The Integration of Knowledge, Economical, and Technological Concepts in the Pre-Vocational Education and Sciences Education Curriculum as Perceived by the Teachers at Irbid Directorate Schools

Muhammad Al-Alawneh* and Jehad Mustafa**

Received Date: 19/11/2011 **Accepted Date: 17/3/2014**

Abstract: The Integration between pre-vocational education and sciences education curricula is fundamental for understanding the nature of sciences and their applications. Therefore, this study was conducted to assess the degree of integrating knowledge, economical, and technological concepts in the pre-vocational education and sciences education curriculum as perceived by the teachers of both subjects, and whether these perspectives differ due to the study's independent variables. A descriptive cross sectional study using a survey to collect the data from 189 teachers from Irbid Educational Directorate was done in the second semester of 2013. The instrument was developed by the researchers after an extensive review of the literature and based on the related previous studies. The results showed that teachers in sciences education and pre-vocational education assessed the integrating of these three concepts on moderate scale, and there was a significant difference between the teachers' perspectives on the technological domain based on the teachers' major. The study concludes with recommendations and implications for future research. (**Keywords**: Pre-vocational Education Curriculum, Sciences Education Curriculum, Integration Concepts, Jordan.).

دمج المفاهيم المعرفية والاقتصادية والتكنولوجية بين مناهج التربية المهنية ومناهج العلوم من وجهة نظر المعلمين في مدارس محافظة إربد

محمد خالد العلاونة، قسم المناهج والتدريس، جامعة اليرموك- الأردن.
جهاد محمد مصطفى، المدرسة النموذجية، جامعة اليرموك- الاردن.

ملخص: يعد التكامل الافقي بين المناهج الدراسية بشكل عام ومنهاجي العلوم والتربية المهنية بشكل خاص ذا أهمية بالغة لما لذلك من أثر في جعل عملية التعلم أدعى للفهم ومن أجل فهم طبيعة العلوم وتطبيقاتها. لذا فقد جاءت هذه الدراسة الوصفية التحليلية لتقييم درجة تكامل المفاهيم المعرفية والاقتصادية والتكنولوجية بين هذين المبحثين من وجهة نظر المعلمين الذين يقومون بتدريسهما. ومن أجل تحقيق أهداف الدراسة فقد تم بناء استبانة لجمع البيانات من جميع معلمي التربية المهنية ومعلمي العلوم في مديريات التربية والتعليم في محافظة اربد والبالغ عددهم 189 معلما ومعلمة في الفصل الدراسي الثاني من العام2013. تم تطوير أداة الدراسة بعد بحث موسع في الادب النظري والدراسات السابقة التي تناولت موضوع التكامل بين المباحث المختلفة. وقد أظهرت النتائج أن درجة تكامل المفاهيم بشكل عام بين المبحثين كان متوسطا، وان هنالك فروقا ذات دلالة إحصائية بين وجهتي نظر معلمي العلوم ومعلمي التربية المهنية حول التكامل في المجال التكنولوجي. وختمت الدراسة بتطبيقات وتوصيات للبحث المستقبلي.
(**الكلمات المفتاحية**: مناهج التربية المهنية، مناهج العلوم، تكامل المفاهيم، الاردن)

Introduction

The integration between all subjects of learning in general and between the pre-vocational education (Voc. Ed.) and sciences education (Sci. Ed.) in specific should be one of the priorities of curricula designers. Presenting these subjects in conjunction may provide deep meaning of sciences education and its applications.

The ongoing changes around the world in all fields are fast. The educational system is responsible for the integration of all subject areas such as languages, technology, economic, mathematics, etc. in pre-vocational education and vice versa. However, integration of career and technical education (CTE) and academic curricular content represents a challenge for CTE professionals (Spindler, 2011).

The National Research Center for Career and Technical Education (NRCCTE, 2005) reported that the acceleration of technology, global competition and political and economical changes should force the educational system to get ready for the future's expectations (Stone, Alfeld, Pearson, Lewis, and Jensen, 2006). The preparation of future workforce should be on the national and international level. In the developed learning systems, memorizing knowledge in isolation of its content in the real life is unacceptable.

The subject of Pre-vocational education could be a "fertile ground" to apply theoretical and scientific subjects; a glance in the pre-vocational education curriculum shows that all vocational domains are rooted in sciences. Stone (2011) asserts that vocation education programs address aspects of science, mathematics, and technology. The pre-vocational education curriculum in Jordan is a comprehensive subject that combines agricultural, industrial, economic, health, and home economy education. Therefore, as Wang (2009) pointed out, the integration of various fields in vocational

* Department of Curriculum and Instruction, Yarmouk University, Irbid, Jordan.

** Model School, Yarmouk University, Irbid, Jordan

education has been a topic of discussion by educational researchers.

In 1990, Layton indicated that Pre-vocational and technological education could be connected in three methods: "applied sciences, experimental approach of devices or in science-technology-society prospect". Later, Stone, Alfeld, Pearson, Lewis, and Jensen (2006) pointed that all vocational programs address some aspects of science, mathematics, and most certainly technology. Integrating learning with applications and experiences will not only benefit students, but will also benefit teachers as well (Chiasson & Burnett, 2001, Myrs & Dyer, 2006, Parr, Edward, & Leising, 2009).

While this holistic approach appears to be a valuable teaching and learning tool, implementing it may prove to be difficult. Some teachers believe that integration of theoretical-based subjects with practical-based subjects could be time consuming, lacks preparation, and lacks administration support (Morgan, Parr, Fuhrman, 2011).

This research presents teachers' perspectives on the degree of contextualizing those concepts toward finding a common ground for integrating (Voc. Ed.) and (Sci Ed.). These two subjects, in addition to other subjects, play an important role in terms of preparing highly skilled and knowledgeable graduates, and in turn, preparing the workforce to participate in the country's development.

Pre-vocational education is a different subject of learning from other subjects in the school education system; it is seen as multi-subjects in one subject to provide students with a full opportunity to explore careers and vocations through *learning by doing* modules; it involves employing theoretical knowledge (facts, theories, and laws) in a real situation, so it cannot be presented in isolation from other subjects, (Al-Hila, 2002, Al-Sayed,2009).

Pre-vocational education in Jordan consists of five-domains: Agriculture Ed., Industrial Ed, Health Ed., Home Economy Ed., and Economy Ed. Therefore, any vocational activity that is related to one of these domains will, basically, be rooted in and is dependent on, the theories of that domain. For example, in terms of agriculture discipline, the learner will not be able to master the vocation of this field if he does not understand the theories and the knowledge of the chemistry, physics, and biology that are related to that discipline. This study introduces themes and main ideas of pre-vocational education and science education in Jordan, objectives and research questions, significance and problem, methodology, procedures of the study, finding and results, and concludes with recommendations and implications for the future research.

The construction of pre-vocational education in Jordan's educational system has been divided into three cycles: (1) from the first grade to the fourth grade; (2) from the fifth grade to seventh grade, and (3) from the eighth grade to the tenth grade. By the end of this stage, pre-vocational education becomes more specialized and the emphasis would be on preparing students for future career. Table 1 shows the general units which are presented to students in each cycle:

Table 1: Pre-vocational education in Jordan from 1st Grade to 10th Grade.

Cycle 1 **grade 1- 4** **Awareness Stage**	**Cycle 2** **grade 5-7** **Orientation Stage**	**Cycle 3** **grade 8-10** **Exploration Stage**
Life skills	Basics in Agriculture	Applied Agriculture
Safety matters	Basics in Industrial	Applied Industrial
Handcraft Activities	Basics in Business and trade	Business and trade
Health and Nutrition	Basics in Home Economy	Home Economy
	Basics in Health and Nutrition	Health and Nutrition

For example, in cycle 1 (Awareness Stage), students learn cleanliness, their needs to vaccines, washing vegetables and fruits before eating in the health and nutrition unit. In the life skills unit, they learn to take care of home's furniture, tying shoes, organizing the bedroom. In the Safety unit, they learn how to cross the street, perform basics in first aids, and safety during biking to count a few.

In cycle 2 (Orientation Stage), students learn in the agriculture unit how to grow and take care of indoor and outdoor plants, poultry, farming, and breeding sheep. In the industrial unit, they learn using tools, technical drawing, carpentry, plumbing and metals works. In the home economy unit, students learn money and time management. Lastly, in the health unit, students learn personal health, first aids, and traffic safety.

In the third cycle (Exploration Stage), these units get more advanced and students learn and apply what they learned in the first and second cycles. This stage (8-10 grades) is considered as an orientation stage to introduce students with options and requirements of the vocational and technical education. After this stage, students will have the option to enroll in the academic

branch or in vocational and technical education branch based on academic achievement and the student's desire.

In terms of science education, Qualter (1993) and Zeitoon (2010) referred to this subject as one of the foundation subjects which aims to develop students' scientific and innovation skills and supplying the communities with highly skilled workforce to carry out new trends and compete in the global economy. Moreover, sciences education aims to prepare learners to solve problems, and make the right decision in their daily life.

In addition, researchers and practitioners who are concerned about science education acknowledge six main objectives for teaching science: assisting learners to acquire functional knowledge, practicing scientific thinking, acquiring scientific skills, supplying with and developing positive attitudes, and appreciating sciences and scholars (Al-Khalili, Haider, & Younes, 1996). Jordan educational system provides general curriculum in science education from the first grade to eighth grade; however, from ninth grade to the twelfth grade the general science curriculum is divided into four dependent subjects: chemistry, physics, biology, and geology. Integrating pre-vocational education and sciences education curriculum on various level will lead to deep understanding of the theoretical knowledge.

UNESCO and ILO (2002) defined technical and vocation education and training (TVET) as "a comprehensive term referring to those aspects of education process involving, in addition to general education, the study of technologies and related sciences, the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors". According to Rosati & Henry (1991), vocational education such as agricultural education program can increase the opportunities for hands-on learning, when infused into secondary agriculture meets needs for instruction in basic biology, chemistry and mathematics concepts required to workers in technical jobs.

Rojewski (2009) reported that the need of integration in vocational education remains a great challenge that is integration makes future workers armed with knowledge and skills that are needed in the labor market. Furthermore, vocational education is seen as an instrument for reducing extreme poverty (Hollander and Mar, 2009), achieving sustainable and globally recognized workforce (Skudai, 2011), enhancing networking knowledge, sharing opportunities and meeting up with the challenges of virtual workplaces (Zarini et al. 2009), and developing human resources for the ever dynamic world of work (Skudai, 2011).

Moreover, Lebeaume (2011) assured that the conflict between science and techniques has stopped. The technology education has been clearly distinguished between experimental technology or applied sciences within science education in order to initiate graduates for the future and more vocational technology.

Lebeaume, added that the integration of vocational education is an international movement in many countries around the world. The European commission aims to organize the basic education with an associated or integrated set of science and technological culture with mathematics, experimental sciences and technology.

The Study

The purpose of the study is to shed light on the teachers' perspectives on integrating knowledge, economy, and technological concepts in the (Voc. Ed.) and (Sci Ed.) curriculum. The research aimed to complete the following objectives:

Objective 1: to examine science education teachers' perspective on integrating knowledge, economy, and technological in science education curriculum.

Objective 2: to examine pre-vocational education teachers' perspectives on the degree of integration knowledge, economical, and technological concepts in pre-vocational education curriculum.

Objective 3: to examine whether these perspectives differ due to the study's independent variables (teachers' gender, years of experiences, and major of the respondents).

Research question

Based on the study's objectives, the researchers will answer the following two questions:

RQ1. What are the perspectives of teachers of (Pre-voc. Ed.) and (Sci Ed.) toward contextualizing knowledge, economical, and technological concepts in the curriculum?

RQ2. Is there a statistically significant difference in teachers' perspectives toward integrating knowledge, economical, and technological concepts between pre-vocational education and science education teachers based on their gender, years of experience, and major variables?

Significance of the problem

Generally speaking, one of the most important problems that may face students and graduates of the educational system is the gap between theories and practice. Hence graduates miss the opportunity to apply what they learn in the learning place in the working place. As a result, graduates hold certificates and diplomas without a capability of transferring and applying what they have learnt.

The integration of (Pre-voc. Ed.) and (Sci Ed.) is a vital issue that provides learners with an opportunity to get a deep understanding of the theoretical knowledge

by applying it in another situation. The importance of this study lies in its focus on finding teachers' perceptions of the degree of integrating important concepts in (Voc. Ed.) and (Sci Ed.) that could be vital to be discussed.

Putting the hands on this problem could be of assistance to the curriculum designers and policy makers of both subjects to take into consideration the design, the development, and the evaluation of the curriculum to integrate these concepts in both subjects. Consequently, the integration of science and pre-vocational education will participate in the preparation of a knowledgeable and highly skilled workforce.

Limitations of the Study

One of the limitations of this research is the instrument which was developed by the researchers, so the interpretation of the results depends on the instrument's validity and reliability. Also, the study took place in Irbid Governorate and the population was pre-vocational education teachers and sciences education teachers, and this makes the generalization of results applicable to the population of the study or similar community.

Procedural Definitions:

- **Knowledge, Economical, and Technological Concepts**: Items of the instrument that are derived from Education Reform for Knowledge Economy in Jordan.
- **Pre-vocational education curriculum**: an educational subject that includes 5-domains in Agriculture, Economy, Home Economy, Health, and Industry and learned by students from first grader to tenth grade in all public and private schools in Jordan.
- **Science education curriculum**: an educational subject learned by students from first grade to eighth grade as a general curriculum, however, the general curriculum is divided into four subjects (physics, biology, chemistry, and geology) from ninth grade to twelfth grade in public and private schools in Jordan.
- **Teachers' perspectives**: qualifying teachers who are able to respond to the instrument's items according to their points of view based on 5-point Likert's scale.

Methodology

Population and sample

The population of this study included all science education teachers and pre-vocational education teachers in Irbid Educational Directorate in the second semester of the academic year 2013. The population of this study consists of (189) teachers as (130) sciences education teachers including physics, biology, chemistry, and geology teachers, and (59) pre-vocational education teachers. The rate of return was (132) usable instruments as 70% of the study's population. Table 2 shows the demographic of the sample.

Table 2: Demographic Characteristics and Percentages of Study Respondents

IV	Levels of IV	Major				Total	
		Vocational Education		Sciences Education			
		N	%	N	%	N	%
Gender	Male	19	14.4	51	38.6	70	53.0
	Female	26	19.7	36	27.3	62	47.0
	Total	**45**	**34.1**	**87**	**65.9**	**132**	**100.0**
Years of Experience	Less than 5 years	18	13.6	16	12.1	34	25.8
	at 5 years and more	27	20.5	71	53.8	98	74.2
	Total	**45**	**34.1**	**87**	**65.9**	**132**	**100.0**

Table 2 demonstrates the study's sample which consists of 70 males and 62 females. A high percentage (74.2%) of the sample has more than 10 years of experience.

Instrumentation

A questionnaire was used to collect data in this study which was divided into four-sections: the first section presents instructions on the nature of the study and how to respond to its items. The second section includes 33 items which were divided into three domains (17-item in the cognitive domain, 9-item in the economic domain, and 7-item in the technological domain). These items were rated on a 5-point Likert scale as number (1) Always exists, number (2) Mostly, number (3) Sometimes, number (4) Seldom, and number (5) Never exists. The third section includes demographic information about the respondents (gender, years of experiences, and major). The instrument was developed by the researchers after an extensive review of the literature and based on the related previous studies.

Validity and Reliability of the Instrument

The questionnaire was tested for reliability and validity. The questionnaire has been validated for facial construction, and internal validity by 14 faculty members from different educational specializations,

including social education, educational technology, science education, vocational education, psychology, measurement, management and economy. All comments and points of view were taken into consideration and some items were modified, changed, or deleted after a deep discussion with each one of the faculty members. Moreover, the instrument was pilot tested with a group of 24 science education and pre-vocational education teachers who were teaching either sciences education subject or pre-vocational education subject in the second semester of the year 2013. The instrument has excellent face validity. Construct validity was further established and illustrated that the items of the instrument were significantly related to its domains. Table 3 shows the construction validity of the instruments for the dimension and the scale.

Table 3: Instrument's Construct Validity**.**

Dimension	Item ID	Item Content	Correlation	
			dimension	scale
Knowledge	1	Match the content with the life situations	0.61	0.55
	2	Focuses on life-long-learning	0.57	0.52
	3	Includes activities to develop self-learning skills	0.63	0.53
	4	Assures the positive participants in scientific fields	0.68	0.60
	5	Concerns of horizontal integration between sciences and vocational education	0.53	0.44
	6	Includes activities to encourage cooperation learning	0.52	0.40
	7	Assures the importance of ethical discipline	0.59	0.55
	8	Identifies the concepts and terminology	0.49	0.40
	9	Provides enough opportunities to learn problem-solving methods	0.59	0.60
	10	Develops the student's ability to reform thoughts and ideas in his own way	0.59	0.51
	11	Exhibits the content in a logical way	0.40	0.32
	12	Encourages learners to utilize divers resources in learning process	0.70	0.71
	13	Enhances the student's ability in critical thinking	0.64	0.64
	14	Provides opportunities for research and applied learning in a new situation	0.66	0.68
	15	Assures the mastery of scientific operations such as observational and experimental	0.64	0.61
	16	Raises issues that seek higher level of thinking	0.64	0.59
	17	Assures the scientific method of thinking and set hypothesis	0.69	0.68
Economic	18	Connects learning with work	0.74	0.75
	19	Supplies the students with skills to increase productivity	0.68	0.67
	20	Discusses ideas about recycling and uses raw materials economically	0.68	0.65
	21	Encourages students to be proud of the work and workers	0.72	0.58
	22	Assures the importance of protection the national resources	0.65	0.53
	23	Clarifies the importance of science and its application in preparing the future's workforce	0.76	0.65
	24	Explains the role of vocational education in decreasing the rate of poverty and unemployment	0.73	0.53
	25	Shows the importance in investment in human capital	0.77	0.60
	26	Assists in choosing a future career	0.62	0.51
Technology	27	Guides the students to follow up with technology	0.75	0.69
	28	Employs the multimedia as assisting instruction tools	0.79	0.64
	29	Encourages students to use various media to save and protect data	0.80	0.65
	30	Assures the importance of mastery computer skills and employ them in learning process	0.89	0.70
	31	Focuses on using the Internet to enrich the curriculum	0.74	0.54
	32	Employs the electronic resources in research and collecting data	0.80	0.59
	33	Shows the Inter-correlation between technology, family, and community	0.77	0.74

Furthermore, the internal construction validity was calculated to reveal the correlation within and between the instrument's domains as presented in Table 4.

Table 4: Overall Correlations for the Domains and the Scale

Correlation	Statistic	Knowledge	Economic	Technology
Economic	Pearson Cor.	0.68		
	Sig.	0.000		
Technology	Pearson Cor.	0.62	0.59	
	Sig.	0.000	0.000	
Over all	Pearson Cor.	0.92	0.86	0.82
	Sig.	0.000	0.000	0.000

Table 4 shows that the Pearson's correlation between economic and knowledge domains was (0.68) and economic and technological (0.59). Also, the correlation between technological and knowledge was (0.62). The overall correlation shows a significant correlation between the domains as the knowledge was (0.92), the economic (0.86), and the technological was (0.82).

Moreover, reliability for the current questionnaire was assessed using the 132 pre-vocational education teachers and sciences education teachers. The Cronbach's alpha reliability was 0.94. The reliability in all domains and as the whole scale was high. Table 5 shows the reliability for the domains and the scale.

Table 5: Cronbach's Alpha Coefficient for the Scale and its Domains (n=132)**.**

Domains	Cronbach's Alpha	Stability Index	N of Items
Knowledge	0.89	**0.81**	17
Economic	0.87	**0.88**	9
Technology	0.90	**0.91**	7
Over Whole	0.94	**0.83**	33

Data collection

The researcher distributed the questionnaire to all pre-vocational education and sciences education teachers in Irbid Educational Directorate in the schools' locations after obtaining permission from the department of Education in Irbid Directorate and a verbal consensus from each teacher. Teachers' names, school addresses, and number of teachers in participant schools were provided by the human resources department of education.

Results and finding

The following section provides the results and findings of the study that was originally conducted to find pre-vocational education and sciences education teachers' perspectives on the integration of knowledge, economical and technological concepts in the curriculum, and to examine whether these perspectives differ due to the assigned variables.

RQ1. What are the perspectives of teachers of (Pre-Voc. Ed.) and (Sci Ed.) toward contextualizing knowledge, economic, and technological concepts in the curriculum?

Table 6 shows pre-vocational education teachers and sciences education teachers' perspectives toward the degree of contextualizing these concepts in the curriculum.

Table 6: Participants' Perspectives toward the Degree of Contextualizing Knowledge, Economical, and Technological in the Curriculum.

Dimension ID	Scale and its Dimensions	Specialty						Total		
		Vocational Education			Sciences Education					
		Rank	Mean	Std. Dev.	Rank	Mean	Std. Dev.	Rank	Mean	Std. Dev.
1	Knowledge	1	3.50	0.62	1	3.48	0.56	1	3.48	0.58
2	Economic	2	3.34	0.82	3	3.06	0.70	3	3.16	0.75
3	Technology	3	3.06	0.88	2	3.37	0.91	2	3.26	0.91
Over all			3.36	0.64		3.34	0.59		3.35	0.61

Table 6 shows the rank of each domain as perceived by respondents of (Pre-Voc Ed.) and (Sci Ed.) teachers. In terms of knowledge concept, both (Pre-Voc Ed.) and (Sci Ed.) teachers ranked this concept in the first place among other concepts (m=3.50, and m=3.48 respectively). However, pre-vocational education teachers ranked the economical concept in the second place (m=3.34) and sciences education teachers ranked the economical concept in the third place (m=3.16). In terms of technological concept, pre-vocational

education teachers ranked that in the third place and sciences education teachers in the second place (m=3.06). Overall, pre-vocational education teachers perceived that those concepts are represented in the curriculum (m=3.36) slightly higher than sciences education teachers (m=3.34).

For the purpose of answering this question, the respondents were asked to rate the 33-item on the degree to which they agree with each statement using a 5-poing Likert scale range from 1 (Always) to 5 (Never). The researchers used the three-level correction scale as the following: from less than 1 to less than 2.33 (low), from 2.33 to less than 3.66 (moderate), and from 3.66 to 5 (high).

Regarding the first question, on one hand, the results show that teachers of pre-vocational education subject have rated item number 8 in the knowledge domain (identifies the concepts and terminology), item number 11 (exhibits the content in a logical way), item number 2 (focus on life-long-learning), and item number 15 (assures the mastery of scientific operations such observational and experimental) on a high scale.

Conversely, pre-vocational education teachers rated item number 14 (provides opportunity for research and applied learning in a new situation), item number 9 (provides enough opportunities to learn problem-solving methods), and item number 10 (develops the student's ability to reform thoughts and ideas in his own way) on a moderate scale. In terms of the economical domain, pre-vocational education teachers rated item 22 (assures the importance of protection the national resources) and item number 18 (connects the learning with work) as high. However, they rated item number 26 (assists in choosing a future career, and item number 25 (shows the importance of investment in human capital) as moderate on the scale. Regarding the technological domain, pre-vocational education teachers rated all the items in this domain on a moderate scale as well.

On the other hand, sciences education teachers have rated item number 8 in the knowledge domain (identifies the concepts and terminology), item number 2 (focuses on life-long-learning), and item number 6 (includes activities to encourage cooperation learning) on a high scale. However, they rated the rest of the items in this domain as moderate.

In terms of economical domain, teachers have rated item number 22 (assures the importance of protection the national resources) on a high scale. However, the rest of the items in this domain have been rated as moderate on the scale. Regarding the technological domain, sciences education teachers have rated all the items in this domain as moderate on the scale.

A quick glance at the results (Appendix1) shows that pre-vocational education teachers and sciences education teachers have the same perspective on specific items in the three-domains. As an example, both pre-vocational education teachers and sciences education teachers have identified item number 8 as the most item that is contextualized in the curriculum. Moreover, (Voc Ed.) and (Sci Ed.) teachers perceived item number 22 and item number 18 in economical domain as the most items that are integrated in the curriculum. Moreover, both teachers agree on item number 26 as a lowest item that is contextualized in the curriculum.

In terms of technological domain, both pre-vocational education teachers and sciences education teachers have rated item number 27 (guides the students to follow up with technology) as the most item that is contextualized in the curriculum even though they rated that item on a moderate scale. Though, the teachers have rated item number 29 (encourages students to use various media to save and protect data) at the bottom of the technological domain item even though they rated that on a moderate scale.

Second, the study aims to determine whether teachers' perspectives significantly differ due to the assigned variables through answering the following questions:

RQ2. Is there a statistically significant difference in teachers' perspectives toward integrating knowledge, economical, and technological concepts between pre-vocational education and science education teachers based on their gender, years of experience, and major variables?

Table 7 shows whether there are significant differences based on the interaction between the major variables and the gender and years of experience.

Table 7: Source of Variances due to the Independent Variables**.**

Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
Major	0.107	1	0.107	0.287	0.593
Major×Gender	0.165	2	0.083	0.221	0.802
Major×Experience	1.214	2	0.607	1.624	0.201
Error	47.101	126	0.374		
Total	48.555	131			

Table 7 illustrates that there are no significant differences (α =0.05) between the major variable and gender variable and year of experience. Moreover, there is no significant difference due to the interaction between study's variables.

The results show a comparison between pre-vocational education teachers and sciences education teachers' perspectives according to the study's dependent and independent variables. Table 8 shows the mean and standard deviations for each dependent and independent category.

Table 8: Means and Standard Deviations for each Dependent and Independent Variable.

DV	IV	Levels of IV	Major				Total	
			Vocational Education		Sciences Education			
			Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Knowledge	Gender	Male	3.54	0.64	3.44	0.60	3.47	0.61
		Female	3.47	0.61	3.52	0.51	3.50	0.55
		Total	**3.50**	**0.62**	**3.48**	**0.56**		
	Years of Experience	Less than 5 years	3.44	0.49	3.74	0.75	3.58	0.64
		at 5 years and more	3.54	0.69	3.42	0.50	3.45	0.56
		Total	**3.50**	**0.62**	**3.48**	**0.56**		
Economic	Gender	Male	3.39	0.93	3.11	0.71	3.19	0.78
		Female	3.31	0.74	2.99	0.70	3.13	0.73
		Total	**3.34**	**0.82**	**3.06**	**0.70**		
	Years of Experience	Less than 5 years	3.48	0.82	3.42	0.85	3.45	0.82
		at 5 years and more	3.25	0.82	2.98	0.65	3.06	0.71
		Total	**3.34**	**0.82**	**3.06**	**0.70**		
Technology	Gender	Male	3.19	0.89	3.25	0.84	3.23	0.85
		Female	2.97	0.89	3.53	0.99	3.30	0.98
		Total	**3.06**	**0.88**	**3.37**	**0.91**		
	Years of Experience	Less than 5 years	3.12	0.69	3.46	1.03	3.28	0.87
		at 5 years and more	3.03	1.00	3.35	0.89	3.26	0.93
		Total	**3.06**	**0.88**	**3.37**	**0.91**		

Table 8 shows that male pre-vocational education teachers scored higher than female teachers on the study's domains (knowledge, economic, and technology). However, the gender variable of sciences education teachers has no effect on their perspectives on the three-domains. Also, the affect was slightly different between the dependent variables due to the gender and years of experience. The standard deviations ranged from 0.56 to 1 which refers that both pre-voc. Ed. teachers and Sci. Ed. teachers may have a convergent point of view toward integrating specific concepts in the curriculum.

In order to make sure that the visible differences are real, the researchers calculated the correlation factors between the three domains to decide whether to use the statistic ANOVA or MANOVA. Bartlett's test of Sphericity (table 9) was conducted to find out the real differences and correlations factors that are related to the three-domains based on the study's variables.

Table 9: Correlation Factors between Dependent and Independent Variables (Bartlett's Test).

Correlation due to IV	Knowledge	Economic
Economic	**0.69**	
Technology	**0.63**	**0.66**
Bartlett's Test of Sphericity		
χ^2	**df**	**Sig.**
189.999	5	0.000

Table 9 shows there is a moderate correlation between the study's domains and Bartlett's test of sphericity which indicates that the factor model is appropriate (Eyduran, Karakus, and Cengiz, 2009). Therefore, MANOVA was conducted as shown in Table 10.

Table10: Results of MANOVA Test on Teachers' perspectives based on the Study's Independent Variables.

Effect	MANOVA test	MANOVA Value	Whole F	Hypothesis df	Error df	Sig.
Major	Hotelling's Trace	0.110	**4.565**	3	124	0.005
Major×Gender	Wilks' Lambda	0.932	1.488	6	248	0.183
Major×Experience	Wilks' Lambda	0.907	2.071	6	248	0.057

Overall, table 10 shows the main effect (**α** =0.05) regarding the major and the interaction between major and years of experience. However, the study shows no effect in interaction between the teachers' gender and teachers' major (pre-voc. or Sci. ed.).

To identify which of the domains (knowledge, economic, and technology) has been effected from the study's variables (major, years of experience, and gender), the researchers conducted a non interaction statistic ANOVA on the three domains individually based on the study's independent variables as reported in table 11.

Table 11: Results of ANOVA on Teachers' Perspectives based on the Study's Independent Variables**.**

Source of Variance	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.
Major	Knowledge	0.174	1	0.174	0.517	0.473
	Economic	0.722	1	0.722	1.324	0.252
	Technology	42.635	1	42.635	**84.357**	0.000
Major×Gender	Knowledge	0.182	2	0.091	0.270	0.764
	Economic	0.477	2	0.238	0.438	0.647
	Technology	2.011	2	1.005	1.989	0.141
Major×Experience	Knowledge	1.479	2	0.740	2.196	0.116
	Economic	3.112	2	1.556	2.856	0.061
	Technology	0.126	2	0.063	0.125	0.883
Error	Knowledge	42.447	126	0.337		
	Economic	68.644	126	0.545		
	Technology	63.681	126	0.505		
Total	Knowledge	44.283	131			
	Economic	72.954	131			
	Technology	108.452	131			

In terms of the effect of the major on the three-domains, the results show no significant differences in knowledge and economy. However, there is a significant difference in the technological domain p=0.000 at (**α** =0.05).

Also, the results showed no significant differences in the three-domains based on the interaction between the major and gender of the respondents. Nevertheless, the results showed no significant differences in the three-domains regarding the interaction between the major and years of experiences. However, it is worth noting that there are very close numbers to be significant in the economical domain (0.061) based on the interaction between the major and years of experience.

Discussion of Implications and Recommendations

Reviewing the related literature revealed that integration in curriculum is one of the topics of interest for many researchers. Griffin (2003) calls for integration because of the rapid changes in the educational systems and curriculum should not be isolated. Spindler (2011) refers that the integration is a need and a challenge for professionals in the field of Voc. Ed., moreover, Chiasson & Burnett (2001), Myrs & Dyer (2006) Parr, Edward, & Leising, (2009) refer to the curriculum integration as a benefit of students and teachers as well. Therefore, this study was conducted to find out the integration between Pre-voc. Ed. curriculum and in Sci. Ed. curriculum in specific concept as perceived by teachers of both subjects.

Integrating both subjects is vital in terms of the fact that one of them is presented as a theoretical subject and the other is presented, mostly, as a practical subject. One of the most benefits of this study was its educational impact on both teachers before and during the application of the study because its focuses on the important domains that are related to the labor market. Researchers felt during and after applying the study a real educational impact on both Voc. Ed. and Sci. Ed. teachers because it exposed them with concepts that are needed to be integrated in the two subjects.

Generally speaking, the study shows relatively moderate mean scores on all three domains which indicate that these concepts needed to be considered in both subjects. For example, knowledge concepts were ranked on the first place in both subjects while the economic and technological concepts were ranked in the

second and in the third place respectively-- that could be an implication that the curriculum focuses on the knowledge concepts over other concepts such as economic and technology. Despite the results show that teachers have agreed on the sum of the items (study's instrument appendix 1), it is clear that the teachers' perspectives are different due to the subject they teach.

The results of this research may add to the body of literature important information that could be utilized in developing (Voc Ed.) and (Sci Ed.) curriculum. One of the weaknesses of the curriculum in the developing countries is its focus on the knowledge aspects and pays little attention to the other aspects that work as "connecting the learning with the real life".

In terms of knowledge concepts, it is strongly recommended that curriculum should be integrated vertically and horizontally. The curriculum has to focus on providing opportunities for research and applied learning in a new situation, providing enough opportunities to learn problem-solving methods, and developing the student's ability to reform thoughts and ideas in his own way.

In terms of economic concepts, it is recommended that curriculum has to assist students in choosing their future career, show the importance in investment in human capita, and discuss ideas about recycling and using raw materials economically.

Regarding the technological concepts, the study shows a need that curriculum should encourage students to collect, organize, and save the data by using various media. Moreover, the curriculum should assure the importance of a mastery computer skills and employing them in the learning process, and to focus on using the internet to enrich the curriculum.

References

Al-Hila, M. (2002). Educational Games: Techniques and Production. Amman: Dar Almassera.

Al-khalili, K., Haidar, A., & Younnes, M. (1996). Teaching Sciences in General Education. UAE: Dar Alkalam Publication.

Al-Sayed, M. (2009). Pre-vocational Education: Principles and Strategies of Teaching and Evaluation. Amman: Wael Publication:

Association for Supervision and Curriculum Development (2003). The definition of curriculum integration. Retrieved from http://www.ascd.org/publications/curriculum-handbook/425/chapters/Overview.aspx

Endrlin, K. J., Osborne, E. W. (1992). Student achievement, attitudes, and thinking skills attainment in an integrated science/agriculture course. Proceeding of the 19th annual National Agricultural Education Research Meeting (37-41). St. Luis, MO.

Eyduran, Y. K., Karakus S. and Cengiz F. (2009). Usage of factor scores for determining relationships among body weight and some body measurements. *Bulgarian Journal of Agriculture Sciences 15*(373-377).

Holland, A. & Mar, N. Y. (2009). Towards Achieving TVET for All. In R. Maclean, & D. Wilson, (eds). International handbook of education for the changing world of work, 1863-1877. Springer Science + Business Media BV.

Layton, D. (Ed.). (1990). Integration and diversity in science education and technology. In D. Layton Innovations in Science Education and Technology. Paris: UNESCO.

Lebeaume, J. (2011). Positioning Technology in the Curriculum. The Netherlands: Sense Publisher.

Morgans, A. C., Parr, B., Fuhrman, N. (2011). Enhancing Collaboration among Math and Career and Technical Education Teachers: Is Technology the Answer? *Journal of Career and Technical Education, 26* (2), p.77.

Myers, B. E. Dyer, J. E. (2006). Effects of investigative instruction on content knowledge and science proves skill achievement across learning styles. *Journal of Agriculture Education, 50* (2), 75-86.

Parr, B. A., Edwards, M. C., & Leising, J G. (2009). Selected effects of a curriculum integration intervention on the mathematics performance of secondary students enrolled in an agriculture power and technology course: An experimental study. *Journal of Agriculture Education, 50* (1) 57-69.

Qualter, A. (1993). I Would Like to Know More about That: A study of Interest shown by Girls and Boys in Scientific Topics. *International Journal of Science Education. 15*(3), 307-317.

Rojewski, J. W. (2009). A conceptual framework for technical and vocational education and training. In R. Maclean, & D. Wilson, (eds). International handbook of education for the changing world of work, 1863-1877. Springer Science + Business Media BV.

Rosati, R., & Henry, R. (1991). Aquaculture: A new component of the agriculture curriculum. *NACTA journal, 35* (4), 16-20.

Spindler, M. K (2011). CTE Teachers' Perspectives on the Process of CTE and Science Content Integration: A Grounded Theory. ERIC ED536136. from http://www.proquest.com/en-US/products/dissertations/individuals.shtml

Stone, J. R. (2011). Delivering STEM Education through Career and Technical Education Schools and Programs. Paper Prepared for the workshop of committee on Highly Successful Schools or Programs for K-12 STEM Education. National Research Council, Washington, DC, May 10-12, 2011.

Stone, J. R. III, Alfeld, C., Pearson, D., Lewis, M. V., & Jensen, S. (2006). Building academic skills in context: Testing the value of enhanced math learning in CTE. St. Paul, MN: National Research Center for Career and Technical Education.

Stone, J. R. III, Alfeld, C., & Pearson, D. (2008). Rigor "and" relevance: Enhancing high school students' math skills through career and technical education. *American Educational Research Journal, 45*(3), 767- 795

The Teaching of Science and Technology in an Interdisciplinary Context. Pilot Project. Bulgaria: UNESCO publications.

UNESCO. ILO (2002). Revised Recommendation. Concerning Technical and Vocational Education. UNESCO; Geneva, Switzerland: ILO. http//unescodoc.unesco.org.

Venkataiah, S. (2001). Strategies and Theories of Vocational Education. New Delhi: Kumar.

Wang, T. (2009). Rethinking teaching with communication technologies (ICTs). *Teaching and Teacher education*. 25 (8), 1132-1140.

Zaitoon, A. (2010). Global Trends in Teaching Sciences Curriculum. Amman: Dar Alshorook Publication.