Teaching and Learning Family and Consumer Sciences through K-W-L Charts

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While much of the control and many of the activities found in today's classrooms have been placed in the hands of the learners and learning has become inquiry-based, there remains a need for teachers to use teaching tools that would facilitate this student-centered teaching process. This article identifies the K-W-L Chart as one such tool and follows a case study of four Kuwaiti 'Family and Consumer Sciences' teaching/learning events to evaluate their ability to enhance the learning outcomes of eight students. The research was designed from a qualitative, multi-tiered design approach and was assessed through a constant comparative method of data analysis of interview responses, classroom observations and worksheet-assessments. The results showed that the use of K-W-L Charts influenced the teachers and learners toward a more inquiry-based approach and facilitated a more student-centered and collaborative learning environment, raising the level of interest and the amount of personal input given by the students.

In Kuwait, many classroom activities have commonly been conducted mainly through 'chalk-and-talk' presentations in which the learners' only involvement has been is listening, reading and writing. The most common teaching tools have been maps, texts, and pictures. However, there is currently a move towards alignment with teaching approaches used in other countries where a student-centered approach to teaching has replaced the traditional teacher-centered approach. In this new teaching environment teachers are expected to act as facilitators and motivators of learning (Labaree, 2000; Richetti, & Sheerin, 1999) for students who are seen and treated as individuals who already possess unique perceptual frameworks about the subject (Martin, Sass, & Schmitt, 2012), who have unique learning styles (Kolb, 1984) and who have a desire to construct their own meaning about the subject (Meyers, & Jones, 1993).

In the context of Kuwait's Family and Consumer Sciences curriculum area, there is the added challenge of meeting the demands of globalization while retaining Kuwait's traditional respect and roles for women in resource management, fashion design, internal design, hospitality and tourism, food and feeding, and family education. Faced with these changes and challenges in teaching FCS, there is a need for the development of teaching tools specifically designed to facilitate the new teaching/learning process. The K-W-L Chart is one such tool. There is also a need to assess and evaluate the willingness and ability of teachers to use such tools in their teaching practice, because, unless teachers are willing and competent using these tools, their availability would be of little value.

Developed by Carr and Ogle (1987) the K-W-L was specifically designed to enable students to identify and activate their own prior knowledge, set their own learning goals, and be able to identify the new knowledge learned (Al-Shaye, 2002).

In the context of a teaching/learning event, the K-W-L Chart (Figure 1) is used as a worksheet on which students identify the progressive stages of knowledge acquisition about a given topic.

Figure 1.
K-W-L Chart.

K	W	L
Knowledge Known	Knowledge Wanted	Knowledge Learned

K: The K column is used as a pre-learning activity, in which students brainstorm and write down what they already know about the current topic. During this activity, the teacher prompts the students through interactive questions and discussion, and students are encouraged to categorize and subcategorize the information recalled.

W: The W column is also used as a pre-learning activity. Students are encouraged to brainstorm and write down what more they want to learn about the current topic. This activity is often facilitated through small groups, class discussions, or teacher-prompted question-and-answer sessions so that students are encouraged to find personal reasons for wanting to learn more about the current topic.

L: The L column is used as a post-learning activity, in which the students consider what they have learned about the topic as a result of the lesson. This activity is often facilitated through continuous individual learning, revision and recall, through group activities, or through teacher-student interaction. Also by relating the L column activity with the K and W columns, students are provided opportunity to measure the gap between what was desired in learning and what has been learned and to initiate new questions and establish new aims for their learning. This then leads to further development of the K-W-L Chart. The combination of the K-W-L Charts in a given topic will then provide an accurate assessment of the students' progression of knowledge and learning over a longer period than a single lesson.

This article identifies the primary theories undergirding the use of K-W-L Charts and reports on a case study of four Family and Consumer Sciences teaching/learning events and the learning experiences of eight students in Kuwait. It then evaluates the effectiveness of K-W-L Charts in terms of their ability to shape the preparation and delivery of student-centered classroom teaching/learning experiences, promote student interest and participation, and facilitate positive learning outcomes.

Theoretical Framework

The importance of prior knowledge and the capacity to activate that knowledge has been well established (Ausubel, 1968; Beck, Omanson, & McKeown, 1982; Gillani, 2003). Of primary importance was Ausubel's (1968) theory that the "… assimilation, progressive

differentiation and integrative reconciliation …" of new and established information is dependent on the identification of prior knowledge and the understanding of the relationship between what is known and what can be known. That these theories draw on basic constructivist principles can be seen in the finding that, during interactions between the learners and the environment, learners are capable of actively finding out novel and advanced strategies for learning (Hess, & Trexler, 2005; Siegler, & Ellis, 1996). Given that learning involves cognitive development and the rearrangement of mental schema (Piaget, 1976; Silverman, 2002), schema theory sought to explain the constructive process through which meaning is constructed by learners. Lipson and Wixson (1991) explained that meaning is developed from within the learner, whom they described as 'the reader,' the text, and the context. For them, the development of meaning begins with learners accessing their information storage system (Lipson, & Wixson, 1991), which Ausubel (1968), Anderson (1977) and Gagne (1985) would call "prior knowledge," and continues to develop as each learner chooses to retrieve specific information from that storage (Zintz, & Maggart, 1984), a process that demands choice and selection based on perceived relevancy of that stored information to the current input. The interchange that takes place between the learner, prior knowledge, and new knowledge was described by Rumelhart (1977) through schema theory and linked by Maria (1990) to the general theory of knowledge and memory.

Research findings about the role of prior knowledge and about learner-perceived relevance of new information, led educators to see the learning environment as a collaboration of variables related to student, text, context, and teacher (Idol, 1988; Lipson, & Wixson, 1991). This realization then was able to help teachers to see reading, for example, as an interactive activity through which learners construct meaning from the text by logically linking what is already known with clues within the text (Anderson, Hiebert, Scott, & Wilkinson, 1985; Pearson, 1985). That the K-W-L Chart empowers students to construct their own learning by linking prior knowledge to newly acquired knowledge and thereby enable them to create personal meaning confirms their alignment with both schema and constructivist learning theory.

Effective Use of K-W-L Charts

K-W-L Charts have been praised for their ability to adapt to different types of information (Camp, 2000), different degrees of learner potential and achievement (Czajkowski, 2000), and to a range of learner attitudes towards different subjects (Williams, & Burden, 1997). They have also been commended for their flexibility to meet the requirements of different curriculum areas including physical science (Williams, 2006), social science (Czajkowski, 2000), and reading comprehension, self-expression, and vocabulary (Elliott, Formhals, & Wheat, 2002; Tonks, & Taboda, 2011) across a range of grades (Houtz, & Quinn, 2010).

They have also been praised for their effectiveness and efficiency in helping teachers facilitate group-work activities and to act as a stimulus-tool to encourage individual thinking and evaluation, the sharing of knowledge gained through reading, and the identification of what is yet unknown and therefore needing to be learned (Johnson, Johnson, Holub, & Roy, 1984). Moreover, Burns' (1994) study on the effect of K-W-L Charts as a reading strategy for 52 fifth graders, showed that after six weeks the K-W-L Charts had a positive effect on the learners' interaction skills and reading comprehension and some positive effect on reading attitudes (Burns, 1994).

In regard to the efficiency and effectiveness of K-W-L Charts to promote learning through writing, Brown and Day (1983) showed that they also had a positive effect on students

being able to plan their personal written expression of a specific topic. According to Carr and Orgle (1987), K-W-L Charts provided opportunity for the students to write about their newly acquired knowledge, along with their previous knowledge base, in a manner that was both systematically structured and appropriately detailed. For Camp (2000) the effectiveness of the "L" column in the K-W-L Chart was found in its ability to raise students' awareness after the lesson, to the details of the new information they had learned through the activity.

Evidenced by the findings of these research studies, the bottom-line advantage of K-W-L Charts is the potential for teachers to move the learning environment away from being teacher-centered to one that is student-centered, and from instruction that is based on chalk-and-talk to an interactive event that is based on the acceptance by the individual students of their responsibility to own and design their own learning through co-operation with peers, texts, contexts, and teachers.

The research reported here is part of a larger study of the use of graphic organizers (Alshatti , Watters, & Kidman, 2010). The aim of this component of the study was to explore the following research questions:

1.   How does the use of K-W-L Charts influence the teacher's approach, preparation and delivery of the lesson?
2.   How does the use of K-W-L Charts influence the student's motivation, class participation, learning strategies and learning outcomes?
3.   What strengths and limitations do FCS teachers and students experience when using K-W-L Charts in the FCS curriculum area?

Methodology

In response to Creswell's (2008) expectation that research be directly linked to the specific research problem, that it be contextually relevant to the participants and unbiased in its reporting, this research was designed using a multiple qualitative, multi-tiered approach in which the perspectives of the researcher, participant teachers, and students were collected, collated and considered. This approach ensured that the K-W-L was evaluated from a Kuwaiti perspective, with specific attention paid to its effectiveness as a teaching and learning tool, to the changes its' use makes to the preparation and delivery of the lesson, to student interest and participation during the lesson and to the outcomes of the lesson from the perspectives of both teacher and learner. To maximize the contextualization of this study all preparatory instructions, lesson materials, lessons, and interviews were conducted in Arabic and all observations and analyses carried out by Kuwaiti nationals. The study was conducted over a four-week period commencing in November 2010.

Selection of Participants

A brief three-part questionnaire was prepared by the researcher and given to all available FCS Teachers in Kuwait. The first section of the questionnaire collected data concerning each respondent's teaching history, in terms of general teaching experience, FCS teaching experience, measured in years, and the respondent's current experience in terms of district, school, and grade. The second section of the questionnaire contained open-ended questions that explored the teachers' knowledge of K-W-L Charts, their opinions about the potential value of K-W-L Charts in the classroom, and their current usage of K-W-L Charts. The questions also explored the teachers' opinions concerning the current quality of FCS teaching in Kuwaiti schools and their

suggestions about ways to resolve their concerns about Kuwaiti teaching practices. The third section of the questionnaire investigated each teacher's current classroom strategies.

From the 192 respondents who completed the questionnaire, priority was assigned to teachers with the most teaching experience, with specific experience with teaching Grade 6 FCS, interest to attend a professional development (PD) program and knowledge about potential reform strategies, but no prior firsthand experience with K-W-L Charts. Following the receipt of a letter of approval from the District Education Office of Mubarak Al Kabeer, four female teachers from four different Kuwaiti intermediate girl schools and their classes were selected to participate in this research. Teacher 1 had 3 years experience in teaching Grade 6 FCS, Teachers 2 and 3 had 5 years experience in teaching Grade 6 FCS, and Teacher 4 had 10 years experience in teaching Grade 6 FCS. Two students aged from 10 to 11 years old, from each of four classes of twenty-two, were selected by their teacher, by a random casting of lots. A total of eight students were selected. Although there was no overt decision to choose equally academic students for this study, that this was the first year of learning FCS subjects for each student, was taken to indicate some level of consistency in the students' prior knowledge. Written consent from the selected students and their parents was obtained prior to the students' participation in the study.

Professional Development Program

In the first tier of the study, all participating teachers attended a 12 hour PD program conducted over three consecutive days, held in the Mubarak Al Kabeer district education office. The PD program was conducted by the researcher. During the PD the participating teachers investigated the primary features of K-W-L Charts, analyzed the relationship of the theories of cognitive and conceptual learning to the use of K-W-L Charts, and discussed the potential benefits of using K-W-L Charts in FCS. After developing their own K-W-L Charts, the teachers discussed concerns about potential difficulties and limitations related to the design and implementation of K-W-L Charts in their lessons and collaboratively refined each other's K-W-L Chart to maximize its potential in each lesson.

In the second tier of the study, each teacher constructed a lesson lasting 45 minutes from the fashion design unit in the FCS curriculum area. Teachers 1 and 3 were assigned the topic, 'the importance of fashion.' Teachers 2 and 4 were assigned the topic, 'organizing your wardrobe.' The teachers were expected to research, develop, and prepare their own teaching resources including, visual presentations, lesson material, and student worksheets. During the lesson, students were encouraged to use the K-W-L Charts as a learning tool. During the lesson, the researcher recorded her observations about the teacher's use of the K-W-L Chart in the lesson as well as the students' interest, attitudes, and classroom participation. To ensure that observations and notations were unbiased and non-selective, all observation practices were directed by the pre-lesson interview questions and the recommendations of established literature (Horizon Research Inc, 2002). Moreover, all observations were guided by the teacher's lesson-plan. In all lessons, the observer assessed and evaluated the degree to which the teacher used the K-W-L Chart to create an interesting and attention-capturing lesson, the degree of influence the use of the K-W-L Chart had on the students' willingness and ability to identify and list their prior knowledge and desired learning direction. The observer also assessed the effectiveness of the K-W-L Chart to promote the students' enthusiasm and participation in the lesson and, in the closing portion of the lesson, to enable the students' to demonstrate what they had learned. In addition to the researcher's notes about the lesson itself, all observation-notations included school codes,

teacher codes, subject and unit information, and the date and time of the observation. In accordance with Merriam (1998), audio recordings were kept of all the observer's comments to enable interpretation of the notes to be carried out later without being influenced by the observer's assumptions, persuasions, and outcome-preferences.

Data Collection
Data were collected at five different stages of the study.

1. Before the PD, a questionnaire was completed by each teacher about her knowledge about K-W-L Charts and her previous experiences with K-W-L Charts.

2. The day after the PD program but before the lesson, teachers participated in an interview lasting approximately 1 hour, during which a number of closed and open-ended questions were asked in a face-to-face, semi-structured format designed to assess the teacher's knowledge and skills related to the use of K-W-L Charts that she would take into the teaching event. The teachers were asked about the degree to which the PD program had helped them to understand the students' needs in FCS and about the appropriateness of the teaching and learning strategies taught in the PD, in terms of their ability to meet the teaching and learning goals of FCS. They were also asked to express their sense of increased competency in using K-W-L Charts in the classroom as a result of the PD program. All pre-implementation interviews were audio recorded and transcribed for the analysis.

3. During each classroom lesson, the researcher noted her observations about the teacher's demonstrated comfort, knowledge, and use of K-W-L Charts as well as about the students' demonstrated attitudes, interest, and participation.

4. Immediately following each lesson, student worksheets were collected and assessed to evaluate each student's use of K-W-L Charts in the context of the lesson. These completed worksheets were analyzed for the accuracy of the data presented, the alignment of the concepts included with those taught during the lesson, and the completeness of the students' worksheet presentation. Each worksheet was also assessed for the degree to which it demonstrated the student's independent learning style and strategies, rather than showing that the student had merely learned by rote.

5. Following each lesson, both teachers and students were interviewed (post lesson interviews) and their responses noted. Each teacher interview was conducted in a face-to-face, semi-structured format in which the questions were again mostly open-ended (Creswell, 2008). The teachers were asked to evaluate the PD program and the subsequent support in terms of preparing them to use the K-W-L Chart in the lesson. They were also asked to describe the influence that the K-W-L Chart had on their teaching techniques and confidence in presenting the lesson. Each teacher was then asked to identify, what she saw to be the main advantages and disadvantages of using K-W-L Charts in place of the traditional methods used in Kuwait. These interviews were also audio-recorded and transcribed for analysis. The students' interviews were also conducted in a face-to-face, semi-structured, format conducted by the researcher, lasting 5 minutes each. During the interview each student was asked a series of open-ended questions about their current appreciation of the K-W-L Chart used in the lesson, in terms of its effect

on their classroom participation, attitudes, and learning. The students were asked to identify any discernible changes in their own classroom participation and attitudes that might be due to the inclusion of the K-W-L Chart. They were asked to describe the ways in which the use of the K-W-L Chart helped them to learn about the topic of the lesson. All student responses were audio recorded and later cross-referenced with the observer's notes for verification.

All interviews were conducted, recorded, and transcribed in Arabic. The data were then translated into English by two independent translators, both of whom were bilingual, with Arabic as their first language and English their second. The English translations were then synthesized, by the two translators and the researcher to form one English document, which was then checked for precision against the original Arabic version.

Data Analysis

All data collected from interviews, observations, and student worksheets were analyzed for evidence about the degree of influence exerted by the use of the K-W-L Chart on the teachers' approach to and methods of practice in the teaching/learned event. All data were also analyzed for evidence about the degree of influence the use of the K-W-L Chart had on students' interest in the topic, motivation to learn, and participation in the classroom learning activities as well as on their learning outcomes and the students' sense of achievement and self-esteem. The data analysis process was by a "constant comparative" method of analysis (Corbin, & Strauss, 2008; Glaser, & Strauss, 1967; Merriam, 1998) where sentences and paragraphs were examined to identify themes and specific codes. In accordance to the expectations of Creswell (2008) concerning analysis strategies, the researcher examined each response and assigned a code word or phrase that accurately and concisely identified the significance of the response to the overall goal of the research and to the research questions. In accordance to the expectations of Merriam (1998), the researcher then examined all codes to identify similarities and differences implied by the responses and collated similar codes under a clearly defined mono-dimensional category. Unnecessary categories were removed and repeated responses were noted. These categories were then analyzed for consistency of focus and a single main theme was determined. The identified main theme of this research was 'the effectiveness of K-W-L Charts.' A summary of the data analyses and researcher's reflections was then compiled.

Results

The results of the study were identified through an analysis of the data collected through the prescribed questionnaire prior to the PD Program, an assessment of the PD Program, the pre- and post-lesson teacher-interviews, and an analysis of the observer's notes made during each lesson as well as the post-lesson student-interviews and an analysis of the student worksheets following the lessons.

Questionnaire

In respect to Research Question 1 "What experience do FCS teachers have in planning and implementing teaching activities build around the use of K-W-L Charts?" a number of specific questions were asked, the data analyzed, and a number of results identified. When asked to identify specific pedagogical practices that currently established connection between individual student's established knowledge and new concepts, 82% of the teachers said that their

current teaching strategies in this area were limited and that they rarely involved teaching approaches that linked new knowledge to the students' prior knowledge. Eighteen percent of teachers did not give a response at all.

In response to the question, "What changes do you think are necessary to improve the teaching of FCS?" 79% of the teachers pointed to methods that would improve their students' involvement and motivation. Twenty-four percent identified the need to have activities that are of personal interest to the students. Twenty-seven percent of teachers suggested that greater use of audio-visual aids would not only generate student interest, but would also have a positive impact on teaching and learning. In response to the question, "Which strategy do you think would be more effective and why?" 86% of the teachers pointed to student-centered cooperative group-work, collaborative discovery, and the promotion of student-directed discussions, 21% of teachers considered these student-centered strategies to be effective in encouraging students to contribute their own ideas about the topic learned, and 19% of the teachers said they valued the way student-centered strategies made teaching and learning fun and interesting for the students. When asked to describe the type of assistance they would need to improve their range of FCS teaching strategies, 77% of the teachers referred to the provision of PD, and 24% of those, voiced their eagerness to attend workshops and courses designed around training in model lessons which utilized innovative and interactive teaching methods. Seventeen percent of the teachers who indicated a desire for a PD program voiced a personal interest in student self-evaluation methods.

Professional Development Program

In respect to Research Question 2, "In what ways can Kuwaiti FCS teachers be developed to effectively adopt and adapt the use of K-W-L Charts in their teaching?", the PD program was examined and the data collected was analyzed for evidence of change in the teachers' understanding of K-W-L Charts and the teachers' confidence and competence in the use of K-W-L Charts in the classroom. On Day 1 of the PD program, all the participating teachers demonstrated enthusiasm in the discussions related to the theory of visual and cognitive learning. They then collaboratively explored techniques that could be used to apply visual and cognitive learning theories in a student-centered classroom. While all four teachers found the theories to be new, they were able to acknowledge the importance of involving visual and cognitive learning tools in their FCS classrooms. Time management was raised as a major concern because of the potential of the K-W-L Chart promoting extra questions and discussions from the students. After collaboratively exploring the concepts, in the topic 'Waste Disposal and Recycling,' the researcher and the teachers identified 'collection of used empty glass bottles,' 'breaking down the glass into smaller pieces,' 'melting the crushed glass in an oven,' and 'reproducing new glass bottles using the molten glass' as the primary processes in the topic. The researcher and the teachers co-operatively integrated the key concepts in the topic into the sample K-W-L Chart. The researcher then assigned the teachers homework tasks based around a new topic, 'organizing your wardrobe,' to further develop teacher competency in integrating key concepts in the topic into a student-centered lesson involving the K-W-L Chart.

During Day 2, each teacher presented her homework to the group and the researcher and teachers discussed ways to improve the integration of the K-W-L Chart in that topic. All teachers demonstrated an appropriate understanding of each of the columns in the K-W-L Chart. All teachers were able to use Column 'K' to answer the question "What do I know about organizing my wardrobe?", Column 'W' to answer the question "What do I want to learn about the

organizing my wardrobe?", and Column 'L' to list what they had learned during the lesson. That each teacher included entries in each column that were personally motivated, demonstrated to the teachers the ability of the K-W-L Charts to develop student-directed learning.

On Day 3, each teacher selected a specific topic from the FCS curriculum to teach. Teachers 1 and 3 selected as their topic, 'the importance of fashion.' Teachers 2 and 4 selected as their topic, 'organizing your wardrobe.' The teachers who had selected the same topic collaborated in the planning of each lesson. The teachers and the researcher then collaboratively refined the strategies for using the K-W-L Chart in the lesson. The final lesson plans presented by each teacher demonstrated an appropriate level of competence and confidence gained through the PD program.

The evidence provided by the teacher's participation, enthusiasm, and final lesson plans confirmed the influence of the PD program to develop the teachers' understanding of the theories taught during the first portion of the PD program, promote teacher competence and confidence in using the K-W- L Chart to promote discussion, elicit questions, and encourage participation during the lesson.

Teacher Interviews and Observations

In respect to Research Question 3, "What strengths and limitations do FCS teachers and students experience when using K-W-L Charts in the FCS curriculum area?", data was collected from pre- and post-lesson interviews and observations and analyzed for evidence of change in the teachers' understanding of K-W-L Charts, as well as teacher-confidence and competence in the use of K-W-L Charts in the classroom. The interview responses showed that all the participating teachers believed that their use of the K-W-L Charts in their lessons had been effective in meeting the goals of the Family and Consumer Sciences curriculum area. The teachers also affirmed the positive influence that the K-W-L Charts had had on their planning and teaching of the lesson as well as on their ability to promote students' interest, classroom participation, and learning.

The 'K' Column

All teachers found the 'K' Column to be a useful means to drawing students into a peer discussion about foundational knowledge concerning the topic to be discussed in the lesson. Teacher 1 (Topic – 'the importance of fashion') said it encouraged her students to disclose their current knowledge base and personal experiences with the topic of fashion. Teacher 2 (Topic - 'organizing your wardrobe') echoed these comments, saying that the 'K' column had been most useful for engaging students in a revision of previously acquired knowledge about clothing categories as well as wardrobe design and arrangement strategies. Teacher 2 also commented on the fact that the 'K' column had been so effective in generating interest and discussion in the topic that it had reduced the amount of time that she would normally have spent in introducing the lesson and thereby provided more time to engage the students in peer discussion directly on the topic, through the use of the 'W' column. Teacher 4, who also addressed the topic, 'organizing your wardrobe,' reported finding the 'K' column to be an effective way to encourage students to articulate what they had previously learned and for them to voice their current attitudes to arranging their wardrobes. For Teacher 4, a major advantage of the 'K' column was its effectiveness in drawing all the students into an interactive discussion aimed at refining the accuracy of the previous knowledge attained. She said,

> *The 'K' column revealed that a lot of what the students knew about organizing wardrobes was either only partially true or somewhat misinterpreted. But because the activity associated with the 'K' column was a peer discussion, the amendments to each person's thinking were often achieved through the persuasive contributions of the other students.*

The students also considered the 'K' column an asset to their learning. The two students identified as students of Teacher 1, commented that the 'K' column had boosted their egos by providing opportunity for them to voice what they already knew about the subject.

The 'W' Column

The sequencing of thought promoted by the 'K' and 'W' columns, from what is already known to what new knowledge is desired, was noted as an advantage by all the teachers. Teacher 1 said that it helped the students move from foundational thinking about the topic to a higher level of critical thinking. She said that, prompted by the peer discussion used in conjunction with the 'W' column, students were able to cognitively balance their perceptions about 'the importance of fashion' with 'the need for protection, 'the desire for modesty,' and 'the quest for beauty.' The observer noted that Teacher 1 was also able to use the 'W' column to draw the more difficult students into the discussion and encourage the quieter students by showing that it is normal to need to ask questions. For Teacher 2, the 'W' column was an effective means for eliciting from the students, four primary categories of inquiry associated with the topic: Why do I need to organizing the wardrobe on a regular basis?, What is the correct way of folding clothes in the wardrobe?, What are the steps followed to organizing the wardrobe?, and What are the things that are useful in the organizing of the wardrobe? When asked to identify the most advantageous aspect of using the 'W' column, Teacher 2 said,

> *The best part was the ability to help the students reach an agreed list of topics that would be discussed in the lesson. This helped keep the students interested, focused, and motivated during the lesson, because they had had a part in deciding the content of the lesson.*

Teacher 3 further demonstrated the ability of the 'W' column to promote higher critical thinking by empowering her students to ask the more controversial and difficult-to-answer questions, especially concerning designing clothing by using different combinations of fabrics, such as wool and silk. She added, "The number of controversial questions prompted by the use of the 'W' column has proved to me that I need to be well prepared in advance for any question that might be raised in that portion of the lesson." The observer also noted the high number of controversial questions and comments that were raised as a result of the 'W' column, especially concerning 'respect for laws and regulations,' 'satisfying customs and traditions,' and 'the definition of appropriate in the context of personal clothing.' For Teacher 3, empowerment provided by the 'W' column for students to freely discuss controversial issues, and for teachers to monitor the discussions and to support individual student's opinions on all sides of the debate was a true benefit of the K-W-L Chart. These comments were further affirmed by both students. They each independently said that the peer discussion generated by the teacher's use of the 'W,' had raised their level of interest, had encouraged them to participate more in the lesson by providing opportunity for them to raise the issues that were important to them personally, had

increased their critical thinking skills during the peer-discussion phase of the lesson, and increased their capacity for recall. In response to the question, "In your opinion, how was the teaching different in this class?", Student 6 noted that the discussion raised by the 'W' column had encouraged her to rethink her ideas about the appropriateness of color and patterns for specific occasions. She said, "I have always liked bright colors, but this lesson helped me recognize that bright colors are not always suitable for every event, so I guess I need to find some darker colors that I can wear also."

The 'L' Column

The 'L' Column was also affirmed by all teachers to be of benefit to student learning. Teacher 1 especially noted it to be a useful tool, not only for students to identify what they had learned in the lesson but also for her to evaluate the effectiveness of the lesson and to set the foundation for the following lesson. She said that all the students had responded enthusiastically through the 'L' column and were able to create their lists quickly. An analysis of student worksheets also confirmed the effectiveness of the 'L' column and, at the same time the effectiveness of the overall use of the K-W-L Chart in terms of learning and the promotion of short term memory. While all students had used the 'L' column to list the information learned from the lesson, a comparison of the students' entries revealed slight differences, which indicated that individual students had been alerted to specific information that satisfied their individual learning needs. Student 5 made special note in the 'L' column of having learned to appreciate the differences related to casual and formal clothing.

For Teacher 3, the 'L' column also revealed a disadvantage of the K-W-L Chart, but qualified her comment by saying,

> *Its disadvantages are not caused by its shape and organization capacity, but by the limited time associated with each lesson. For example, by the end of the lesson, the students had a lot of information to write down in the 'L' column and the limited time of the lesson period (45 minutes) was not sufficient for this activity.*

The K-W-L Chart as a Whole Activity

Commenting about the overall effect of the K-W-L Chart, teachers, students, and the observer were in agreement concerning its benefits for teaching FCS subjects. Teacher 3 commented that it had certainly demonstrated an ability to help students develop their powers of persuasion to support their current thinking about the importance of fashion and to learn from each other. She said, "In this lesson students effectively used all three columns in the K-W-L Chart to represent and arrange their specific personal life experiences for the topic importance of fashion." Based on her analysis of her students' worksheets, Teacher 2 concluded that the K-W-L Chart had promoted higher critical thinking about the topic, which for previous students, who had been taught without the K-W-L Chart, had seemed mundane and of little importance. When asked, "What are your perceptions of the way students responded to the lesson through the use of the K-W-L Chart?", Teacher 4 stated that, "Compared to traditional classes, the students were obviously more keen to participate in the learning activities, particularly when using the 'K' and 'W' columns of the K-W-L Chart." She especially emphasized the lack of certain learning problems that were common in classrooms that did not use the K-W-L Chart during group activities. She said,

The students normally lose their focus when they are involved in any group activities, especially the quieter and less academic students. However, in this lesson, I think the K-W-L Chart provided a support system that enabled the students to remain focused and to stay involved in the peer discussion.

The comments by the students affirmed those made by the teachers. Student 2, said, "I think the chart progressively helped me organize the information in my mind and helped me see which concepts in this topic about fashion were more important than others." When later asked about the effect that the K-W-L Chart had had on her thinking about wardrobes, Student 3 said,

The lesson actually got me interested in how my wardrobe looks. I started to think about what changes I could make to my wardrobe so that it was organized in one way during the cold months and in another way in the warmer months of the year.

In response to the same question, Student 4 said,

The K-W-L Chart helped me understand that there is always more to learn, even about simple things, like arranging my wardrobe. The lesson helped me learn new things, but it also made me change the way I use to think about some things. And now it has made me interested in learning more about things I had never thought of before, like how important it is to have of fresh air flowing through my wardrobe to stop my clothes from smelling stale in winter.

Overall, the data collected from the research questionnaire, teacher and student interviews, observations. and student worksheets, showed that the K-W-L Chart has the potential to be a most powerful tool for empowering students to identify their prior knowledge, to articulate their individual desires for learning, to recognize what they had learned, and to be able to express the fact that some of what they had learned had been more meaningful to them personally than other aspects of their learning. The participating teachers were specifically impressed by the ability of the K-W-L Chart's 'K' column to generate interest and motivate students to participate in the lesson from its earliest stages. Both teachers and students voiced an emphatic appreciation of the way the 'W' column provided a space for students to take ownership of the learning process by being able identify the specific concepts within the topic that they would like to investigate. The positive influence of the first two columns of the K-W-L Chart was demonstrated by the high level of student interaction in every lesson during which time all students were able to ask questions of personal interest, based on their individual levels of academics, logic, and curiosity. For many of the teachers, the results of this research demonstrated a breakthrough in the development of a truly student-centered classroom, especially in the light of the fact that most students normally go through stages during which time they are reluctant to admit their limitations in knowledge. All teachers agreed that the success of the learning outcome was primarily due to the ability of the K-W-L Chart to ignite students' personal passions, to raise students' personal issues and questions, and to engage each student in the teaching/learning process more than the traditional approach to the same type of lessons. The challenge to become more proficient and efficient in the use of the K-W-L Chart

was admitted by all participating teachers and all pointed to the PD program as a primary means to develop those proficiencies and efficiencies.

Discussion and Implications

The findings of the research revealed a general agreement among participating teachers about the need for the K-W-L Chart as a student-centered teaching/learning method in the Kuwaiti education system. Eighty-two percent acknowledged having limited access to student-centered strategies in Kuwait and little experience with teaching approaches that linked new knowledge to the students' prior knowledge due to the strength of traditional worldviews and cultural resistances to many global trends. However, 86% of the participating teachers affirmed the potential impact of student-centered cooperative group-work, collaborative discovery, and the promotion of student-directed discussions. Twenty-four percent specifically identified the need to shape these activities so that they would be of interest and be enjoyable from a student's perspective but would also have a positive impact on teaching and learning.

Each of these percentages is significant because, while they each underscore the influence of cultural belief systems over the desire of individuals to explore new reforms, there is evidence to suggest an approaching breakthrough in reformation strategies once the evidence of success has been confirmed. While this research study was conducted within the context of Kuwait, these findings can be applied to other cultures where traditional and long standing approaches and practices, govern the norms of education, and reformation is approached with caution. The findings of this research, that Kuwaiti teachers are interested in student-centered teaching strategies is also important, especially considering that they are the front-line professionals who are qualified by learning and experience to decide if their students have the ability to take responsibility for their own learning and to develop skills that would enable them to become life-long learners. This finding aligns with the comments by Lumpe, Czerniak, Haney, and Beltyukova (2012) concerning the importance of using the learning and experience of teachers to formulate a benchmark in matters relating to teaching approaches and strategies.

That the teachers in this study reported students enthusiastically engaging in the activities through the different columns of the K-W-L Chart and students being able to identify and use their prior knowledge to determine their personal learning needs, indicates the importance of this study to releasing the potential of student-centered learning to, not only Kuwaiti FCS students, but to students in other countries as well. This notion is supported by similar investigations into educational reforms in the Netherlands (Meirink, Meijer, Verloop, & Bergen, 2009), in which participating teachers were required to adopt student-centered teaching and learning approaches. They found that, following the research experiences, all participating teachers had adopted a positive perception about value of student-centered teaching methods and developed an increased awareness of the need to further develop student-centered strategies through a PD program.

If the argument put forward by Bakah, Voogt, and Pieters (2011), that new reforms in education are successful when teachers are empowered to participate in, and given ample time to refine the reforms, then the agreement among participating Kuwaiti teachers, found in this study, about the need for the K-W-L Chart as a student-centered teaching/learning method is also important and should be enacted with vigor by all educational bodies. It was for this reason, important that the current study provided an opportunity for the participating teachers to identify the specific learning needs of students and through the exploration of the K-W-L Chart, decide if it could help their students to become life-long learners.

Developed around Research Question 2: "In what ways can Kuwaiti FCS teachers be developed to effectively adopt and adapt the use of K-W-L Charts in their teaching?", the PD program was evaluated in terms of its contribution to the "conceptual, empirical, systematic, and sustained inquiry" (Wang, Odell, Klecka, Spalding, & Lin, 2010, p. 400) related to teacher education pertaining to student-centered learning. The work samples created by the teachers during the PD program, together with the observer's notes and the teachers' post-PD comments, were used as the assessment instruments. That all four teachers were able to acknowledge the importance of involving visual and cognitive learning tools in their FCS classrooms was taken as evidence of their understanding of the theories of visual and cognitive learning and their appreciation of the application of those theories to their classroom teaching activities, in particular to creating a student-centered, inquiry-based approach to teaching and learning that focused on individual student-differences. These results affirmed the comment by Fishman, Marx, Best, and Tal (2003) that for PD programs to be effective, they should be focused toward change in teacher knowledge, beliefs, and the adoption of new skills. That the teachers were able to effectively integrate the key concepts of their sample topic, 'organizing your wardrobe,' confirmed the effectiveness of the PD program in developing the teachers' competence and confidence in using the K-W-L Chart components. That, by the end of the three day PD program, all the teachers were eager to integrate what they had learned into their classroom teaching strategies, confirmed Fishman et al. (2003) comment that successful PD programs positively influence teachers' classroom enactment. These findings highlighted the importance of ongoing PD within the education sector. They also showed the importance of developing PD programs that model, in their training approaches, the teaching strategies being taught in the program.

The evidence collected in response to research question 3, "What strengths and limitations do FCS teachers and students experience when using K-W-L Charts in the FCS curriculum area?", clearly affirms the contribution made by this research to educational theory and practice. The interview responses given by the teachers, together with the researcher's observation notes and an analysis of the student worksheets indicated that the integration of the K-W-L Chart into the FCS lessons had had a positive influence on the teachers' pre-lesson research, lesson planning activities, and lesson strategies as well as on the students' participation and learning outcomes. The comments by Teachers 1 and 3 (Topic – 'importance of fashion') that the K-W-L Chart promoted a high level of interaction and peer-discussion related to the benefit of particular clothing styles to the students' own life-experiences are significant, especially in the light of Caskey's (2002) insistence that classroom learning be connected with daily life. Moreover, Teacher 1's comment that the 'W' column proved to be effective in drawing the more difficult students into the discussion while, at the same time ensuring that the quieter students were also able to feel secure in their peer interaction concerning 'the need for protection,' 'the desire for modesty,' and 'the quest for beauty,' along with Teacher 3's comment that the 'W' column had helped students develop their powers of persuasion to support their current thinking about the importance of fashion highlighted the significance of K-W-L Charts concerning the promotion of deeper critical thinking through interactive learning and information sharing.

Equally significant are the comments by Teachers 2 and 4 concerning the ability of the 'W' column Chart to help students reach an agreed list of topics to be discussed in the lesson and provide space for them to articulate their personal attitudes concerning these selected topics. According to Teacher 2, "This helped keep the students interested, focused, and motivated during the lesson, because they had had a part in deciding the content of the lesson." To this,

Teacher 4 added, "Compared to traditional classes, the students were obviously more keen to participate in the learning activities, particularly when using the 'K' and 'W' columns of the K-W-L Chart." These comments confirm the importance, assigned by Lacey (2008), of classroom activities that are directed by students, under the facilitation of teachers, rather than by teachers alone.

Arguably some of the most revealing responses of the entire study concerning the effectiveness of the K-W-L Chart to increase participation and learning, were made by the students. All students reported an appreciation for the positive influence that the K-W-L Chart had had on their learning. For Student 1, the most significant change in her learning resulted from the K-W-L Chart helping her to further develop her critical thinking skills and capacity for recall. For Student 2 it was the way that the K-W-L Chart has helped her to cognitively organize and prioritize the information presented in the lesson. Students 3 and 7 pointed to the way the K-W-L Chart was able to generate interest and enthusiasm among the students. While Students 4 and 6 emphasized the way that the K-W-L Chart had helped them change the way they had previously thought about the concepts taught, Student 5 voiced her appreciation for the way the K-W-L Chart had helped her to differentiate concepts based on an examination of their finer details. Student 8 added to this, saying, "The K-W-L Chart seemed to help the teacher to listen more to what the students thought, but also gave her opportunity to add important details to what we were learning."

These comments made by the students clearly demonstrate the effectiveness of the K-W-L Chart in enabling students to evaluate their own learning, identify the applications for what is learned, and synthesize their new learning, all of which are learning outcomes that have been identified as essential to ongoing learning (Miri, Ben-Chaim, & Zoller, 2007; Weaver, & Qi, 2005; Zydney, 2010).

The analysis of the student worksheets confirmed the teachers and students assessment of the K-W-L Chart and highlighted the contribution it makes to Thorndike's Laws of Effects (Stephens, & Clements, 1998), and Skinner's (1993) educational theory about the impact that the learning-environment has on learning. It also highlights the significance of this study to the understanding of student-centered strategies that will capitalize on individual differences in the classroom to produce learning approaches that are vital for the functioning of the reforms that play an important part of future educational practice (Wang et al., 2010). The worksheets showed that the students had been effectively engaged in each stage of their lessons. They had all been able to use the 'K' column to identify their personal knowledge base. Moreover, they had all been able to use the 'W' column to indicate the knowledge that they wanted to learn. That their lists differed in the content of this column, indicated the ability of the K-W-L Chart to meet the specific learning needs of each individual. That the entries made by the students in the 'L' column showed the same type of individuality, highlighted the capacity for the K-W-L Chart to be used at the same time for students with a range of academic abilities and a variety of learning styles. Together, the students' comments and their worksheets clearly underscore the significant contribution that this study makes to the understanding of student-centered teaching practices, particularly through the use of interactive teaching tools such as the K-W-L Chart. They support the argument put forward by El-Sabban (2008), that student-centered teaching through interactive tools produce higher levels of student interest and motivation. They also support the call by Mitakidou and Tamoutseli (2011) for teachers to be trained to use interactive learning strategies.

Conclusion

Teachers in Kuwait, like teachers in the USA, are constantly challenged by the need to keep abreast with current reforms in education, in terms of content, standards, and methods, whilst retaining the cultural uniqueness of their students. As in the USA also, the current concern in Kuwait is the PD of teachers toward student-centered and interactive practices that would enable them to become facilitators and motivators of learning and empower their students to have greater control over their own learning. As part of this shift toward student-centered learning, is the need for Kuwaiti teachers to adopt teaching tools that will promote this new teaching/learning process. The K-W-L Chart is one such tool.

The theoretical framework for this study assumed a direct link between the K-W-L Chart and cognitive, schema and constructivist theories. It identified prior knowledge as a primary influence on learning and thereby confirmed the usefulness of the 'K' column in the K-W-L Chart. The literature reviewed, also highlighted the influence that prior knowledge can have on the learner's desire for new information when considered relevant to the student's personal life-experiences and thereby also confirmed the usefulness of the 'W' column of the K-W-L Chart. Of primary importance to the development of student–centered learning, as revealed through the literature review, was the finding that the interaction between learners and their environments promotes their incentive for learning and facilitates personal learning strategies. This again confirmed the potential for K-W-L Charts to facilitate student-centered learning by linking prior knowledge and the need for new knowledge to their own life contexts. The literature reviewed for this article also confirmed the potential for K-W-L Charts to promote positive changes in students' attitudes and levels of enthusiasm during the learning process.

This research study was designed to evaluate K-W-L Charts in terms of their influence on the teacher's approach, preparation, and delivery of their lessons, and the student's motivation, class participation, learning strategies, and learning outcomes. It was also designed to identify the teachers' perceptions of strengths and limitations of the K-W-L Chart in the context of the Kuwaiti FCS curriculum area. Data were collected at five different stages of the study: (a) before the PD; (b) after the PD program but before the teaching event; (c) during each classroom lesson; (d) immediately following each lesson; and (e) after all lessons had been conducted. To ensure unbiased reporting and interpretation, data was collected from the perspectives of the researcher, the participant teachers and students, and from the evidence of the student worksheets. To maximize the contextualization of this study, all written and spoken elements were conducted in Arabic and all observations and analyses were carried out by Kuwaiti nationals. The study was conducted over a four-week period commencing in November 2010.

The teacher-participants in this study were selected from 192 respondents who initially completed the questionnaire. Priority was given to teachers with the most teaching experience, with specific experience with teaching Grade 6 FCS, interest to attend a PD program and knowledge about potential reform strategies, but no prior firsthand experience with K-W-L Charts. Four female teachers and their classes were selected to participate in this research. Two students from each class were selected at random to participate in the interview and worksheet analysis portions of this study.

The findings of this study confirmed the expectation for student-centered teaching strategies and cooperative student group-work to promote student interest, motivation and lesson involvement. They also confirmed the expectation for interactive visual aids to have a positive impact on teaching and learning. The findings affirmed the ability of PD programs to change in

the teachers' understanding of K-W-L Charts and to promote teacher-confidence and competence in integrating K-W-L Charts into their lesson preparation, classroom strategies, and student activities. All teachers acknowledged the ability of the 'K' column to encourage students to disclose their current knowledge base and personal experiences with the lesson topic. They also acknowledge the impact the 'K' column had on facilitating peer-discussions and refining any erroneous knowledge about the topic. The research findings highlighted the influence that the 'W' column had on empowering learners to direct and generate their own learning and to promote an environment in which higher level of critical thinking could take place. Concerning the 'L' column in the K-W-L Chart, there was unanimous agreement among teachers and students, about its ability to provide space to identify and evaluate what had been learned and to provide direction and impetus for future learning. An analysis of the students' worksheets confirmed the impact that the K-W-L Chart had had on the students' ability to reflect on what they already knew, to identify new directions in learning and to learn from the interactive peer-discussions within the lesson.

Overall, the findings of the research showed that K-W-L Charts influenced the teacher's approach and preparation and delivery of the lesson by promoting deeper critical thinking about the topic, more detailed planning for student activities during the lesson, and a specific focus on the involvement of individual students rather than on the 'giving out' of information. The findings also showed that the use of the K-W-L Charts in the lesson had positively influenced the students' motivation and class participation by empowering them to contribute their personal opinions and give direction to the lesson. The K-W-L Chart also had a positive impact on their learning outcomes, in terms of short-term recall, self-assessment, and as a directive for future learning. The primary strengths of K-W-L Charts revealed in this study were their ability to direct and focus the teachers' planning, promote student interest, and encourage student involvement. The primary limitation of K-W-L Charts revealed in this study was the stress they place on time management.

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