

Status of Prevocational Education (PVE) in Jordanian Elementary Schools as Reported by Elementary Teachers

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ABSTRACT

This study aimed to investigate the status of Prevocational Education (PVE) in Jordanian elementary schools. Information was sought relative to elementary teachers' perception regarding their strengths and confidence in implementing PVE activities, primary factors that affect teachers' initial involvement in PVE, benefits of PVE activities for children, how PVE activities are being implemented, physical resources that elementary teachers need in implementing PVE activities, and barriers to the implementation of PVE. The population of this study consisted of all elementary teachers teaching in the schools of northern region of Jordan (N=3507) during the second semester of the 2003-2004 academic year. A multi-stage random sampling approach was used to select 392 elementary teachers using the 2002-2003, Ministry of Education (MoE) directory that listed all elementary teachers at schools in Jordan. A questionnaire was adopted and modified to gather the required information. To analyze the data gathered from elementary teachers, mean scores and standard deviations in addition to frequencies and percentages were computed for responses to each item on the questionnaire. The study revealed that lack of skills in and knowledge about PVE among elementary teachers were some of several weaknesses in the delivery of PVE at the lower basic stage of schooling in Jordan. Recommendations were offered regarding the development and implementation of PVE and related training programs adapted to the specific needs of elementary teachers.

KEYWORDS: prevocational education, elementary teacher, learning activities, constructivism.

1. INTRODUCTION

One of the aims of the educational system in Jordan is to produce effective and productive citizens who are able to deal with continuous technological developments and changes in life styles. Accordingly, the main rationale for introducing pre-vocational education in the basic education is to prepare students who are technologically oriented, expose them to real life skills in order to improve their daily life and home environment, and enable them to better appreciate craftsmen and manual work (MoE, 1988; Murad, Barghouthi, Salahat and Zawaideh, 1995; UNESCO, 2002).

Prevocational Education (PVE) has had a short history of development in Jordan, unlike in other countries such as the USA and the UK. PVE began to be taught at the elementary school level during the early part

of the 1990s. It received a great deal of attention in the 1980s and 1990s in Jordan. The goal of PVE when it was first introduced into the Jordanian school system, was mainly to develop vocational skills. Another goal was to provide for constructive use of leisure time (Twaisat, 1998; Al-Saydeh, 2002; Rawagah, 1994). The recommendations emanated from the first national conference for educational reform convened in Amman in 1987 argued that courses in PVE at the elementary level should play a prominent role as part of the elementary curriculum (MoE, 1988). The goal of integrating the study of technology and life skills into the curriculum of the elementary grades has continued to the present day, with the explicit purpose of helping children to better understand their world, the world of work and technology, and the ways of how to benefit from using technology in their everyday life. The curriculum at this stage, which comprises an introduction to simple skills related to technology, daily life and careers, encourages students to follow a healthy life style, deal with the products of modern technologies and local environmental

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issues, and improve their co-ordination through manual activities. It comprises the subjects of health and nutrition, life skills, general safety and road safety, and some games (identified as 'vocational activities') that introduce simple vocational abilities (MoE 1990; UNESCO, 2002, 1974; Twaisat, 1998). In short, this stage, which is termed as the career awareness stage, aims to achieve student awareness of personal and social requirements (Ulaimat, 1991; Hendrix, 1986; MoE, 1993). The curriculum at this stage is therefore, not vocational in the conventional sense. Moreover, some of the skills included at this stage could be acquired in home life; for example the importance of food, personal hygiene, tidiness and cleaning vegetables (MoE, 1990).

The curriculum is delivered through a teacher's guide and students' workbooks. Students undertake written exercises and study theoretical concepts, in addition to learning about technology, life skills and careers. The curriculum guidelines state that PVE is delivered at this stage by an elementary-teacher (who is able to teach all subjects in grades 1-4). One course of three credit hours is provided at Jordanian universities for the student teachers who are studying to be elementary teachers. This course is theoretical and usually delivered through lectures to a large class of students. Additionally, this course has no clear objectives in terms of the competencies required to be achieved (Rawagah, 1994).

On the basis of the previous discussion, this study attempted to discover the prevalence and status of PVE in Jordanian schools in order to gain deep insight as to why and how PVE is being implemented and how PVE can find greater acceptance in elementary schools in the future.

2. RESEARCH PROBLEM

As a teacher trainer for two years at Yarmouk university, the researcher observed that prospective elementary teachers, who were being prepared to teach PVE at elementary schools did not practice teaching PVE at schools in their practical teaching experience during their final semester at the university. Several barriers to practicing PVE teaching at schools were identified based on student-teachers' observations of schools environments. Among these barriers were the lack of materials, equipment and tools to carry out PVE activities; the lack of administrative support regarding the implementation of PVE; the lack of understanding of

PVE objectives and PVE importance on the part of elementary teachers and administrators; the neglect of PVE by elementary teachers at cooperating schools; and the negative attitudes towards PVE by teachers, administrators and parents. These barriers to implementing PVE in Jordanian schools have also been identified by most teacher trainers, including the researcher.

In assessing the meager research base for PVE, Twaisat (1998) and Al-Saydeh (2002) emphasized the need to identify the value of PVE and to find ways to ease its implementation. Al-Saydeh (2002) raised the question of whether elementary school teachers were qualified to teach PVE a three-credit-hour undergraduate course is usually provided at Jordanian universities for student teachers who are studying to be elementary school teachers. This study attempted to discover the prevalence and status of PVE in the classrooms in Jordanian schools, in order to gain insight as to why and how PVE is being implemented and how PVE can find greater acceptance in elementary schools in the future.

3. PURPOSE OF THE STUDY

The purpose of this study was to gather data from elementary school teachers who are appointed by the MoE in Jordan to deliver PVE at the lower basic stage level (grades 1 to 4). Information was sought relative to teachers' background and past experience in PVE, their current teaching experience in PVE, and their opinions about PVE. The researcher attempted to describe teacher-perceived benefits of and threats to PVE activities and the confidence level teachers had with PVE instruction and content. He also attempted to elicit teachers' attitudes towards PVE and the extent to which elementary school teachers implement various facets of PVE (technology, life skills and careers).

4. SIGNIFICANCE OF THE STUDY

The success of PVE depends mainly on the attitudes and perceptions of all those involved in its implementation especially teachers (Twaisat, 1998). Therefore, the investigation of teachers' views towards the different aspects of PVE has been a central part of this study. In this regard, the study is expected to provide the MoE and Higher education institutions in Jordan with a useable instrument that can be helpful for continuous

evaluation. In addition, identifying factors that inhibit the proper implementation of PVE at the lower basic stage in Jordanian schools will assist MoE and teacher education institutions to make informed decisions and orchestrate their efforts regarding the proper implementation of PVE at lower basic stage. To the best of the researcher's knowledge, there is no prior study that investigated the status of PVE at lower basic stage in Jordan. Therefore, this research will contribute to the body of the literature concerning PVE in Jordan and other countries.

5. LIMITATIONS AND DELIMITATIONS OF THE STUDY

This study has the following limitations and delimitations:

- 1- The study is confined to investigating the status of PVE at lower basic stage in Jordanian schools.
- 2- The study reflects the perceptions of Jordanian elementary school teachers who teach at lower basic stage during the 2nd semester of the 2003/2004 academic year.
- 3- The study was carried out in the northern region in Jordan. However, results of this study can be generalised to other similar populations in mid and southern regions in Jordan.

6. DEFINITIONS OF TERMS USED IN THE STUDY

This section provides definitions of some terms used in this study. These include:

- 1- Prevocational education: This refers to a practically based provision that aims to expose students to real life skills and to introduce them to the world of work.
- 2- Lower basic stage: This refers to the lower grades which consist of first grade to fourth grade of schooling (ages 6-10 years); in these classes there is one elementary teacher to teach all subjects, including PVE.
- 3- Elementary teacher: The person who has been assigned by the Ministry of Education in Jordan to teach all school subjects at lower basic stage.

7. OBJECTIVES OF THE STUDY

This study was conducted to accomplish the following objectives:

- 1- To determine the types of PVE activities that elementary school teachers' use in classrooms.
- 2- To identify the implementation approaches that

elementary school teachers' adopt in the delivery of PVE activities at lower basic stage.

- 3- To explore the significant benefits of PVE activities for children as perceived by elementary school teachers.
- 4- To determine the factors that affected elementary school teachers' initial involvement in PVE.
- 5- To identify the physical resources elementary school teachers need for implementing PVE activities at lower basic stage.
- 6- To identify the factors that elementary school teachers perceive to be the greatest barriers to the implementation of PVE.
- 7- To evaluate elementary school teachers' confidence regarding various aspects of PVE content and instruction.
- 8- To determine the factors that elementary school teachers believe to be most beneficial for promoting PVE at lower basic stage.
- 9- To explore elementary school teachers' opinions relative to curricular role of PVE at lower basic stage.

8. RESEARCH QUESTIONS

To achieve the objectives of the study, the following questions were raised:

- 1- What are the types of PVE activities that elementary school teachers used in classrooms?
- 2- What are the implementation approaches that elementary school teachers adopt in the delivery of PVE activities at lower basic stage?
- 3- What are the significant benefits of PVE activities for children as perceived by elementary school teachers?
- 4- What are the factors that affected elementary school teachers' initial involvement in PVE?
- 5- What are the physical resources needed by elementary school teachers for implementing PVE activities at lower basic stage?
- 6- What are the factors that elementary school teachers perceive to be the greatest barriers to implementation of PVE?
- 7- How confident are elementary school teachers regarding various aspects of PVE content and instruction?
- 8- What are the factors that elementary school teachers believe to be most beneficial for promoting PVE at

lower basic stage?

- 9- What opinions do elementary school teachers hold relative to curricular role of PVE at lower basic stage?

9. LITERATURE REVIEW

Many people in the field of education believe that students must have experiences that are relevant to the present and that prepare them to live in the future (Gerbracht and Babcock, 1969; Minton and Minton, 1987). Current understandings of elementary school PVE emphasize that technology have to be taught to all students beginning in the earliest school years. The term "PVE" in elementary school is used to include all forms of elementary level activities that involve children from grades one through four in hands-on, experiential activities that promote their understanding of the technological world in which they live. PVE also includes activities which aim to provide students with daily living skills and useful health habits (UNESCO, 2002, 1974; Twaisat, 1998; Al-Saydeh, 2002; MoE, 1990, 1993). Such activities include design and manipulation of materials, problem-solving and other activities that engage students in active inquiry about technology and everyday living skills.

PVE was seen as integrating knowledge and skills from a variety of disciplines (Abu-Cell, 1998; Reid, 2000; Batarseh, 1995). Although many believed so, PVE in the elementary school is not a secondary-school vocational education reduced in difficulty. PVE includes a constructive endeavor in the design and manipulation of materials and tools (Gerbracht and Babcock, 1959; Williams, 2000; MoE, 1993). PVE has the unique ability to integrate and provide relevance to other disciplines such as science and mathematics in elementary schools. Consistent with this argument, many PVE professionals indicated that PVE should serve as a constructive methodology to teach other school subjects (Foster and Wright, 1996; Masri, 1993).

Foster (1997) and Volk (1996) numerated a number of benefits of PVE for children. These benefits include practice with perceptual and motor skills, and skills such as graphic representation, visualization, design and tool use; improved technological knowledge and capabilities; development of vocabulary, language use and creative communication; and improved social and life skills such as engagement, responsibility, personal growth and the ability to work with others. In addition, PVE has the

potential to relate the knowledge and skills students learn in other subjects to their everyday life practices (Twaisat, 1998; Al-Saydeh, 2002; MoE, 1990,1993).

The success of PVE implementation in the schools rests in the hands of teachers. However, the role of teachers has shifted from imparting knowledge to facilitating the learning process. Information and Communication Technology (ICT) has a great potential in aiding teachers to adapt to this role shift (Al-Far, 2002; Altawalbeh, 2003; Dede, 1997). For instance, teachers' inquiry can be facilitated with the help of computers as it provides access to vast amounts of information. Through the use of E-mail, user groups and other online forms, PVE teachers have the opportunity to communicate and share their experiences with a much wider range of colleagues and experts in the field of PVE. The World Wide Web can facilitate teachers' access to digital libraries and vast amounts of information in printed, visual and video form. Video conferencing offers PVE teachers the opportunity to observe other teachers in different countries as they implement similar curriculum areas and learn from their expertise (Gibson, 2002; Al-Far, 2002). Nonetheless, the use of ICT cannot be fully effective unless teachers receive adequate training and support (Al-Far, 2002; Salameh and AbuRaya, 2002; Altawalbeh, 2003; and Resta, Anderson, Davis, Muranov, Thomas and Uvarov, 2002). In addition, teachers' skills and competencies should be continuously updated to keep current with most recent innovations in this area so they can transfer these competencies to students (Resta et al, 2002 ; Reid, 2000).

To enable teachers to utilize ICT, pre and in-service teacher training institutions need to undertake a more active role with regard to teacher training that goes beyond the development of basic ICT literacy skills to educationally oriented training of ICT. This entails that teacher educators and trainers should model the appropriate use of ICT in the delivery of the curriculum of teacher education and training programs in as much as PVE teachers are required to incorporate ICT into their own teaching of PVE at schools (Gibson, 2002; Reid, 2000; Lynch, 2000).

Another approach to help teachers grasp the basics for teaching their subjects could be achieved through the integration of the principles of constructivism in both pre-service and in-service teacher education and training programs. Constructivism is a theory that demonstrates learning as an active construction of knowledge through

experiences and direct interaction with the local environment and context dependent activities (Kozulin, 1998). The theory necessitates that teachers be provided with opportunities that allow them to acquire skills and knowledge in a real world context and authentic activities. This constructivist process to teacher education and training is deemed essential if we are to help teachers to develop problem solving and critical thinking skills and empower them with the ability to apply, analyze, synthesize and evaluate knowledge skills and attitudes (Lynch, 2000; White, 1995).

Wilson and Harris (2003) identified some other factors that would contribute to the effective delivery of PVE and the enhancement of learning and teaching in this area. These include the up-to-date continuing professional development and management support to allow elementary school teachers to implement innovative practices, and the appropriate curriculum content and teaching methods, adequate equipment and accommodation.

The curriculum of the elementary school revolves around content and methodology that should be familiar to elementary school teachers and administrators. Pre-service and in-service courses and workshops are supposed to provide teachers with skills, knowledge and attitudes that underlie their lesson plans and teaching of PVE in accordance with the practical nature of PVE. PVE is unfamiliar to most elementary school teachers and administrators although it is being taught as a stand-alone subject in elementary school classrooms of Jordan. The results from several studies conducted in this field (Al-Saydeh, 2002; Twaisat, 1998; Masri, 1993) revealed a host of problems encountering the delivery and implementation of this subject. Examples of such problems include: poorly prepared teachers, the lack of facilities required for the delivery of PVE activities, the lack of administrative support for this subject, and the negative attitudes teachers, administrators and parents hold towards PVE. These studies ascribed the problems hindering the effective delivery and implementation of PVE to the failure of pre and in-service teacher education programs that focus on the de-contextualized delivery of the curriculum content prescribed for teachers in these programs.

The provision of analogous programs worldwide appears to suffer from similar problems. In the USA, Smith (1989) found that less than half (43.7%) of Industrial Arts/Technology Education teachers

considered themselves knowledgeable about the subject of technology education. Harlen, Holroyed and Byrne (1996) found that technology education teachers in Scotland lacked personal experience of the subject, had limited knowledge and understanding in this area, and lacked the confidence to teach technology education to their students. The results also revealed that only 2% of teachers felt confident to teach technology education at primary school level.

Evans (1998) reported that Post Graduate Certificate in Education (PGCE) students and newly-qualified teachers in the UK were criticized for their incompetence in the delivery and design of technology curriculum. Criticisms were due to teachers' inadequate subject knowledge and insufficient workshop skills and experience. The researcher attributed these deficiencies to poor teacher training programs, inappropriate teacher recruitment policies, inappropriate course design and content, and course brevity. Jones, Harlow and Cowie (2004) reported the main results of a national study conducted to investigate teachers' experiences in the implementation of the technology curriculum in New Zealand schools from years 1–13. Findings indicated that most elementary school teachers were aiming for curriculum coverage, had moderate levels of confidence but were concerned about curriculum overcrowding. The results also indicated that Years 7 and 8 teachers were mainly concerned about assessment, whereas secondary school teachers were constrained by existing structures in schools. Jarvis and Rennie (1998) emphasized that there was a need for special curriculum provision in technology in the UK and Australia based on adequate in-service training of teachers. Such in-service training should empower teachers with knowledge and skills to help students clarify the differences between science and technology and to enable them clarify their ideas through focused activities.

Teacher education in Jordan faces similar problems where lecturing is traditionally used in teacher education institutions (community colleges and universities); crowded classrooms that may be the factor that encourages teacher educators to use only lecturing. In addition, the teaching experience of the majority of Jordanian teacher educators is inadequate. For the case of PVE and vocational education, particularly at community colleges, teacher educators lack higher level qualifications within their fields (Abu-hola, 1997; Al-Smadi, 1999).

The review of research has shown that prevocational education is generally considered to be essential for children at lower basic stage. A need to familiarize children with technology, life skills and careers has been shown. The reviewed studies also revealed several weaknesses in PVE implementation in Jordan and worldwide. Nonetheless, PVE related studies conducted in Jordan did not investigate various facets of PVE especially at lower basic stage. In addition, a need to enrich the meager research base in PVE was recommended by Twaisat (1998) and Al-Saydeh (2002). The need exists for elementary school teachers to have PVE knowledge and skills so they can transfer learning in the classroom to real world situations. Therefore, this study focused on the skills, knowledge and perceptions of elementary school teachers relative to various aspects of PVE at lower basic stage.

10. METHODS

Population and Sample

The population of this study consisted of all elementary teachers teaching in the northern region of Jordan (N=3507) during the second semester of the academic year 2003/2004. A multi-stage random sampling approach was used to select 392 elementary teachers using the 2002/2003, MOE directory that listed all elementary teachers at schools in Jordan.

Research Instrument

A survey instrument was utilized to answer the research questions. The instrument was adopted and modified from an instrument developed by Kirkwood (2000) and nationally by Twaisat (1998) and Al-Saydeh (2002). The revised instrument was reviewed by a panel of experts. Members of the panel were selected because of their experience in PVE, expertise in instrument development, expertise in the use of statistics and expertise in the area of English-Arabic translation. The panel examined all translated statements for appropriate language and word usage and made suggestions about item terminology to enhance clarity and brevity. The suggestions provided by the panel of experts were incorporated into the instrument development to the fullest extent possible.

In its final form, the survey instrument included two sections, demographics and a four-point Likert scale that was designed to measure elementary school teachers'

perceptions relative to various facets of PVE. The demographic section asked teachers for their gender, age, class level they teach, number of years as teachers, level of education and number of undergraduate PVE-relative courses taken by them. The second section, the perceptions scale, was designed to obtain information about elementary teachers' perceptions regarding the status of PVE at lower basic stage through the use of 70 items, divided into nine areas. These areas included: activities used in classrooms (seven items), implementation approaches for PVE activities (five items), the significant benefits of PVE (nine items), initial involvement with PVE activities (five items), physical resources (twelve items), barriers to implementation (eleven items), teachers' perception of their own ability to implement PVE activities (ten items), ways to increase the implementation of PVE (eight items) and curricular role of PVE (three items).

All items of the perception scale were close-ended, requiring responses on a four-point Likert scale with the following descriptors: "strongly agree," "agree," "disagree," "strongly disagree." The responses were assigned numerical values from 1 (strongly disagree) to 4 (strongly agree). For the responses on the area of curricular role of PVE of the perception scale, respondents were asked to select one of the following three options: PVE should be an optional part of the elementary curriculum, PVE should be a compulsory part of the elementary curriculum, and PVE should not be part of the elementary curriculum. This section was analyzed using frequencies and percentages.

In an effort to test the appropriateness of the language and word usage of the instrument, along with a determination of its validity and reliability, a pilot study was conducted. The elementary teachers selected for the pilot study (n=65) were not included in the main study. In addition to completing the instrument, the elementary teachers were asked to circle any words they did not understand and to indicate any difficulties they had in completing the instrument. Modifications to the instrument were made with consideration given to the original intent of the instrument with the guidance of the panel of experts.

Muller (1986) mentioned that tests with items scored along a continuum such as Likert scale require the use of Alpha. Cronbach alpha procedure was used to obtain the reliability estimate of the internal consistency of the perception measurement section of the instrument, which

Table 1: Means and Standard Deviations for Types of PVE Activities that Teachers Used in Classrooms (Ranked in a Descending Order)

Item	PVE Activity	Mean	Standard Deviation
5	Design/make a model village, city, house, vehicle or other artifacts of a past, present or future culture	2.23	0.87
3	Design/make puppets and/or scenery for a classroom play	2.00	0.77
2	Make artifacts that illustrate major aspects (of the elementary curriculum)	1.90	0.62
6	Make a model or simple apparatus that demonstrates a technological principle such as simple machines, bridges, etc.	1.85	0.78
4	Design/construct manipulatives for math and other school subjects activities	1.81	0.87
1	Engage students in a manipulative problem-solving activity	1.80	0.64
7	Identify a specific problem in the classroom and design/make a solution for it	1.79	0.64

was found to be 0.93. This value is considered acceptable in educational studies (Cohen, Manion and Morrison, 2000). Surveys were distributed by the researcher to each elementary teacher during the second semester of the 2003/2004 academic year. Responses were kept confidential.

11. DATA ANALYSIS

To analyze data gathered from elementary school teachers, the questionnaires were first coded and then entered into SPSS. Mean scores and standard deviations were computed for responses for each item on the questionnaire. Frequencies and percentages were generated for the responses on the items related to the area of curricular role of PVE. Tables were developed to present these results and are provided herein to allow interpretations of the data.

12. RESULTS

The main purpose of this study was to gather data from elementary school teachers who teach PVE at lower basic stage relative to various facets of PVE implementation. Based on data analysis, the findings of the study are presented according to its questions.

Demographics of the Sample

The demographic section of the survey instrument revealed that all respondents were licensed. Two hundred fifty two respondents (64.3%) were women. Seventy-two (88.9%) were between the ages of 34 and 41. The mean number of years they had taught was 2.83. All respondents taught all of the core subjects except English. Mean class size was 27.25 students, with a range from 15 to more than 45. All respondents reported taking one

course related to PVE at the undergraduate level.

Around 68% (N=268) of the respondents indicated that they possessed some experience related to PVE teaching, whereas the rest (n=124) indicated that they had a vague understanding of what PVE is.

Activities Used in Classrooms

Research question one: What are the types of PVE activities that elementary teachers used in classrooms? This question was answered by instrument items 1 through 7. In this section of the questionnaire, respondents were asked to check the response that corresponds to the degree of PVE activities they used in classrooms. As shown in Table 1, of all the items related to this section, the mean score for responses related to item 7 “Identify a specific problem in the classroom and design/make a solution” was the lowest. The mean score for these items was 1.79. All mean scores for individual items were less than 2.50, indicating “low extent rating” for these items.

Implementation Approaches for PVE Activities

Research question two: What are the implementation approaches that elementary teachers adopt in the implementation of PVE activities at lower basic stage? This question was answered by instrument items 8 through 12. As seen in Table (2), item 8 scored the highest mean (M=2.65), indicating an agreement among respondents who used PVE activities in an integrated manner with their entire class on some periodic basis. Responses for the rest of the methods reflect a weak agreement with mean scores ranging from 1.40 to 2.44. these results suggested that elementary teachers did not perceive PVE as an independent subject, rather they consider it as a set of activities embedded in other subjects in schools.

Table 2: Means and Standard Deviations for Methods of Implementing PVE Activities (Ranked in a Descending Order)

Item	Method of Implementation	Mean	Standard Deviation
8	Activities are integrated with class instruction on a periodic basis when they conveniently and/or appropriately fit in with the curriculum	2.65	0.73
10	I design instructional software programs for PVE lessons and activities	2.44	0.82
9	I take all the decisions concerning the delivery of the psychomotor skills	2.12	0.67
12	I focus on the local environment in the design and implementation of PVE activities	1.47	0.59
11	I adhere to safety standards when I deliver PVE activities	1.40	0.62

Table 3: Means and Standard Deviations for the Perceived Benefits of PVE (Ranked in a Descending Order)

Item	Benefit	Mean	Standard Deviation
17	Promotes students practice of good habits (hand and face wash, and bathing) after performing PVE activities.	3.62	0.58
19	Develop students' social relationship through teamwork	3.51	0.54
13	Builds lifelong skills such as problem solving, creative thinking and self-directed learning.	3.39	0.65
14	Provides students with opportunities to apply concepts and skills from many disciplines such as math, science and language arts.	3.32	0.68
16	Promotes students' affective development such as improving self-esteem and motivation to learn.	3.31	0.69
18	Promotes students' psychomotor development such as improving fine motor skills and building tool use skills.	3.26	0.58
21	Helps identify students' inclinations and interests during the career awareness stage.	3.26	0.75
15	Helps students learn to identify, solve and evaluate practical problems.	3.19	0.67
20	Helps identify students' personality characteristics during the career awareness stage.	3.15	0.66

Table 4: Means and Standard Deviations for the Major factors Influencing Involvement with PVE (Ranked in a Descending Order)

Item	Major Factors	Mean	Standard Deviation
24	Attended a presentation, workshop or other in-service meetings	3.10	0.86
22	Took a class at the undergraduate level	3.03	0.79
26	An administrator encouraged me to get involved in the implementation of PVE activities.	3.01	0.80
23	Observed other teacher(s) and liked what I saw	2.95	0.76
25	Learned about it by reading educational journals	2.81	0.83

The Significant Benefits of PVE

Research question three: What are the significant benefits of PVE activities for children as perceived by elementary teachers? This question was answered by instrument items 13 through 21. Responses mean scores for items of this section indicated an agreement and a complete agreement on their part regarding the benefits of PVE activities in schools. Mean scores for the items in this section ranged from 3.15 "Helps identify students' personality characteristics during the career awareness stage" to 3.62 "Promotes students practice of good habits (hand and face wash, and bathing) after performing PVE activities". These figures suggest that PVE is a pivotal

subject in schools and that PVE activities can be effectively integrated into the curriculum.

Initial Involvement with PVE Activities

Research question four: What are the factors that affected elementary teachers' initial involvement in PVE? This question was answered by instrument items 22 through 26. Table (4) showed that respondents agree that attending a presentation, workshop or other in-service meetings and taking an undergraduate class in PVE were the most two influential factors in getting involved with PVE activities. Items related to these factors had mean scores of 3.10 and 3.03, respectively. All items listed in

this section had mean scores that range from 2.81 to 3.10. This indicates that all factors are important in motivating elementary teachers to get involved in PVE activities.

Physical Resources

Research question five: What are the physical resources elementary teachers need in implementing PVE activities at lower basic stage? This question was answered by instrument items 27 through 38. According to Table (5), respondents tend to agree that “physical space for implementing PVE activities,” “water supply or sinks,” “hand tools (saws, hammers, drills, clamps, files, brayers, etc.)” and “work tables or other suitable work surfaces/areas” are the most important physical resources for implementing PVE. Items related to these physical resources had mean scores of 3.54, 3.54, 3.52 and 3.49, respectively. None of the items in this section obtained a mean below the “agree” category. This indicated that all physical resources listed in this section could be helpful in the Jordanian schools for effective delivery of PVE activities.

Barriers to Implementation

Research question six: What are the factors that elementary teachers believe to be the greatest barriers to implementation of PVE? This question was answered by instrument items 39 through 49. Barriers, listed in Table (6), were believed to have made implementation of PVE difficult. The items related to “Lack of appropriate equipment and supplies” and “Insufficient financial support for doing PVE activities” achieved the highest mean scores of 3.48 and 3.37, respectively. Responses for all items related to this section fell in the agreeing category with mean scores ranging from 2.59 to 3.48. This result indicated that all barriers listed in this section contribute to an ineffective implementation of PVE at the lower basic stage.

Teachers’ Perception of their Own Ability to Implement PVE Activities

Research question seven: How confident elementary teachers’ are regarding various aspects of PVE content and instruction? This question was answered by instrument items 50 through 59. Respondents were asked to freely respond to the items in Table (7) by indicating the degree of their confidence in their ability in and how they felt about PVE teaching. The overall mean score for this section was 2.14, and the mean scores for the

individual items were less than 2.5. The items “Overall, I feel capable and comfortable teaching PVE” and “I feel capable and comfortable using the problem-solving approach in PVE” achieved the lowest ratings with mean scores of 2.05 and 2.06, respectively. The rest of the items in this section had mean scores ranging from 2.06 to 2.27. This result indicates respondents’ disagreement with the content of the items in this section.

Ways to Increase The Implementation of PVE

Research question eight: What are the factors that elementary teachers perceived to be most beneficial for advancing PVE at lower basic stage? This question was answered by instrument items 60 through 67. Respondents were asked to indicate their level of agreement with 8 suggested ways that were considered to be the best and most effective ways in getting more teachers/schools to implement PVE. The results (Table 8) indicated that all the ways had mean scores greater than 2.5 which was above the agreeing category. One item “Preparing a specialized PVE teachers for the lower basic stage” received a rating in the “completely agree” category (M=3.66). The way that received the second highest mean score was “Developing a web site that caters to PVE implementation,” which fell in the “agree” category (M=3.36). The rest of the ways achieved mean scores ranging from 3.11 to 3.34. The overall mean score for this section was 3.29.

Curricular Role of PVE

Research question nine: What opinions do elementary teachers hold relative to curricular role of PVE at lower basic stage? This question was answered by instrument items 68 through 70. Respondents were categorized into three groups: those who think that PVE should be required, those who think that PVE should be optional and those who think that PVE should not be part of the lower basic stage curriculum. Frequencies and percentages for the three groups, which are presented in Table (9), showed that the majority (65.56%) of respondents (N=257) thought that PVE should be a required part of the lower basic stage curriculum. They also showed that only 10.97% (N=43) thought that PVE should not be part of the lower basic stage curriculum and that 23.47% (N=92) believed that PVE should be an optional part of the lower basic stage curriculum. These results indicated a favorable view towards making PVE a necessary part of lower basic stage curriculum.

Table 5: Means and Standard Deviations for Physical Resources to Increase Ability to Teach PVE Activities (Ranked in a Descending Order)

Item	Desired Physical Resources for PVE	Mean	Standard Deviation
30	Physical space for implementing PVE activities	3.54	0.64
35	Water supply or sinks	3.54	0.61
34	Hand tools (saws, hammers, drills, clamps, files, brayers, etc.).	3.52	0.58
31	Work tables or other suitable work surfaces/areas	3.49	0.64
27	General materials and equipment (wood, wheels, paper, batteries, etc.).	3.47	0.66
29	Storage space for storing PVE gadgets, tools and equipment	3.47	0.61
36	Other tools/devices (sawing fixtures, drilling jigs, cutters, ovens, etc.).	3.32	0.71
33	Computer peripherals/equipment digital cameras, scanners, printers, etc.).	3.19	0.77
32	Suitable Computer Devices	3.10	0.82
28	Commercial kits such as K'Nex®, Lego®, etc	2.98	0.85
38	Availability of a specialized website for PVE on the Internet	2.93	0.90
37	Internet access	2.87	0.94

Table 6: Means and Standard Deviations for Barriers to Implementing PVE activities (Ranked in a Descending Order)

Item	Barriers	Mean	Standard Deviation
39	Lack of appropriate equipment and supplies.	3.48	0.72
40	Insufficient financial support for doing PVE activities.	3.37	0.73
42	Inadequate space in classroom to do PVE activities.	3.22	0.86
41	Insufficient planning time to prepare for PVE activities.	3.09	0.82
43	Inadequate or insufficient training/expertise in the PVE area.	3.01	0.80
49	Lack of parental support.	3.01	0.79
46	Absence of national interest in PVE.	2.88	0.81
48	Lack of support from other teachers.	2.76	0.92
44	Inflexibility of local or state curriculum.	2.70	0.86
47	Lack of administrative support in schools.	2.70	0.92
45	Lack of interest on my part to learn and implement PVE content.	2.59	0.88

Table 7: Means and Standard Deviations for Teachers' Degree of Satisfaction Concerning their Own Ability and Attitude toward Implementing PVE (Ranked in a Descending Order)

Item	Items	Mean	Standard Deviation
55	I feel capable and comfortable using PVE materials such as wood, cardboard, plastic, etc.	2.27	0.80
54	I feel capable and comfortable using PVE tools such as saws, hammers, drills, etc.	2.20	0.83
58	I feel prepared to develop new activities for my students.	2.20	0.78
53	I think I understand most of the technical content involved in PVE.	2.17	0.72
52	I feel I need more training in PVE in order to implement it effectively.	2.14	0.80
51	I think I have the expertise needed to teach PVE.	2.12	0.70
56	I feel capable and comfortable doing PVE processes such as cutting, assembling, etc.	2.11	0.76
57	I feel capable and comfortable using the problem-solving approach in PVE.	2.06	0.71
59	I enjoy PVE teaching.	2.06	0.73
50	Overall, I feel capable and comfortable teaching PVE	2.05	0.72

13. DISCUSSION

Above two-thirds of the respondents indicated that they possessed some experience related to PVE teaching, whereas the rest indicated that they had a vague

understanding of what PVE is. Virtually, all teachers graduated from a program that included a three-credit-hour PVE course. However, for those who had a vague understanding about PVE, the undergraduate PVE course might not have been enough or conducive to familiarize

Table 8: Means and Standard Deviations for Ways to Increase Implementation of PVE (Ranked in a Descending Order)

Item	Ways to Implement PVE	Mean	Standard Deviations
66	Preparing specialized PVE teachers for the lower basic stage	3.66	0.59
67	Developing a web site that caters to PVE implementation	3.36	0.73
62	Publishing more PVE curriculum materials in line with recent technological innovations	3.34	0.67
65	Publishing more articles about PVE in journals and magazines	3.26	0.68
64	Providing more training specifically for administrators to familiarize them with the importance of PVE	3.22	0.78
63	Offering more undergraduate courses in PVE for teachers	3.21	0.72
61	Offering more PVE workshops and interest sessions at conferences	3.12	0.72
60	Offering more workshops (in-service, summer, etc.) in PVE	3.11	0.88

Table 9: Frequencies and Percentages for the Role of PVE in the Elementary Curriculum as Perceived by Elementary Teachers

Item	Opinion	Frequency	Percentage
68	It should be an optional part of the elementary curriculum	92	23.47
69	It should be a compulsory part of the elementary curriculum	257	65.56
70	It should not be part of the elementary curriculum	43	10.97

them with the philosophy and objectives of PVE. In addition, their schools' policy might not have been supportive to PVE implementation. Nevertheless, it is promising to see that over two-thirds of the respondents possessed some experience related to PVE teaching.

Disappointingly, the results (shown in Table 1) related to the "types of PVE activities teachers used in their classrooms" revealed a low extent rate. However, they supported Al-Saydeh (2002) argument that one course of three credit hours might not be sufficient to equip elementary teachers with the necessary knowledge and competencies to deliver PVE at the lower basic stage. A primary conclusion that can be drawn from this finding is that in the absence of other training a single three-credit-hour course may not be adequate to prepare elementary teachers to incorporate PVE activities. Nonetheless, these results indicated that the most popular activity area in PVE was "the design/make a model village, city, house, vehicle or other artifacts of a past, present or future culture" was clearly the most popular PVE activity in Jordanian elementary schools. Least popular was identifying a specific problem in the classroom and design/make a solution for it.

According to the MoE (1990, 1993), PVE is a subject that should be taught independently from other school subjects. Results (displayed in Table 2) showed that elementary school teachers did not perceive PVE as an independent subject, rather they consider it a set of

activities embedded in other subjects. Elementary school teachers' perceptions regarding the delivery approach emphasize what is termed by Masri (1993) as "integrated approach" to PVE delivery. This suggests that the MoE needs to put more efforts in the implementation of PVE at the lower basic stage.

A consensus among elementary school teachers concerning PVE benefits at the lower basic stage was observed. Their response rating on all items representing PVE benefits ranged between "Agree" and "Strongly agree". They believed that promoting students practice of good habits (hand and face wash, and bathing) after performing PVE activities and developing students' social relationship through teamwork were the greatest benefits. This response shows that elementary teachers are aware of the benefits that PVE activities can equip students with. It also indicates that elementary teachers consent that the role of PVE goes beyond simply having children practice some manual skills and simple activities. This result supports what Kirkwood and Foster (1999) found.

Responses regarding the influential factors category indicated that elementary teachers agree with a list of these factors that contributed to their involvement in PVE. However, they believed that attending a presentation, workshop or other in-service meetings and taking an undergraduate class in PVE were the most influential factors.

Respondents agree that “physical space for implementing PVE activities,” “water supply or sinks,” “hand tools (saws, hammers, drills, clamps, files, brayers, etc.),” and “work tables or other suitable work surfaces/areas” were the most important physical resources needed for implementing PVE. The teachers clearly felt that more physical resources were needed in order for the program to improve. In other words, they were willing to change if the resources were available. Yet the lack of necessary resources seems to be a problem shared with PVE in most other countries (Harlen et al, 1996; Kirkwood, 2000; Jones, Harlow and Cowie, 2004). PVE is universally one of the most costly school subjects. Efforts to change the attitudes of financial decision makers must continue, along with the efforts by teachers to convincingly demonstrate the values of the program relative to the cost. Needs for storage space, worktables and physical space received more responses than did computers, computer peripherals and Internet access. These suggest that, for elementary teachers, PVE is a school subject in which students design and make products by using different materials, machines, processes, techniques and tools rather than just computer use. Foster and Kirkwood (1994) concluded that PVE activities for children were about solving problems with their minds and building solutions with their hands.

Results from the section related to the barriers to PVE implementation at the lower basic stage of schooling in Jordan indicated consistency with the results from the physical resources section. “Lack of appropriate equipment and supplies” and “insufficient financial support for doing PVE activities” were seen by elementary teachers as the major obstacles to PVE implementation. These results suggest that in order to increase the implementation of PVE activities, MoE needs to prioritize equipping schools with the needed physical resources and equipment than equipping schools with computers. Teachers first need physical space, work surfaces and time coupled with the materials needed for the delivery of PVE activities. Computers and computer peripherals can come second, along with various hand tools such as pliers, saws, hammers and general equipment such as ovens and fridges.

The results related to the section that dealt with teachers’ degree of agreement with statements about their own ability and attitudes toward implementing PVE were disappointing. All the responses related to this section fell in the “disagree” category, indicating poor attitudes and

low level of competence among elementary teachers. These results reinforced the results obtained in the sections related to the types of PVE activities delivered in the elementary schools and the delivery approach of PVE adopted by elementary school teachers. The results of this study are similar to the ones found by Twaisat (1998) and Al-Saydeh (2002). They also support the results found by several other studies conducted worldwide (Evans, 1998; Harlen et al, 1996; Kirkwood, 2000; Jones et al, 2004). These studies ascribed the problems encountering the effective delivery and implementation of PVE to non-conducive pre and in-service teacher education programmes which focus on de-contextualized delivery of the curriculum content prescribed for teachers and undergraduates. Al-Saydeh (2002) contended that one course of three credit hours might not be sufficient to equip elementary teachers with the necessary knowledge and competencies to deliver PVE at the lower basic stage. Masri (1993) argued that the negative attitudes towards PVE and the non-supportive school environment to deliver PVE activities greatly hinder the effective delivery of this subject. Such barriers to PVE delivery at the lower basic stage of schooling may explain the reluctance on the part of prospective elementary school teachers at the universities to practice PVE teaching at schools. MoE needs to provide specific on-going PVE related training that would enable PVE teachers to implement PVE activities. Also, in order for PVE teachers to keep up with constantly changing PVE related materials and equipment, they must be provided with the fiscal and technological resources necessary for the successful implementation of PVE activities. However, even though the teachers are provided current PVE related resources such as equipment and materials, they may still need incentives to encourage them to attend training sessions relative to PVE instruction.

14. CONCLUSIONS AND RECOMMENDATIONS

The results from this study revealed several weaknesses in the delivery of PVE at the lower basic stage of schooling in Jordan. There were several factors that may help make PVE more prevalent in elementary schools. The most important factor considered by elementary teachers was preparing specialized PVE teachers for the lower basic stage. This could be a viable option that would contribute to the effective delivery of PVE at this stage. Alternatively, a team teaching

approach to PVE delivery could be adopted, where specialized PVE teachers at the middle basic stage can collaborate with and support elementary teachers.

The reported lack of skills in and knowledge about PVE among elementary teachers is reflected in the goals they have for their students. In other words, if teachers themselves are not skilled in an area, they do not see it as important content for their students. The delivery of pre-service and in-service elementary teachers' education programs should focus on a contextualized delivery. These programs should emphasize the importance of context in equipping elementary teachers with the necessary skills and knowledge to teach PVE. Emphases should also be placed on practical activities consistent with the practical nature of PVE.

Developing a web site that caters to PVE implementation received the second most important factor that would promote PVE delivery at the lower basic stage. Such website will help elementary teachers to access a vast amount of PVE related information in the areas of planning, assessment and approaches to delivery which may facilitate the implementation of this subject.

To keep elementary teachers informed regarding various innovations relative to PVE, Jordanian universities and MoE should encourage PVE specialists and researchers to publish more articles about PVE in journals and magazines at both local and international levels. They also should provide more training specifically for administrators to familiarize them with the importance of PVE. Pre-service programs should strengthen their emphasis on the PVE knowledge and skills of pre-service elementary teachers by offering more undergraduate courses.

It is recommended that the instrument used in this study be adopted for use in other similar studies in Jordan. Quantitative and qualitative research approaches should be carried out to gain a deeper insight into elementary teachers' training needs related to the delivery of PVE at the lower basic stage.

15. IMPLICATIONS OF THE STUDY

Elementary school teachers recognized the value and

usefulness of PVE for their students. They reported that they did not have the necessary skills and knowledge to implement it effectively. Elementary school teachers' competency in PVE is essential for the successful implementation of PVE activities. Universities should offer more undergraduate courses relative to PVE. Additional PVE related training and equipment is also necessary. Teachers should seek out mentoring opportunities and business/industrial assistance in upgrading their knowledge and skills. Perhaps, the establishment of school-business partnerships for improved learning opportunities for both teachers and students needs to be pursued. Cooperation with local industry will benefit PVE implementation by the donation of materials or the provision of student field trips. Teachers can also receive expertise from the local industry.

Powerful and productive thinking can result from sharing across disciplines and situations. Therefore, a multidisciplinary approach seems most appropriate to the development of technology education in elementary schools in Jordan by incorporating elements from other school subjects into PVE curriculum for lower basic stage.

Although PVE has been updated to an extent in the early nineties of the last century, there is a general feeling that there should be more connection to the modern technological world than what exists now. The activities in which the pupils are engaged determine the kinds of technological knowledge and processes they learn. PVE activities should, therefore, be upgraded so that they correspond more closely to the modern technological world. The designing and making of products should include more theoretical elements, abstract thinking and links to the technology that students encounter in their daily lives.

The need for the highest level commitment to equip the Jordanian schools with computers and ICT facilities is crucial. Given the often sophisticated operational requirements of an ICT classroom, adequate training is also vital if teachers are to apply the requisite skills to facilitate effective teaching and learning.

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