

*Full Length Research Paper*

## Benefits of teaching interdisciplinary subjects collaboratively in Jordanian pre-vocational education

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The study aimed to investigate the benefits of teaching pre-vocational education (PVE) through the collaboration of the other teacher with the PVE teacher. The study adopted experimental and descriptive methodologies. An experiment was conducted through collaboration of teachers of different subjects in Pre-Vocational Education (PVE) to teach a class for a full school year (the experimental group), and another class was taught by the PVE teacher only (the control group). The number of students in each class was 35 students. To identify the effect of the experiment from the teachers point of view a semi-structured interview was conducted with each one of the participant teachers, while students responded to an attitudes scale in addition to practical and theoretical achievement tests. Results revealed that collaborative teaching that was undertaken co-operatively by the PVE teacher and teachers of other subjects better improved students' achievement and attitudes towards PVE in comparison to teaching only by the PVE teacher. It was also found that there are other benefits of multi-teacher collaboration on the delivery of PVE; among these were: better training on practical skills, better integration with other school subjects, better record of students' progress that is required for guidance purposes, in addition to better time utilization of classes.

**Key words:** Collaborative teaching, pre-vocational education (PVE), multi-teacher collaboration.

### INTRODUCTION

Co-teaching, collaborative teaching and team teaching are the categories of the teaching approaches that have been introduced to maximize the benefits of the teaching and learning process with appropriate nature of activities. For some researchers, these are interconnected and share common characteristics, as they need collaboration between more than one teacher to be implemented. The concept of co-teaching is also considered as one form of

the collaborative teaching. It is defined as "two or more professionals delivering substantive instructions to a diverse, or blended, group of students in a single physical space" (Cook and Friend; 1995, Scribner-MacLean and Miller, 2011 (p.419); Davis, 1995).

Co-teaching has been defined as a practice in which "two professionals co-plan, co-instruct and co-assess a diverse group of students. Both teachers provide

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substantive instruction to all students on a daily, consistent basis. Neither is considered the main teacher of the class; they are equals” (Murawski and Dieker, 2008, p. 29). Friend and Cook (2010) have mentioned co-teaching as a form of approach to provide advanced and specialized services to each student in a broad education classroom (Conderman, 2011). It includes two or more teachers working collectively to convey directions to a heterogeneous gathering of students in the instructional space. Educators share their aptitude, offer materials, and create regular instructional objectives (Friend and Cook, 2010 cited in Scribner-MacLean and Miller, 2011, Nierengarten, 2013). As co-teaching requires more than one teacher to be implemented, it may also take the form of team teaching. In team teaching, teachers have equal roles in the execution of instruction. Equality becomes evident as teachers utilize the same strategies of instruction, monitoring, and interacting with students (Cole, 2009; Murawski and Hughes, 2009).

For as long as two decades, co-teaching has turned out to be a viable methodology for K-12 education, in which co-teaching was utilized to enhance practice and guidelines better help for students. Co-educators work to “create a typical syllabus, incorporate their different viewpoints, select subjects, and offer list of exercises” (Dugan and Letterman, 2008). Gately and Gately (2001) characterize co-teaching as a variety of group that includes two or more teachers offering arranging and guideline for gathering students in the same session in a single physical space. Furthermore, co-teaching has witnessed remarkable development by introducing some models of delivery for teachers to follow and implement. There are various structures or “models” that are perhaps used in a set up of conducting co-teaching to identify the participation of each professional in providence of instructions (Kamens et al., 2013). The most universal ones are those that have been made prominent by Friend and Cook (2010, p. 7) and incorporate one instruct/one watch, one educate/one aid, station instructing, parallel educating, option instructing, and group educating. Different elements that influence the adequacy of co-showing incorporate the substance mastery of the educators, their level of showing background, accessibility of joint arranging time, and co-educator similarity (Friend and Cook, 2010; Mastropieri et al., 2005).

The intention of co-teaching has been to meet the needs of all students and to ensure all students reach their potential (Abbye-Taylor, 2014). There are essential requirements that are required to benefit from co-teaching; energy and an uplifting demeanor are crucial when two separate educators are occupied with co-operation (Carley, 2013; Friend, 2008). One instructor’s hesitance or lack of interest to team up influences the other educator and furthermore, it obstructs students’ learning (Syh-Jong et al., 2006). Welch (1998) expressed that a few obstructions to fruitful joint effort incorporate contrasts in instructive ideas, a commonsense

methodology and individual disposition.

Researchers have stated that co-teaching is producing positive impact upon the performance of the students in High School (Syh-Jong, 2006, p.7). They have also noted the benefits to ‘English Language Learners’ (Zehr, 2006) whereas diversity in the student population has evidently shown academic growth (Zehr, 2006). Instructors in different domains, for example, science and arithmetic, have likewise noted the focal points of co-instructing the students (Scantlebury et al., 2008; Syh-Jong, 2006).

Chu et al. (2011) investigated the effect of combining learning of collaborative teaching with inquiry project-based learning on the development of primary students’ information literacy and IT skills. A collaborative teaching approach involving three teachers in different subject areas was adopted. The results indicated that this program had a positive impact on the development of different dimensions of the students’ information literacy and IT skills. Wallace (2007) investigated the effect of interdisciplinary team teaching team configuration upon the social bonding of the middle school students. One of the configurations in the study was to form a team of four teachers, each specializing in a core subject to teach the subjects to all students. All levels of analysis indicated that interdisciplinary teaching team configuration produced a significant effect on the students’ social bonding.

Uwanieiye and Ojikutu (2009) investigated the effect team teaching on the academic achievement of students in an introductory technology course. The results showed that there was a significant difference between the performance of students taught using team teaching and those taught using conventional method in favor of team teaching. Syh-Jong (2006) studied the effect of incorporating web-assisted learning with team teaching in seventh grade science classes. The results showed that the average final examinations scores of students experiencing web-assisted team teaching were significantly higher than that of those who received traditional teaching. Also Syh-Jong (2008) studied the effect of integrating technology and team teaching into science teacher education methods course. The results revealed that there was a significant effect of using team teaching in integration with technology on enhancing the teaching practice of student-teachers, in addition to its effect on enhancing friendship through interaction between student teachers.

Besides all benefits of co-teaching, there is one that comprises opportunities to fluctuate presentation of the content, variation in giving instructions, scaffold learning experiences and keeping a check on comprehension of the students (Hartigan, 2014). Working with co-educators can similarly permit learners to have more rich criticism from teachers with diverse encounters and perspectives. With the capability to impart obligations, co-showing permits superb guideline to proceed as teachers oversee different commitments (Conderman, 2011).

Due in part to its relatively recent emergence, empirical research on the effectiveness of co-teaching-in terms of quantitatively-measured student outcomes- is limited. Indeed, very few large-scale studies on co-teaching have been conducted to date, and smaller-scale studies have yielded mixed results (Hanover Research, 2012, p.5).

Magiera et al. (2005) found that in secondary math courses, team teaching specifically is rare. The special education teacher is very rarely the primary instructor in co-taught mathematics classes, serving instead as a support for the general education teacher during instruction. The study found that in such classes, the most common role played by both teachers is that of monitoring student work, either by reviewing homework or observing students solving problems independently. In a mathematics class, the same study stated, "the role of the special education teacher is not to become a quasi-mathematics teacher (there is one already in the classroom) but to explicitly teach processes that help students with disabilities understand mathematical concepts (p. 6).

Zigmond and Magiers (2001) mentioned that several researchers have attempted to perform meta-analyses of studies on co-teaching. One of these, conducted in 2001 by the Council for Exceptional Children (CEC), identified four studies "in which the effectiveness of co-teaching was measured empirically and compared statistically with a control condition. Three of these studies took place in elementary schools and showed co-teaching to be as effective-but not *more* effective-than resource room instruction or consultation with the general education teacher. One study examined co-teaching in a high school setting, and found a decline in student performance. Based on the results of these studies, the CEC report advised educators to exercise caution when implementing co-practitioners how to do it, there are virtually no convincing data that tell the practitioner that it is worth doing (p. 46).

Murawski and Swanson (2001) also examined data-based studies on the effectiveness of co-teaching. The report found that only six of 89 reviewed articles "provided sufficient quantitative information for an effect size to be calculated. All six studies took place in public schools over the course of one year, except for one, which lasted only three weeks. Each class under examination was led by a general education teacher, a part-time teaching assistant (for four hours a day), and a special education teacher (for one to two hours a day). Special education students were primarily students with learning disabilities and/or low achievement. The studies encompassed all grade levels: one examined grades K-3, two examined grades 3-6, and three examined grades 9-12.

Prevocational education (PVE) in Jordan is one of the curriculum subjects taught at the basic education stage, it is a practical form of provision of subjects related to different vocational sectors. It does not aim to equip

students with employable skills. It is delivered as modularized training packages in agriculture, industry, home economics, economics, and health and safety (Ministry of Education, 1990). The provision of PVE in Jordan is intended to achieve a variety of general objectives. These objectives can be summarized in: inculcating positive attitudes towards manual work and workers, enabling students to acquire practical and applicable skills with economic and social benefits, providing the students with an opportunity to discover their affinities and aptitudes in order to facilitate their selection of prospective careers based on informed and realistic experiences. In addition, PVE aims at acquainting students with the practical application of knowledge obtained from other subjects, improving students' problem-solving and values-commitment abilities, enhancing their abilities to deal with modern technology, improving their consciousness of domestic life requirements, improving their "sense of responsibility" towards the environment, and enabling them to communicate through drawings and symbols (Ministry of Education, 1990).

Because of the wide spectrum of objective, and teacher's tasks, the curriculum of (PVE) is distinguished from the traditional academic curriculum in that it includes not only theoretical Knowledge and basic subject skills, but also practical ability in real-life situations. Prevocational education does not take the form of a linear curriculum, and thus the interaction of all relative components will continuously occur. The educational system in Jordan struggle to find the suitable way to prepare teachers who are able to teach PVE. It is currently taught by two types of teachers: teachers who are specialized only in one of its subject knowledge domains at a diploma level without any educational qualification, or by teachers who are PVE specialists and educationally qualified. However, both types of teachers find it difficult to teach all domains of the PVE curriculum (Doghlos, 2004).

Previously, a perceptual study was led to find the method of reasoning to embrace group showing for the most part in conveyance of PVE (Alsa'aideh, 2010). It was discovered that educators of distinctive subjects in the school can partake in a group to show the fields (subjects) of PVE: Science instructors saw themselves capable at a high level to instruct the agrarian subjects; Arts training educators were seen the most ready to work together in showing a portion of the mechanical subjects; Math instructors saw themselves the most ready to educate the finance related subjects; Science educators are the most ready to teach Home-economics subjects; Also, health and safety related subjects that are included in the PVE curriculum were perceived suitable to be taught collaboratively with science teachers. This encouraged the researchers to investigate the effectiveness of a synthesis of team teaching models on the delivery of PVE in a real school experiment.

## Problem of research

It was discovered that educators of distinctive subjects in the school can participate in a group to deliver the (subjects) of PVE curriculum from the teachers' points of view (Alsa'aideh, 2010). Therefore it is needed to evaluate the impact of co-teaching on students' achievement since it is one of the new methodologies to deliver subjects. Students' achievement promotion should be the core focus of the educational institutions because their effectiveness is inevitably measured by students' achievement (Cole, 2009; Conderman, 2011). As PVE (Pre-Vocational Education) is an interdisciplinary useful situated subject, the status of showing PVE in Jordan is not fulfilling as far as students' disposition towards the subject, a variable that contrarily influences their enthusiasm towards the conveyed exercises. Therefore, it is also needed to investigate the effect of co-teaching on the students' attitudes. In this manner, the functional capabilities of students are powerless, and they decline to enlist in professional training at the end of the fundamental education. This non-fulfilling circumstance is ascribed in many studies (Al-saydeh, 2002; Doghlos, 2004; Ahmed and Al-saydeh, 2007, Tweisat, 1998) to the weak eagerness and capacity, the huge quantities of students in classes, the low nature of showing exercises, and the deficiency of time designated for PVE, the irrelevance of teachers' specialties to the curriculum subjects, the lack and the lack of facilities in schools (Tweisat, 1998, Doghlos, 2004).

PVE in Jordan is currently taught by two types of teachers: teachers who are specialized only in one of its knowledge domains at a diploma level, or by teachers who are prepared to be a teacher for all of the subject domains. Therefore, it was found that both types of teachers are of low capability to teach all domains of PVE (Doghlos, 2004). This negatively affects the willingness of PVE teachers to teach the subject, willingness of teachers is a problem that is not easy to resolve. However, collaboration with other teachers could enhance willingness since individual motivation usually improves when tasks to accomplish appears to be easier in comparison (Geelan, 2003), the case that could happen in teachers' collaboration. It is also expected that teaching PVE collaboratively could enhance students' engagement in learning because two teachers in the class (or workshop) will monitor the activities and formatively assess the students' progress towards achievement of the learning outcomes. This actually bridges the gap and develops integration between school subjects that could be obtained (Kaufman and Sawyer, 2004; Hoachlander, 1999; Eisman et al., 2003).

This study examined -through a real yearly experiment-teaching PVE collaboratively, and investigated its general benefits in addition to its specific effect on students' achievement, skills mastery and their attitudes towards PVE.

## Research questions

The study was expected to answer the following research questions:

1. What are the general benefits of multi-teacher collaboration on delivery of PVE as specified by participated teachers?
2. What is the effect of multi-teacher collaboration on the students' attitudes towards PVE?
3. What is the effect of multi-teacher collaboration on the students' achievement in PVE?
4. What is the effect of multi-teacher collaboration on the students' mastery of practical skills?

## Subjects of the study

The experiment was undertaken in two classes of the seventh grade in one of the public schools in Amman, Jordan. One of the classes was the "experimental group" with which collaborative teaching was experienced, while the other class "the control group", was taught by the PVE teacher only. Each group counted 35 students whose age was around 12 years old.

Five teachers participated in the experiment: the science teacher participated in teaching the "agricultural" units, "simple tools", and "metal works", the arts-education teacher in "painting and carpentry", and "engineering drawing".

The math teacher participated in the units of "financial" and "administrative" affairs, and the physical education teacher in the units of "health and safety". Those were in addition to the PVE teacher. All teachers who participated in the experiment were of the same academic level (Bachelor's degree) and had between 3 to 6 years of teaching experience.

## The experiment and data collection

For the experimental group, before launching the delivery of each unit of the curriculum, the dual sub team of teachers planned the activities and specified the role of each teacher. It was also ensured that both teachers attended the lessons of the unit that is, two teachers participate in the delivery of the lesson to students taking different roles in the classroom or the workshop. The total lessons attended by the other teachers accompanying the PVE teacher were 58 lessons which constituted 90% of the total PVE lessons in the year. However, lessons for the control group were completely planned and delivered by the PVE teacher only.

Students in both classes responded twice to the attitudes' scale, one before teaching "pretest", and the other after teaching "post-test". However, the students sat for the practical and theoretical achievement tests only

after giving their routine lessons because of the difficulty and shortage of time. To ensure the equivalence, the means of the students' scores in the sixth grade were used. Difference was not statistically significant at significance level ( $\alpha=0.05$ ) neither in the achievement in the sixth grade nor in the pre-teaching attitudes' level.

### Instruments of the study

Four instruments were developed to collect data (attitudes scale, achievement written test, group of rubrics for assessment of practical skills, and interview schedule for teachers). Details are as follows:

*Attitudes scale:* To collect data about the effect of collaborative teaching on the students' attitudes toward PVE, a scale was developed including (40) items that cover three dimensions: importance of PVE for the student, importance of PVE for the family, and the requirements of studying PVE compared to studying the other subjects. Each item was followed by a five degree agreement scale (strongly agree, agree, hesitant, disagree, and strongly disagree). Validity of the scale was insured by a panel of experts, and the reliability was also tested through the internal consistency coefficient (Cronbach- $\alpha$ ) method on 250 students in different schools. The reliability coefficient was (0.82).

*Achievement written test:* An achievement written test was designed for the content of the seventh grade textbook. The test composed of 100 items. It was piloted on 250 students. Difficulty indices of the items ranged from (0.26-0.79), the acceptable values are (0.20-0.80). Item discrimination indices ranged (0.30-0.85), while the acceptable values of the discrimination index is above 0.20.

*Practical skills mastery rubrics:* Five practical tasks from those included in the curriculum were selected to assess the students' mastery of skills: to serve a bee cell, to build the circuit of a florescent lamp, to produce an apricot jam, to prepare a feasibility study for a small project, and to check the hygienic features of meat. Each task was allocated 20 marks. Rubrics were developed for each of the above tasks. They were consulted by. To examine the reliability of the rubrics, two examiners observed a student doing each one of the tasks. Agreement percentages between the two assessors about the marks estimated of each item were calculated. Percentages ranged from 0.79 to 0.95.

*Teachers' interview schedule:* A semi-structured interview schedule was developed to initiate dialogue with the group of the teachers who participated in the experiment. Questions addressed the benefits (if perceived existing) of the collaboration with the PVE teacher compared to

teaching it only by PVE teacher in terms of: Integration of subjects, and life benefits of subjects, enhancement of the practical training on skills, the record of progress required for vocational guidance, facilitation of PVE teacher tasks, time efficiency of PVE lessons, enhancement of students attitudes, enhancement of students achievement, and the general enhancement of PVE delivery. Specifically, the main guiding questions included in the interview schedule were:

- Do you find collaboration in teaching PVE advantageous compared to teaching by the PVE teachers only?
- Would you please mention the main advantages of teaching PVE advantageous compared to teaching by the PVE teacher only?
- Are there any specific advantages of collaboration in teaching PVE regarding (students' learning, the PVE teacher performance, the knowledge integration, vocational guidance)?
- In your opinion why this advantage happen, and how?
- As a result, do you think that collaboration in teaching PVE improves its delivery?

Because of the design of the interview question, it was found that teachers on what they found when they collaborate in the delivery of the PVE lessons, and not on the conventional method (teaching lessons by the PVE teacher only). This helped the researchers to extract the themes directly from the manuscripts of the interviews.

For validity purposes, the interview schedule was consulted of by the teachers themselves who participated in the experiment since they know the special purposes of the schedule.

For reliability purposes, the interview transcript for each teacher was reviewed by the teachers to ensure agreement about the content of the transcript.

### Data analysis

To measure the effect of collaborative teaching on achievement and students' attitudes towards PVE, T-tests were conducted for the means of the experimental and the control groups in the post-teaching results. Data collected from the interviews were analyzed qualitatively to specify the main benefits mentioned by teachers; quotations were utilized to interpret the results.

## FINDINGS AND DISCUSSION

### First: General benefits of multi teacher collaboration on PVE delivery

There are different general benefits for the collaboration of teachers of different subject. In the interviews with the participant teachers, the following benefits were

mentioned in comparison to teaching by the PVE teacher only:

1) *Higher motivation and enthusiasm*: Participating teachers highly concentrated on the fact that pre-vocational education encounters with the problem of negative attitudes of students. When teaching the content of PVE subjects in relation to other subjects (mainly academic), students will better accept this content and may learn it with better motivation and enthusiasm, and intuitively this leads to better achievement and tasks' accomplishment. The mathematics teacher ascertained that *"Although it is said that students do not like PVE, I felt that they have the same motivation as in mathematics lessons when they do functional calculations in the PVE lessons"*. Also having two teachers in the same class could show students more enthusiasm and better monitoring of the teaching/learning activities, in addition to more personal contact with the teacher/s.

Research reviews on collaborative teaching and integrating curricula in school-to-career initiatives (Eisman, 2000; Stasz et al., 1994, Stern et al., 1994) have concluded that one of the main benefits for students is the better motivation and enthusiasm that leads to better accomplishment of tasks and projects. Relating to this, Wallace (2007) found that interdisciplinary teaching team configuration produced a significant effect on the students' social bonding, which is a factor that empowers students in group to do better in their teaching/learning tasks.

2) *Better integration between vocational and academic subjects*: When teachers of other subjects participate in explanations of PVE subjects they, inevitably, relate these subjects to their fields of specialty. The Arts education teacher mentioned that *"in the Arts education lessons, students were effectively discussing what we have done together when I was helping them in the lesson of engineering drawing during my collaboration with the PVE teacher"*. This will take place in two aspects, first: collaborative teaching will clarify the use of scientific concepts, theories and laws, to produce useful products in careers. Syh-Jong (2008) and Felder et al. (1996) and Goets (2000) achieved similar results in experiencing collaborative teaching in technology and engineering subjects. Second: collaborative teaching with teachers in social subjects will better integrate teaching to produce better understanding of ethics and values of work. This result was achieved by Clarke and DeNuzzo (2003), when trying collaborative teaching in inclusive classrooms, and by Eisman et al. (2003) when examined the participation of academic, vocational and special educators in a year long business school and university-based institute on integrated training. In addition, collaboration with other teachers might make the PVE teacher more powerful to integrate the subjects because of the confidence in the subject-matter that the teachers' team in the class will possess due to the depth of

knowledge of the teachers of academic subjects who collaborate with the PVE teacher.

3) *Better vocational guidance*: One of the other benefits is stated that one of the main objectives of PVE curriculum in Jordan is to utilize the student's resulting aptitudes to achieve better vocational guidance. This demands that teachers should record detailed information about students' progress in different subject-related tasks. If one teacher (PVE teacher) is the only responsible for such recording, it will not be done continuously. When more than one teacher collaborate they will do better detailed recording, this will be of a great advantage in guiding students to the various streams of education (either academic or vocational). The PVE teacher mentioned that *"when I have another colleague with me in the workshop, I was able to observe students while they were working, this enabled me to decide their weaknesses and strengths, I mean I can discover the abilities of a higher percentage of students"*. Also, having another teacher participating in the lesson' delivery could save some of the PVE teacher time, this will enable him/her to focus on recording the students' progress and to guide students who needs more attention than others. Clarke and DeNuzzo (2003) mentioned an advantage similar to better recording, when stating that one teacher could be engaged in teaching, while the other observing both learning progress and behavioral problems.

4) *Better observation of behavior and better time efficiency*: Better observation of behavior results in better control on problematic students. This factor leads to better students' engagement in learning, which in all means, is equal to better time of PVE lessons. The teacher of PVE mentioned that *"you know, students are not very interested in PVE as a non-academic subject, therefore; they try to play here and there in the PVE lessons. When I am a lone in the workshop I cannot control the problematic student in a proper way, they affect the students who want to learn. When another teacher is with me their behavior becomes better, and we focus on teaching"*. Therefore, teachers insured that collaborative teaching leads to better time efficiency. In addition, aforementioned benefits of collaborative teaching in PVE, teachers agreed that collaborative teaching enhances PVE delivery. This was at the end of the interview with each teacher (do you think that collaboration in teaching PVE produced better delivery of the subject?) all teachers answered positively. The PVE teacher himself said *"certainly it is better that I teach it alone even in terms of better knowledge in the different domains of the curriculum"*.

This also agreed with what Wallace (2007) found of the positive effect of collaborative teaching on the students' social bonding.

5) *Better training on skills*: Other expected advantage of collaborative teaching in PVE was that better practical

training on skills will be achieved. This will take place when teachers of better relevant specialties participate in teaching PVE subjects. In many studies, (Al-saydeh, 2002, Tweisat, 1998, Ahmed and Al-saydeh 2007), it was reported that PVE subjects are delivered only as theoretical content among the main reasons that was the lapses in teachers' abilities. Although it was stated that collaborative teaching requires a long time to have tangible results (Eisman et al., 2003). It was found that collaborative teaching resulted in better mastery of knowledge, particularly in accomplishment of practical tasks (Felder et al., 1996; Goetz, 2000; Syh-Jong, 2008). Also, Chu et al. (2011) found that collaborative teaching improves the information literacy and information skills when they tested it on primary students. Furthermore, the students' results on the practical skills' test that will come later in this study will be an empirical evidence of this aspect

In summary, this part of the results that mainly utilized the interviews' results revealed that collaborative teaching could help achieve better PVE delivery in different aspects: expected higher students' achievement, expected better attitudes towards, PVE, better practical training, better life benefits of subjects, better students' recorded achievement, and better attitudes. It was also found that collaborative teaching will make the job of PVE teachers easier as teachers work together and share with each other their experiences, knowledge, and best practices.

### **Second: The effect on the students' attitudes towards PVE**

Table 1 shows the results of t-test between the mean scores of the experimental and the control groups on the attitudes scales. Results show that there is a statistically significant difference in the level of attitudes towards PVE between the group of students taught by the team of teachers and the group taught by only PVE teacher. This could be referred to the higher level of engagement with learning occurred to the students in the collaborative teaching class. As mentioned before, better observation may be the main factor that stands before this level of engagement. Also, in the case of the existence of two teachers involved in the class students had the chance to practice skills for a longer period of time through the lesson period. It is well known that practicing things for longer time makes the students more familiar with skills. In addition, having two teachers in the class/workshop gave students the opportunity to receive better detailed explanation of ideas through more teacher contact with the students' groups, having deeper discussions with teachers, and having more negotiation about the importance of the tasks they undertake in the PVE lessons. Moreover, the teachers emphasized that they had better chances to talk to the students who showed carelessness during the PVE lessons, as more friendly

discussion occurred with these students they showed better engagement to the activities, a factor that indicated attitudes' improvement.

In informal chats with students, they ensured that the contributions of other teachers who change by curriculum units made them like the course and its content. In a study exploring students' perspectives of co-teaching, Murawski and Dieker (2008) learned that students who were educated by effective co-teaching teams specified their overall approval with the co-teaching instructional practice. Satu et al. (2012, p.30) found that collaborative teaching help to meet the learning styles of students through the teaching/learning activities, a factor that leads to an enhancement of attitudes towards the course. Also, Uwanieiye and Ojikutu (2009) found that there was a significant effect on the overall performance of students taught using team teaching. Moreover, Arhar (1994) cited in Wallace (2007) found that attitudes of students towards their peers, teachers, and their schools became stronger through teacher teaming.

### **Third: The effect on students' achievement**

Table 2 shows the summary of the t-test between mean scores of the control group and the experimental group on the achievement test after teaching. Results shows that there is a statistically significant difference between the mean scores of the experimental group that was taught by the team of teachers and the control group that was taught by the PVE teacher only. The enhancement occurred in the students' achievement could be referred to the chance of students to be observed for longer time during task undertaking, in addition to better explanation of the material content from the collaboration between the PVE teacher and the other teachers in the team. Also, students showed better enthusiasm with participation in learning activities when having another teacher in the workshop, because they consider him as an observer guest, a factor that was ascertained by teachers themselves as a reason for better behaviors and discipline inside the workshop. The PVE teacher said: *"Students were totally different in their behavior when the colleagues are with me. They show a high degree of engagement in learning. They consider him a guest in the workshop".*

Another teacher insured that by saying: *"I feel that students appreciated my existence in the workshop and my trial to help them. They pay a high degree of attention to my explanation, particularly when they feel that their teacher (the PVE teacher) is busy with other groups of students".* Moreover, results showed that enhancement of practical abilities of students could be referred to the detailed help by the teachers to students to amend their faults during training. One of the teachers expressed that: *"Students who made faults in their tasks found better opportunities to correct by the collaborative colleague".* Uwanieiye and Ojikutu (2009) found that team teaching

**Table 1.** Summary of t-test between the mean scores on the attitudes scale of the control group and the experimental group.

The group	Mean scores	Standard deviation	t-value	Calculated level of significance
Experimental	3.51	0.39	3.34	0.001
Control	3.07	0.71		

**Table 2.** Summary of the results of t-test between mean scores of the control group and the experimental group on the achievement test.

The group	Mean scores	Standard deviation	t-value	Calculated significance level of difference
Experimental	83	14.00	4.84	0.001
Control	70	10.25		

**Table 3.** Summary of the results of t-test between mean scores of the control group and the experimental group on the practical tasks test.

The group	Mean scores	Standard deviation	t-value	Calculated significance level of difference
Experimental	84	16.01	4.85	0.001
Control	71	12.25		

enhanced the overall performance in an introductory technology course. In a web-assisted learning environment incorporated with team teaching, Syh-Jong (2006) found that the average final examinations scores of students in the seventh grade science classes were significantly higher than that of those who received traditional teaching.

#### **Forth: The effect on students' mastery of skills**

Table 3 shows the summary of the t-test between mean scores of the control group and the experimental group on the practical tasks test after teaching. Results show that there is a statistically significant difference between the mean scores of the experimental group that was taught by team of teachers and the control group that was taught by only PVE teacher in favor of the experimental group. This is due to the fact that teachers followed different approaches and interactive methods that helped students to learn the subject easily, more training time of each group of students as two teachers train students, better detailed training on the steps of skills, more chances to have feedback about what students do and slower and detailed correction of their mistakes. This was mentioned specifically by the arts education teacher who said: *"while groups of students were working, we both felt comfortable to help them showing them specific details, give them detailed feedback on their work, make slower presentations when needed"*.

Team teaching has been cited as extremely beneficial

by many scholars and researchers. Research has shown that team teaching is an effective way of constructing deep learning of concepts while learning alternative ways to teach the same subject matter (Syh-Jong, 2006). "Specifically, compared to the traditional classroom where the non - native English teacher alone was responsible for all of the instruction process, a collaborative team work in which language teachers with different linguistic and cultural backgrounds is able to better respond to students' need or interests" (Jui-min Tsai, 2007). Moreover, Chu et al. (2011) tested a collaborative teaching approach involving three teachers in different subject areas. The results indicated a positive impact on the development on the students' information literacy and IT skills.

Austin (2001) adds another reason to the mastery of skills when teaching inter-disciplinary subjects by teams; she mentioned the impact of seeing grown-ups team up and coordinates on an objective, which a few students may not see in their normal single-instructor classroom. An advantage of collaborative teaching in PVE is to have better clarification of life-benefits of other subjects. This can be achieved when teachers of other subjects utilize previous knowledge they taught in their original subject to introduction, explanations or application of the PVE lessons. This shows the real uses of the theoretical knowledge students learn in academic subjects. This will take place in an interactive way due to the high variety of subjects of PVE (agricultural, industrial, health and safety, home economics and economics). This advantage was also concluded by (Berentsen, 2006) when used

complimentary collaborative instructing with scholastic central subjects utilizing flight ideas, and by Felder et al. (1996) when utilized synergistic educating as a part of a coordinated Freshman designing educational program. They mentioned that collaborative teaching shows the benefits of theoretical subjects in solving real life problems.

## CONCLUSION AND IMPLICATIONS OF THE STUDY

Co-teaching has been implemented in all educational settings with students from different backgrounds like students with special needs, normal students and college students. In this sense, co-teaching is an administration conveyance choice intended to address the needs of students in a comprehensive classroom by having a general instruction educator and an extraordinary administration supplier. The impact is eventually greater than in normal circumstances since the other educator is more specialized in the subject matter.

Prevocational education is not considered an academic subject amongst students, parents, some teachers and some of the educational leaders at various levels. Since PVE is encountered with number of problems with respect to managing negative attitudes among the students and insufficient training for skills enhancement (Al-saydeh, 2002; Ahmed and Al-Saaideh, 2007; 2012, Doghlos, 2004), it is predictable that 'multi teacher collaboration may facilitate the attempts of changing the negative impression of PVE as a marginal subject, and it is also able to allow students to be experiencing diverse activities about teaching that could gratify and compliment to their learning styles.

More importantly, it may create better opportunities for teachers to teach practical skills rather than confronting their teaching to only theoretical bases. That is because teachers of other school subjects may master some subject-relating skills that are difficult to master by the PVE teacher. This is specifically true for PVE teachers who are originally specialized only in one of the curriculum fields.

Results of the study may be useful for different parties like:

- School administrators who might find a novel way to deliver PVE rather than to use the traditional approach to deliver PVE that is an interdisciplinary subject by one teacher specialized in one field of the curriculum.
- Teacher of PVE, to change the status quo of their professional practice in schools by planning, teaching, and evaluating collaboratively. This also could change the paradigm of teacher isolation in his/ her classroom, a factor that hinders the professional development.
- Curriculum developers who could rethink PVE through rethinking teaching of the subjects collaboratively, a step that could lead to a reform of the whole school curriculum by more integration.

- Students who could learn collaboration (rather than competition) by seeing others (teachers) collaborate.

Despite the advantages for teachers and students, co-teaching has some disadvantages and requirements. Among these are the (lengthy) time required for planning, because the PVE teacher can easily take the decision about his lesson activities, but to make a compromise between two opinions is difficult. Another difficulty was the conflict that might take place in teachers' timetables, which requires a high degree of commitment of both teachers and the school administration to the collaboration. Also, among the difficulties that could face such an experiment is the compatibility of team members, the degree of interest of members to connect curriculum content to real life, and most importantly, the need for training of the team of teachers in order to implement teaching using this new approach for teachers in the schools, particularly in schools that suffer from shortage of teachers. Additionally, there might be some disadvantages for students, like the unwillingness to try out new learning techniques implied by teams, and the frustration and discontentment about having more than one teacher in the class, these disadvantages were also mentioned by Sparker (2003).

## RECOMMENDATIONS

Collaborative teaching was found to help achieve better PVE delivery in terms of enhancing students' achievement and attitudes towards PVE. Therefore, it is recommended to have the following in order to promote these benefits:

- To approve an approach to support collaborative teaching that entails slight changes in the school system and curriculum (for short term)
- To concentrate on collaboration between teachers, as an instructional methodology, in the distribution issued by the Ministry of Education, and by educating instructors in Jordan, keeping in mind the ultimate goal of creating better acceptance to this methodology
- To put an arrangement for appropriation of collaborative teaching inside the future educational program advancement for PVE, as well as for all relating subjects in order to achieve the final target of the integrated implemented curriculum.
- To create a successful motivating framework for instructors who take part in community-oriented education to fortify their fulfillment.
- To persistently assess the execution of collaborative teaching so as to tag challenges and to get desired results.
- To secure better social communication among instructors in schools in light of the fact that similarity between instructors is an absolute necessity for community oriented instructing achievement.

## Conflict of Interests

The authors have not declared any conflicts of interest.

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