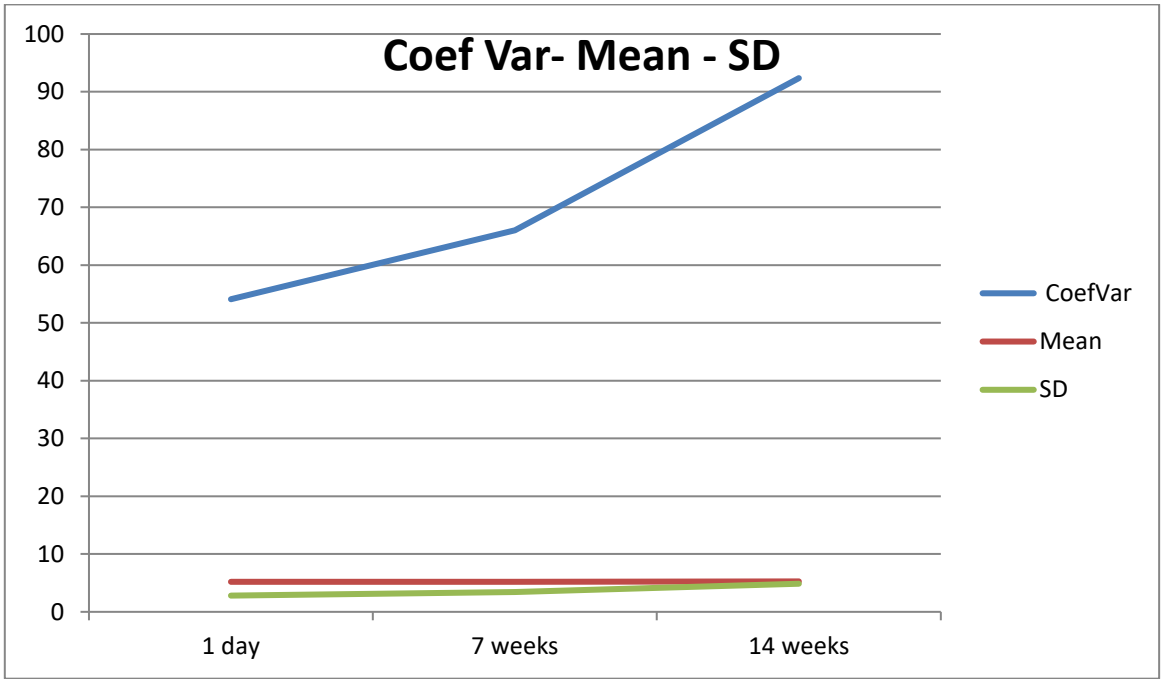

Figure (8) Coef Var - Mean - SD

The analysis showed statistically significant differences in the variation of methods among participants in the PSTE measurements as well as the measures before and after the method. This indicated that science teachers' levels of PSTE and STOE progressed significantly across the course and this is showed in the baseline measurement (figure 8, 9), and that the changes in PSTE and STOE continued to vary significantly between each subsequent scale taken during the study.

3.4 Comparing between 1st day and after 7 weeks

In table 11, the sum of negative rank is equal to Zero and sum of positive is 222. This mean that, the different between the negative and positive is 191 degree before teachers take course and 7 weeks after course, and it appeared that the high amount of deferent is for positive and it shows how teachers interact with the new method in just 7 weeks.

Table (11) Rank of 1st day: 7 weeks

Ranks			
	N	Mean Rank	Sum of Ranks
Negative Ranks	4a	7.75	31.00
Positive Ranks	18b	12.33	222.00
Ties	0[c]		
Total	22		

Test Statistics	
Z	-3.106-b
Asymp. Sig. (2-tailed)	.002

3.5 Comparing between 7weeks and after 14 weeks

In table 12, the sum of negative rank is equal to zero and sum of positive is 253. This mean that, the different between the negative and positive is 253 degree in 7 weeks after begin of course and the end of course, and it appeared that the amount of deferent is for positive with 72.5% upgraded percentages and the signed ranks test is 51%. Throughout the course, teachers continue to progress at their level and reach the desired degree of research after the course ends.

Table (12) Rank of 7 weeks: 14 weeks

Ranks			
	N	Mean Rank	Sum of Ranks
Negative Ranks	0[a]	0	0.00
Positive Ranks	22[b]	11.50	253
Ties	0[c]		
Total	22		
Test Statistics			
Z		-4.108-[b]	
Asymp. Sig. (2-tailed)		.000	

4. Conclusion

The quantitative findings showed a continuous statistically significant linear increase between the measures of PSTE beliefs of the Jordanian preservice teachers from the baseline measure to the end time of the method. However, a slight decrease in their PSTE beliefs was observed in the final measure but was determined as not statistically significant. The qualitative findings suggested that the preservice teachers' descriptions of their experience in the methods course were centered on discussing how the methods course influenced their attitudes and beliefs about science and science teaching and how they perceived they grew in areas such as self-confidence and teaching abilities. These findings also suggested that generally the preservice teachers perceived that all of the cognitive apprenticeship-based instructional coaching methods positively influenced their PSTE, but respective individuals valued them differently depending on their unique needs and perceptions of their own levels of science teaching efficacy.

Quantitative results showed a statistically significant linear increase in the beliefs of the effectiveness of personal science teaching for custodial teachers because of their experience in the course. Two of the five categories derived from qualitative data have indicated their experiences and may help to explain this observed phenomenon. The two categories consist of references to:

1- Changes in attitude / feelings
2- Perceptions of growth in the beliefs of the effectiveness of personal science teaching (PSTE)

The largest number of references was "changing attitudes / feelings", representing the most (68%) of the encrypted data on how they viewed their experience during the course.

Changes in Attitudes/Feelings.

When discussing their experience during the methods course, preservice teachers referred to changes in their attitudes/feelings about their science teaching abilities and towards students' science learning in the majority of the coded references. Several preservice teachers reported beginning the course with initial feelings of fear and anxiety primarily due to having low confidence in their abilities to teach science (TSE) effectively. However, as they engaged in the learning activities in the course their anxiety levels declined.

Preservice teacher's comments

- "When the course first began I was shy and uncertain of how to teach science lessons effectively but through learning in class and actively working on assignments I believe that I can now teach science lessons effectively."
- "I went from not having the faith that I could teach science at all, let alone effectively for students to learn and gain something from it, to teaching science in a meaningful way and providing an environment for all my students to succeed at science."
- "The contents in this course led to the diminishing of that fear present at the beginning and provided me with a step by step guide to go into the classroom feeling comfortable enough to deliver an effective science lesson where learning takes place."

These findings reveal preservice teachers' struggles with their personal science teaching efficacy beliefs at the beginning of the method as evidenced by references to being uncertain and not having faith. In two of the cases above, the word "fear" was used to describe their feelings towards teaching science. This is most likely because, as (Yilmaz, 2008) noted, preservice teachers often view science as difficult and feel inadequately prepared to teach it.

However, the preservice teachers held that their attitudes and feelings began to change as they learned the content and engaged in the learning experiences in the course. Their use of the terms "actively working" and "step-by-step guide" to describe the learning experiences suggest that the course promoted a high degree of engagement, modeling, and guided practice, which are characteristic of cognitive apprenticeship learning. Additionally, the findings also suggest that not only were their personal science teaching efficacy beliefs influenced, but their outcome expectancies were as well the other dimension of science teaching efficacy belief. This excerpt from a preservice teachers' portfolio reflection is illustrative.

5. Recommendation

The overall results of this study suggest that to enhance performance and attitudes towards instructional planning among Saudian higher diploma science teachers using the cognitive apprenticeship-based instructional coaching (CAIC) methods may provide an effective reform-based model for developing and sustaining the STEB "science teaching efficacy beliefs" of preservice higher diploma science teachers. The quantitative findings in this study further illustrate that the results obtain by adopting the CAIC approach designing and implementing of science methods can be significantly positive for teachers. Additionally, perceptions of the teachers about the influence of the CAIC methods course present in the qualitative data suggest that this model may also be worth exploring for its ability to influence preservice teachers who come to methods course with various learning needs and with different levels of STEB. Embrace the coaching role that utilizes the tools of cognitive apprenticeship (Warren, 2013) may equip science methods instructors with a framework to design and implement methods courses that engage students as apprentices in meaningful learning opportunities that are narrowly-tailored to the four aspects of self-efficacy development, as they learn to teach science effectively through authentic social engagement within the local and functional context of instruction.

Bibliography

- Avant, R. C. (2012). Instructional coaching and emotional intelligence (Doctoral Dissertation). ProQuest Dissertations and Theses database.
- Baker, G. W. (2010). Instructional coaching in U.S. urban school districts: The principal perspective on how coaches are supervised (Doctoral Dissertation). ProQuest Dissertations and Theses database.
- Borman, J. &. (2006). Instructional coaching: Key themes from the literature. Providence. RI: The Education. Alliance at Brown University.
- Burner, V. P. (2015). The Cognitive Apprenticeship Model in Educational Practice. Florida: Florida State University.
- Cooper, T. (September, 2013). Practice, Professionalism, & Patriotism in England Science Education. London.
- Cooper, T. a. (2008). Student Leadership Development in Higher Education. An Annotated Bibliography (Master's Capstone).
- Cornett, Knight. (2008). Research on Coaching. In J. Knight (Ed.) Coaching: Approaches and perspectives. Thousand Oaks, CA: Corwin.
- Denton, C. A. (2009). A description of instructional coaching and its relationship to consultation. Journal of Educational and Psychological Consultation, 150-175.
- Knight, J. (2009). Coaching: Approaches and perspectives. Thousand Oaks, CA. Corwin.

- Liu, T. C. (2015). Web-based cognitive apprenticeship model for improving pre-service teachers' performances and attitudes towards instructional planning: design and field experiment. Educ. Technol. Soc, 136–149.
- Reed, L. A. (2015). Case study of the implementation of cognitive coaching by an instructional coach in a title I elementary school (Doctoral Dissertation). ProQuest Dissertations and Theses database.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2012). Experimental and quasi-experimental designs for generalized causal inference. Boston: Houghton Mifflin.
- Warren, J. M. (2013). When implementing policy gets messy: An analysis of a district wide coaching initiative (Doctoral Dissertation). Canda: ProQuest Dissertations and Theses database. .
- Wicker, R. K. (2016). Do science coaches promote inquiry-based instruction in the elementary science classroom? (Doctoral Dissertation). Canda: ProQuest Dissertations and Theses database.
- Yilmaz, H. &. (2008). The effects of the teaching practice on preservice elementary teachers' science teaching efficacy and classroom management beliefs. Eurasia Journal of Mathematics, Science & Technology Education, 45-54.

Appendix A

Science Teaching Efficacy Belief Instrument – Form B

Developed by (Enoch, 1990) used with permission.

Please indicate the degree to which you agree or disagree with each statement below by circling the appropriate letters to the right of each statement.

		Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1-	When a student does better than usual in science, it is often because the teacher exerted a little extra effort.					
2-	I will continually find better ways to teach science					
3-	Even if I try very hard, I will not teach science as well as I will most subjects.					
4-	When the science grades of students improve, it is often due to their teacher having found a more effective teaching approach.					
5-	I know the steps necessary to teach science concepts effectively					
6-	I will not be very effective in monitoring science experiments.					

		Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
7-	If students are underachieving in science, it is most likely due to ineffective science teaching					
8-	I will generally teach science ineffectively					
9-	The inadequacy of a student's science background can be overcome by good teaching					
10-	The low science achievement of some students cannot generally be blamed on their teachers					
11-	When a low-achieving child progresses in science, it is usually due to extra attention given by the teacher					
12-	I understand science concepts well enough to be effective in teaching science					
13-	Increased effort in science teaching produces little change in some students' science achievement					
14-	The teacher is generally responsible for the achievement of students in science					
15-	Students' achievement in science is directly related to their teacher's effectiveness in science teaching.					
16-	If parents comment that their child is showing more interest in science at school, it is probably due to the performance of the teacher					
17-	I will find it difficult to explain to students why science experiments work					
18-	I will typically be able to answer students' science questions					
19-	I wonder if I will have the necessary skills to teach science					
20-	Given a choice, I will not invite the principal to evaluate my science teaching					
21-	When a student has difficulty understanding a science concept, I will					

		Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
	usually be at a loss as to how to help the student understand it better					
22-	When teaching science, I will usually welcome student questions					
23-	I do not know what to do to turn students on to science					

Appendix B

Statistical Analysis

1- 1st day

Table (13) first day sample

	S.A.	A	U	D.A	S.D.A
1	0	2	3	11	6
2	0	3	4	6	9
3	0	2	6	7	7
4	0	4	3	10	5
5	0	0	2	8	12
6	0	1	1	12	8
7	0	2	0	8	12
8	0	1	1	9	11
9	0	1	2	9	10
10	0	1	2	9	10
11	4	0	1	8	9
12	3	0	1	12	6
13	3	1	3	11	4
14	1	3	5	8	5
15	0	4	5	4	9
16	1	3	5	4	9
17	0	0	2	12	8
18	0	2	1	11	8
19	1	0	0	9	12
20	0	2	4	9	7
21	0	3	3	6	10
22	0	5	6	4	7
23	0	5	5	6	6
Mean	0.57	1.96	2.83	8.39	8.26

	S.A.	A	U	D.A	S.D.A
S.D.	1.16	1.58	1.87	2.54	2.34
S.D. (PSTE)	1.48	1.19	1.59	1.88	2.63
S.D. (STOE)	0.48	1.77	2.01	2.95	2.02

Table (14) 1st day teachers sample degrees

Teacher	Question																						total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	1	1	3	1	2	1	2	1	1	1	1	1	1	2	1	1	2	2	1	2	2	3	1	34.00
2	1	1	2	2	1	1	2	1	2	1	2	1	3	2	1	1	2	1	2	1	2	1	2	35.00
3	2	1	1	2	1	2	1	1	1	2	1	2	1	1	1	2	1	2	1	4	4	1	1	36.00
4	4	3	3	3	2	1	1	1	2	1	1	2	3	1	2	1	2	1	2	3	3	1	2	45.00
5	3	4	3	3	2	2	2	2	1	1	1	1	2	1	2	1	2	2	2	3	3	2	2	47.00
6	3	3	4	4	1	2	1	2	2	1	2	1	2	1	2	1	1	1	2	3	4	1	1	45.00
7	3	3	3	4	2	1	2	1	4	3	2	3	5	5	3	3	2	1	1	3	4	1	1	60.00
8	4	4	3	3	2	1	1	2	3	3	3	5	2	3	3	3	2	1	2	4	3	1	1	59.00
9	2	1	2	1	1	2	1	2	3	4	5	2	5	3	4	4	1	2	1	1	1	1	1	50.00
10	1	1	1	2	1	2	1	2	1	2	2	5	2	3	4	3	2	1	1	1	1	2	2	43.00
11	2	1	1	2	1	2	2	1	2	2	5	2	2	3	4	3	1	2	1	2	1	3	4	49.00
12	2	2	1	2	1	2	1	1	1	1	5	5	2	3	3	5	1	1	5	1	1	3	3	52.00
13	1	2	1	2	1	2	1	2	1	2	5	2	5	4	3	4	2	3	2	1	1	4	4	55.00
14	2	1	1	2	1	2	1	1	1	2	1	1	2	1	1	1	1	2	1	2	1	3	3	34.00
15	1	2	2	1	2	2	1	1	2	2	2	2	2	2	1	1	2	2	1	2	1	4	3	41.00
16	2	1	1	2	1	1	2	2	2	1	2	1	2	2	1	2	1	2	2	1	2	4	3	40.00
17	2	2	2	1	1	1	2	2	1	2	1	2	2	2	2	1	1	2	1	2	2	3	4	41.00
18	2	1	2	2	1	2	1	2	2	1	1	2	1	2	1	2	2	2	2	2	2	3	4	42.00
19	2	4	3	4	3	3	4	4	1	1	2	2	1	2	1	2	2	1	1	2	1	4	3	53.00
20	2	3	4	4	3	4	4	3	2	2	1	2	3	4	4	4	3	4	1	2	1	4	4	68.00
21	1	2	2	1	2	1	2	1	2	1	2	2	4	4	3	3	3	4	2	1	2	2	2	49.00
22	2	2	2	2	2	2	1	1	1	2	1	2	2	2	1	1	2	2	1	2	1	2	2	38.00
Mean Degrees																								46.18

2- 7 weeks

Table (15) 7 weeks sample

	S.A.	A	U	D.A	S.D.A
1	0	2	6	11	3
2	0	3	9	6	4
3	0	2	7	7	6
4	0	4	5	10	3
5	0	0	12	8	2

	S.A.	A	U	D.A	S.D.A
6	0	1	8	12	1
7	0	2	12	8	0
8	0	1	11	9	1
9	0	1	10	9	2
10	0	1	10	9	2
11	0	0	9	8	5
12	0	0	6	12	4
13	0	1	4	11	6
14	0	3	5	8	6
15	0	4	9	4	5
16	0	3	9	4	6
17	0	0	8	12	2
18	0	2	8	11	1
19	0	0	12	9	1
20	0	2	7	9	4
21	0	3	10	6	3
22	0	5	7	4	6
23	0	5	6	6	5
Mean	0.00	1.96	8.26	8.39	3.39
S.D.	0.00	1.58	2.34	2.54	1.97
S.D. (PSTE)	0.00	1.35	2.60	2.21	1.99
S.D. (STOE)	0.00	1.93	1.92	3.07	2.07

Table (16) 7 weeks teachers sample degrees

Teachers	Questions																							Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	3	3	1	3	2	3	2	3	3	3	3	3	3	2	3	3	2	2	3	2	2	1	3	58
2	3	3	2	2	3	3	2	3	2	3	2	3	1	2	3	3	2	3	2	3	2	3	2	57
3	2	3	3	2	3	2	3	3	3	2	3	2	3	3	3	2	3	2	3	4	4	3	3	64
4	4	1	1	1	2	3	3	3	2	3	3	2	1	3	2	3	2	3	2	1	1	3	2	51
5	1	4	1	1	2	2	2	2	3	3	3	3	2	3	2	3	2	2	2	1	1	2	2	49
6	1	1	4	4	3	2	3	2	2	3	2	3	2	3	2	3	3	3	2	1	4	3	3	59
7	1	1	1	4	2	3	2	3	4	1	2	1	1	1	1	1	2	3	3	1	4	3	3	48
8	4	4	1	1	2	3	3	2	1	1	1	1	2	1	1	1	2	3	2	4	1	3	3	47
9	2	3	2	3	3	2	3	2	1	4	1	2	1	1	4	4	3	2	3	3	3	3	3	58
10	3	3	3	2	3	2	3	2	3	2	2	1	2	1	4	1	2	3	3	3	3	2	2	55
11	2	3	3	2	3	2	2	3	2	2	1	2	2	1	4	1	3	2	3	2	3	1	4	53
12	2	2	3	2	3	2	3	3	3	3	1	1	2	1	1	1	3	3	1	3	3	1	1	48
13	3	2	3	2	3	2	3	2	3	2	1	2	1	4	1	4	2	1	2	3	3	4	4	57
14	2	3	3	2	3	2	3	3	3	2	3	3	2	3	3	3	3	2	3	2	3	1	1	58

Teachers	Questions																							Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
15	3	2	2	3	2	2	3	3	2	2	2	2	2	2	3	3	2	2	3	2	3	4	1	55
16	2	3	3	2	3	3	2	2	2	3	2	3	2	2	3	2	3	2	2	3	2	4	1	56
17	2	2	2	3	3	3	2	2	3	2	3	2	2	2	2	3	3	2	3	2	2	1	4	55
18	2	3	2	2	3	2	3	2	2	3	3	2	3	2	3	2	2	2	2	2	2	1	4	54
19	2	4	1	4	1	1	4	4	3	3	2	2	3	2	3	2	2	3	3	2	3	4	1	59
20	2	1	4	4	1	4	4	1	2	2	3	2	1	4	4	4	1	4	3	2	3	4	4	64
21	3	2	2	3	2	3	2	3	2	3	2	2	4	4	1	1	1	4	2	3	2	2	2	55
22	2	2	2	2	2	2	3	3	3	2	3	2	2	2	3	3	2	2	3	2	3	2	2	54
Mean Degrees																								55.18

3- 14 weeks

Table (17) (14 weeks) sample

	S.A.	A	U	D.A	S.D.A
1	6	8	2	6	0
2	11	4	3	4	0
3	9	5	2	6	0
4	7	8	4	3	0
5	13	7	0	2	0
6	10	8	3	1	0
7	14	4	4	0	0
8	13	4	4	1	0
9	12	5	3	2	0
10	13	6	1	2	0
11	11	6	0	5	0
12	8	10	0	4	0
13	8	7	1	6	0
14	8	5	3	6	0
15	10	3	4	5	0
16	10	3	3	6	0
17	9	6	5	2	0
18	12	3	6	1	0
19	13	4	4	1	0
20	10	6	2	4	0
21	12	4	3	3	0
22	7	4	5	6	0
23	6	6	5	5	0
Mean	10.0870	5.4783	2.9130	3.5217	0.0000
S.D.	2.4292	1.8798	1.7033	2.0420	0.0000

	S.A.	A	U	D.A	S.D.A
S.D. (PSTE)	2.599309573	1.887883	1.5525	2.087816	0
S.D. (STOE)	2.263232693	1.264911	1.247219	2.024846	0

Table (18) (14 weeks) teachers sample degrees

Teachers	Questions																							Degrees
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	5	5	2	5	4	5	4	5	5	5	5	5	5	4	5	5	4	4	5	4	4	2	5	102
2	5	5	4	4	5	5	4	5	4	5	4	5	2	4	5	5	4	5	4	5	4	5	4	102
3	4	5	5	4	5	4	5	5	5	4	5	4	5	5	5	4	5	3	5	3	3	5	5	103
4	3	2	2	2	4	5	5	5	3	5	5	4	2	5	4	5	3	5	3	2	2	5	4	85
5	2	3	2	2	4	3	3	3	5	5	5	5	4	5	4	5	3	3	3	2	2	4	4	81
6	2	2	3	3	5	3	5	3	3	5	4	5	4	5	4	5	5	5	3	2	3	5	5	89
7	2	2	2	3	4	5	3	5	3	2	4	2	2	2	2	2	3	5	5	2	3	5	5	73
8	3	3	2	2	4	5	5	3	2	2	2	2	4	2	2	2	3	5	3	3	2	5	5	71
9	4	5	4	5	5	4	5	4	2	3	2	4	2	2	3	3	5	3	5	5	5	5	5	90
10	5	5	5	4	5	4	5	4	5	4	4	2	4	2	3	2	3	5	5	5	5	4	4	94
11	4	5	5	4	5	4	4	5	4	4	2	4	4	2	3	2	5	3	5	4	5	2	3	88
12	4	4	5	4	5	4	5	5	5	5	2	2	4	2	2	2	5	5	2	5	5	2	2	86
13	5	4	5	4	5	4	5	4	5	4	2	4	2	3	2	3	4	2	4	5	5	3	3	87
14	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	2	106
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3	2	110
16	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3	2	107
17	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	3	107
18	4	5	4	4	5	4	5	4	4	5	5	4	5	4	5	4	4	4	4	4	4	2	3	96
19	4	3	2	3	2	2	3	3	5	5	4	4	5	4	5	4	4	5	5	4	5	3	2	86
20	4	2	3	3	2	3	3	2	4	4	5	4	2	3	3	3	2	3	5	4	5	3	3	75
21	5	4	4	5	4	5	4	5	4	5	4	4	3	3	2	2	2	3	4	5	4	4	4	89
22	4	4	4	4	4	4	5	5	5	4	5	4	4	4	5	5	4	4	5	4	5	4	4	100
Mean Degrees																								92.14