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Middle School Social Studies Teachers Experiences in Teaching Spatial Thinking in Social Studies Classrooms in Kuwait: an Exploratory Study

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Abstract

Social studies educational research has, so far, devoted very little attention towards spatial thinking in classroom teaching. To help address such paucity, this study explores the spatial thinking instructional experiences of middle school social studies teachers in Kuwait. The goal is to learn their teaching practices and assess teacher understanding for the spatial thinking concept to enable future improvements. Using a qualitative study approach, the researcher conducted semi-structured interviews to examine the relevant experiences of 14 social studies teachers. The findings revealed three major themes: 1- Concepts of space, 2- tools of representation, and 3- spatial reasoning. These themes illustrated how social studies teachers focus predominantly upon simple concepts of space, using multiple tools of representation, but avoid addressing critical spatial reasoning. The findings help explain the current situation while identifying weaker areas for further analysis and improvement.

Keywords: Spatial thinking, Critical spatial thinking, Concepts of space, Tools of representation, Spatial reasoning.

Introduction

Spatial thinking has become an important part of everyday life. Whether this involves Global Positioning System-enabled navigation tools in our cars or mobile phones, interactive online maps, or other location-focused software applications, people the world over have adopted the affordances of spatial data to make their lives easier.

Consequently, spatial thinking has become a major cognitive skill which educators must address in their curricula and teaching practices. Social studies teachers, for example, began devoting increased interest towards developing student spatial thinking over the past decade or so (Anthamatten, 2010; Jo & Bednarz, 2009). Highlighting this effort, the National Council for Social Studies (NCSS) (2013) noted that social studies education develops student spatial thinking in learning areas involving population, place, and environment. As such, students learn to "think with space" to gain understanding for the effects of place upon how people interact with their environments.

Regarding how to describe spatial thinking, the National Research Council (NRC) (2006) defined it in their publication; Learning to Think Spatially as a constructive combination of three elements: (a) concepts of space, (b) tools of representation, and (c) process of reasoning. Here, concepts of space involves knowledge of important details such as location, pattern, spatial association, network, etc. (Bednarz, 2004; Gersmehl, 2005; Zwartjes et al., 2007); whereas, tools of representation implies maps, diagrams, images, graphs, the tools which support spatial thinking, etc.; (NRC, 2006). Finally, spatial reasoning refers to people's ability to observe, analyze, and interpret spatial knowledge and thereby understand the world around them (Costa, 2001; Holyoak & Morrison, 2005; Moseley et al., 2005). Teachers must integrate all such elements in their coursework to help students understand many other geo-referenced phenomena so that they can solve problems effectively and make informed decisions.

However, Goodchild & Janelle (2010) note that while many teachers use spatial thinking in their classrooms, very few actually focus upon teaching critical spatial thinking. Critical spatial thinking requires students to use concepts of space and tools of representation to inform their spatial reasoning. Sinton (2016) suggests that critical spatial thinking engages students in higher-order thinking, within the context of space, to reach informed conclusions. A critical spatial thinker, therefore, integrates critical thinking with spatial thinking skills to understand and interpret spatial concepts in tools of representation to solve problems and make informed decisions (Zwartjes et al., 2017). Moreover, Sinton (2016) argued that the capacity to make informed decisions about spatial problems is a core aspect of critical spatial

thinking. Indeed, many researchers believe that using geospatial technologies, such as Geographic Information Systems (GIS), enhances critical spatial thinking (Alazmi, 2020; Kerski, 2000; Milson et al., 2012). Goodchild & Janelle (2010) indicate that GIS, for example, provides a variety of affordances enabling students to perform critical spatial analysis to help solve real-world problems and/or make informed decisions.

With regard to the author's homeland, Kuwait's Ministry of Education (2016) indicated that a major goal for their social studies education program is to prepare students to become informed, effective, and reasonable citizens by improving their understanding for critical topics within time and place contexts. For example, students may address a topic by learning where people live, or the patterns of population distribution and movement, etc. However, for the Kuwaiti context at least, only a few studies have investigated the general abilities and practices of social studies teachers in transferring critical thinking skills in their classrooms (Alsinafi, 2008; Karam, 1992). These studies revealed that most social studies teachers in Kuwait scored poorly in this area, and lack the practices of critical thinking skills. For example, Alsinafi (2008) indicated that most social studies teachers in Kuwait achieve only a low-level of knowledge and performance in using critical thinking in their classrooms. Karam (2002) concluded, therefore, that there is a need to improve the instruction of thinking competencies among social studies teachers in Kuwait. To mitigate this issue, he suggested developing training courses to help in-service social studies teachers master essential thinking skills. Regarding spatial thinking skills, despite the importance of spatial thinking to social studies curricula, there is no single study for Kuwait which addresses the teaching of spatial thinking in social studies classrooms, or which explores social studies teacher knowledge, ability, or performance in using spatial thinking skills in their classrooms. Shin et al. (2016) confirmed this deficiency, noting that very little research has investigated teaching spatial thinking in social studies. Furthermore, Goodchild and Janelle (2009) argued that spatial thinking is essentially a discarded topic, especially in professional development and teacher training courses and workshops. To address this lack of research, this study will explore the spatial thinking instructional experiences of

middle school social studies teachers in Kuwait, to discover their classroom practices and assess teacher understanding, to enable future improvements. The following research question guides this study:

How do social studies teachers develop their spatial thinking instructional practices regarding the three components of spatial thinking: 1- concepts of space, 2- tools of representation, and 3- spatial reasoning?

Literature Review

Spatial Thinking - Definition and Components

Despite, the rising importance of spatial thinking, there is presently no clear consensus about its actual definition (Lee & Bednarz, 2012). Eliot et al. (2007) suggest that the development of spatial thinking assessments is lacking in comparison to spatial ability tests. This trajectory may be due to unclear perspectives regarding spatial thinking, and the procedures for achieving it. As an example, the NRC (2006) defines spatial thinking as the constructive integration of three cognitive skills: 1- concepts of space, 2- using tools of representation, and 3- the application of geographic reasoning. However, Wakabayashi and Ishikawa (2011) term these skills as: 1- spatial concepts, 2- spatial representation, and 3- spatial reasoning. Meanwhile, Jo and Bednarz (2009) explain that spatial thinking must improve one's knowledge, habits, and skills for applying space concepts, visual representation tools (such as maps), and the process of spatial reasoning, to solve real-world problems. Furthermore, Anthamatten (2010) split spatial thinking between three categories to facilitate teaching: "1- thinking in space, considering the role of spatial relations in daily life; 2- thinking about space, directing teachers to rely on maps to reinforce spatial concepts such as hierarchies and diffusion; and 3- thinking with space, putting "non-spatial" ideas into spatial representations," (p. 170).

Returning to the NRC definition, the cognitive skill concepts of space involves students gaining understanding for space by learning essential concepts such as distance, coordinates, distribution, patterns, spatial association, etc. (see Bednarz 2004; Gersmehl, 2005, 2006; Zwartjes et al., 2017). Students must also be able to distinguish between spatial and non-spatial concepts, classifying them effectively. Spatial concepts essentially fall into four categories: (a) non-spatial, (b) spatial

primitives, (c) simple-spatial, and (d) complex-spatial concepts (Golledge et al., 2008; Golledge, 1995, 2002). Here, spatial primitives involve the fundamental characteristics of a place, such as its identity, location, magnitude, and space-time perspective, etc. Whereas, simple-spatial concepts represent the set of spatial primitives (e.g. distance is the interval between locations), and complex-spatial refers to the combination of primitive and simple-spatial concepts (e.g. a network comprises sets of locations).

In the NRC definition for spatial thinking, tools of representation are, quite simply, the tools which organize, explain, store, analyze, and/or communicate information (e.g. maps, graphs, and diagrams). The NRC (2005) classified these tools as having either internal or external representations, where, internal refers to the mental visualization tools needed to make spatial relationships between ideas, and external that involves the physical representation tools which organize, store, analyze, explain, and/or communicate information in, for example, maps, pictures, and graphs. Essentially, spatial representation consists of both geographic space and non-spatial objects which may either be internally or externally visualized. Thus, teaching spatial thinking must focus upon improving student abilities to both use and create spatial representation tools. Many researchers argue that a student's use of representation tools such as graphs (Bertin, 1977), maps (Boardman, 1983), geo-visualization through technology (MacEachren, 2004), etc. has a positive impact upon developing their spatial thinking.

The final cognitive skill required for spatial thinking, spatial reasoning, is one which demands complex reasoning. Bruner (1973: 219) stated that, at its core, spatial reasoning means "going beyond the given information," and this necessitates high-level thinking processes (Costa, 2001; Holyoak & Morrison, 2005; Moseley et al., 2005). Spatial reasoning enables students to interpret, explain, and manipulate information to reach informed decisions (NRC, 2005). As already implied, spatial reasoning requires higher-order thinking skills to interpret and apply prior knowledge to solve real-world problems and/or make informed decisions. Jo and Bednarz (2009) classified three main levels of spatial reasoning: 1- input level (gathering/recalling information from memory), 2- processing level, (analyzing, explaining, and interpreting information obtained via the input level), and 3- output level, (generating

new knowledge from the information acquired from the previous two levels). Stated succinctly, spatial reasoning is the complex process of integrating the elements of spatial thinking.

Spatial Thinking in Social Studies Curricula

Education systems design social studies curricula to help students adapt effectively to their human, social, and physical environments (NCSS, 2013). Within that context, the development of student spatial thinking regarding their world is an essential goal for any social studies curriculum. In Kuwaiti context, the Ministry of Education (2016) stated that the major aim for social studies education is to improve student understanding regarding ''how societies work and how people can participate as critical, effective, informed, and responsible citizens of today and tomorrow... contexts are drawn from the past, present, and future and from places within and beyond Kuwait,'' (p. 24). Social studies curricula consist of various topics which address our understandings for where people live, where these places are located, the patterns of human population and movement, and how economic resources are distributed globally. Aligned with this content, students must describe and analyze location properties and human activities using spatial thinking. In social studies curricula, there are many opportunities for developing student spatial thinking in topics related to people, places and their environment (NCSS, 2013). Students are asked to investigate human interactions with the environment globally, and how the environment shapes people's lives and population distributions. Within such content, students need to explain human activities and the relevant related environmental spatial features to understand the relationships between them.

The NCSS considers spatial thinking to be a critical thinking skill which social studies curricula must emphasize. Goodchild (2006) refers to spatial thinking as a fundamental type of intelligence, or ''spatial intelligence'', which is necessary for building a modern, civic society. Spatial intelligence supports a student's ability to visualize information and form spatial relationships (Lohman, 1996). Furthermore, a large body of literature asserts that spatial thinking has a positive impact upon mental development (Behrmann et al., 2004; Cohen et al., 1996). Indeed, studies show that developing spatial thinking skills improves student abilities to mentally organize and analyze information. For this reason, many researchers, such as Goodchild (2006), argue that educa-

tional goals, including those in social studies curricula, must feature spatial thinking skills. Spatial thinking helps students build blocks into models, or create and use graphs, charts, and maps, to analyze, organize, classify, and interpret their thinking.

The NCSS (2013) encourages social studies teachers to develop students' spatial thinking by asking space-specific questions, such as "Where are people and things located? Why there? What are the consequences? An environmental perspective views people as living in interdependent relationships within diverse environments" (p. 40). Such questions enhance students' understanding for the spatial-mental process. Geography, in general, and social studies curricula in particular have great potential for developing students' spatial thinking. Thus, social studies teachers must offer the opportunities for students to think critically from a spatial view to solve problems or make decisions. Moreover, teachers take responsibility for creating an environment in which students learn to think spatially; the first step to develop these skills is to explore teachers' knowledge and performance when teaching spatial thinking. In order for teachers to improve spatial thinking in their classrooms, they need to acquire the appropriate knowledge, skills, and dispositions.

Despite the importance of developing these skills for building well-informed future citizens, very few studies have addressed this topic thus far (Shin et al., 2016). As previously noted, in Kuwait, few studies have explored social studies knowledge and performance in developing critical thinking skills (Alsinafi, 2008; Karam, 1992; Karam, 2002). Moreover, no prior research has investigated social studies teachers' knowledge, skills, and performance in spatial thinking. Exploring teachers' knowledge and performance in spatial thinking would help identify any weaknesses in order to make improvements and further recommendations. Therefore, as a starting point, this paper will explore how Kuwait's middle school social studies teachers develop spatial thinking in their instructional practices, with the aim of both discovering and assessing the status of their performance in spatial thinking in their classrooms.

Conceptual Framework: Critical Spatial Thinking

Critical spatial thinking incorporates the concepts of space and tools of representation to inform spatial reasoning (see figure 1). Critical spatial thinkers understand the concepts of space represented in

maps, graphs, or diagrams to analyze, interpret, and synthesize the information contained within them to reach informed decisions (Jo &Bednarz, 2009). Teaching critical spatial thinking must engage students in critical thinking within the context of space (Sinton, 2016). In other words, critical spatial thinking integrates critical thinking with spatial thinking. Furthermore, Zwartjes et al. (2017) noted that critical spatial thinkers must be able to both understand and interpret the assumptions underlying spatial information, its representation, and the reasoning associated with it. As already intimated, critical spatial thinking focuses upon using spatial knowledge to understand and solve problems, then make informed decisions. Indeed, the capacity to make informed decisions about spatial problems is at the core of critical spatial thinking (Sinton, 2016). A classroom exercise, for example, could ask students to decide where best to locate a hospital, airport, or school. Successfully completing such a task enables students to understand a wide variety of spatial perspectives, such as location, scale, direction, population distribution, or other important spatial variables. We now live in a globalized era in which students must learn more about the world around them in order to thrive; solving problems from spatial perspectives is crucial to this effort. Goodchild and Janelle (2010) concluded that training students to be critical spatial thinkers also helps them develop skills for collaborative work, research, debating ideas, not to mention spatial awareness.

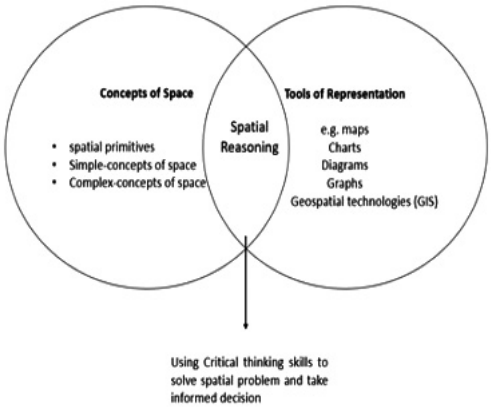

Figure 1.

Critical spatial thinking

Goodchild and Janelle (2010) define critical spatial thinking as the use of spatial data and tools "as the mental processes that accompany the use of these technologies," (p. 9). They indicated that critical spatial thinking requires promoting the process of data storing, mining, analysis, manipulation, and modeling, and that students use critical thinking when they investigate complexity, projection, and scale. All of these processes need spatial technologies to help students cope with the torrent and variety of data involved and to critically investigate spatial issues. Reflecting upon these requirements, a large body of research in the literature argues the importance of using technology, such as GIS, to facilitate spatial thinking in social studies curricula (Alazmi, 2020; Kim & Bednarz, 2013; Lee & Bednarz, 2009). Furthermore, Kim and Bednarz (2012) conducted an empirical study to explore the relationships between students using GIS and their development of critical spatial thinking. Results revealed a strong positive relationship between integrating GIS and critical spatial thinking. They found that using this technology enables students to use spatial reasoning to solve spatial problems. Furthermore, Kerski (2000) reported that students who employed GIS to, for example, identify, analyze, and synthesize spatial patterns, recorded higher level spatial reasoning than those who used traditional methods. Moreover, after conducting 33 case studies, Milson et al. (2012) found that using GIS in a social studies classroom improved student critical spatial thinking. They believed that: ''The emergence of GIS has revolutionized the way people explore and understand the world around them. The ability to capture, manage, analyze, and display geographic data and information has enabled GIS users to make decisions and solve problems,'' (p. 3). There is an imperative need to integrate spatial technologies into social studies classrooms to enhance student critical spatial thinking. Thus, Social studies teachers need to be able teach students spatial thinking through using technologies such as GIS.

Methodology

This study uses a qualitative research approach with semi-structured interviews to answer the research question. The qualitative research method enables researchers to explore circumstances and perceptions realistically through emphasis on meanings and experiences

(Creswell, 2014). For this paper, the researcher interviewed 14 middle school social studies teachers in Kuwait to explore their experiences and classroom instructional practices regarding spatial thinking.

Sampling

The researcher used purposeful sampling (Creswell, 2014) to select social studies teachers with both the relevant experience and background to serve the study. Purposeful sampling helps enrich the research area by selecting participants with great relevance to it (Babbie & Motuon, 2001). Selection criteria required participants to have taught social studies to students at grade levels 6 through 9 for ten or more years.

The researcher first got MoE permission to conduct the study, and then requested their assistance to help find and introduce relevant teachers for interviewing. These teachers 12 females and 2 males all came from Kuwaiti public middle schools. They each had between 10 and 25 years' experience teaching social studies. To preserve anonymity, participants received unique designators from T1 through T14; Table 1 describes their relevant demographics.

Table 1.

Participant profiles

Teacher	Gender	Experience Years
T1	F	12
T2	F	13
T3	F	10
T4	F	20
T5	F	11
T6	M	21
T7	F	25
T8	F	10
T9	F	12
T10	F	12

Cont. Table 1.

Participant profiles

Teacher	Gender	Experience Years
T11	F	14
T12	M	16
T13	F	19
T14	F	11

Data Collection

The researcher collected data using the semi-structured interview method. Prior to their interview, each participant completed and signed a consent form. The researcher also informed them that all conversations would be audio-recorded to ensure information accuracy through verbatim transcription (Merriam, 2009). Each roughly 60-minute interview, conducted online via Microsoft Teams, focused primarily upon the interviewee's experience teaching spatial thinking. The researcher used the same set of open-ended questions to collect detailed information from each teacher, with the nine questions split evenly across the three components of spatial thinking: concepts of space, tools of representation, and spatial reasoning.

Data Analysis

Maxwell (2005) states: "The experienced qualitative researcher begins data analysis immediately after finishing the first interview or observation, and continues to analyze the data as long as he or she is working on the research," (p. 95). Accordingly, data analysis began immediately after each teacher completed their interview, and continued for the duration of the research effort.

In qualitative research, data analysis takes place via one of two distinct methods: 1- descriptive analysis, and 2- content analysis (Miles & Huberman, 1994). For this study, the researcher employed the descriptive method (Merriam, 2009), where data is coded, line-by-line, using an inductive coding scheme which helps create categories to disaggregate interview data. Essentially, unprocessed data undergoes conversion into understandable and usable data for readers (Patton,

1990). The process follows four sequential steps: (i) under each theme, inductive coding identifies important codes in the data, (ii) similar codes are combined under relevant categories, (iii) categories and themes are identified and organized, and then (iv) findings are interpreted. In this particular case, the researcher combined similar categories, grouping them under whichever of the following three themes was most appropriate: (a) concepts of space, (b) tools of representation, and (c) spatial reasoning. Furthermore, in each category within a theme, the researcher added relevant quotations from teacher interviews (see Table 2).

Findings

Table 2 shows how data analysis generated categories across the three themes to help answer the research question: "How do social studies teachers develop their spatial thinking instructional practice regarding the three components of spatial thinking: 1- concepts of space, 2- tools of representation, and 3- spatial reasoning?"

Table 2.

Data Analysis Results

Themes	Categories	Definition	Statement examples
Concepts of space	Basic concepts of space	This involves spatial primitives and simple spatial concepts.	"Students learn the concepts of location and boundary." "I teach students about latitude and longitude..."
	Complex concepts of space	This involves the combination of spatial primitives and simple spatial concepts.	"I teach my students about spatial patterns... both physical and human." "They need to learn about spatial associations, and how the world around them is connected."

Cont. Table 2.

Data Analysis Results

Themes	Categories	Definition	Statement examples
Tools of representation	Maps	A drawing for a particular area which represents certain specific features.	"Sure, maps are the most common tool I use in my classroom."
	Diagrams	A graphical representation, commonly a drawing, which describes the connections between spatial information.	"Sometimes I ask students to draw arrow diagrams to classify spatial features."
	Graphs	A pictorial depiction of data describing the relationships between spatial variables.	"Students may draw line graphs, or bar charts to compare between countries."
Spatial reasoning	Information extraction	The process of extracting spatial information from maps.	"Students extract information I ask for, such as [finding] the biggest country in the Arab world."
	Map reading and interpretation	The act of interpreting and understanding geographic information on a map.	"Students read the map and understand how some features are distributed"
	Spatial relationship	The understanding for how an object is located in space relative to other objects.	"Students make relationships between countries in the world...[and] how their locations affect them"
	Comparison	The analysis of how similar/dissimilar a place is to other regions.	"For example, students compare between Kuwait and China..."

Theme 1. Concepts of Space

During their interviews, the social studies teachers stressed the importance of students understanding concepts of space. For example, T4 stated: "Concepts of space help students to gain spatial knowledge, which improves their spatial understanding." When asked "What basic concepts of space do you focus on/use in your classroom?" teacher responses fell under two categories: 1- basic concepts of space, and 2 complex concepts of space. Regarding the former, most teachers responded that they always focus upon the most fundamental and important concepts of space, with T4 stating:

In each lesson, I determine places, such as which countries events occurred in... Using maps for my lesson, I then ask students where the place is located... [Regarding] the concepts of space, I use location. [For] connections like the relationships between countries, it is sometimes essential for students to learn how to read a map, such as direction, distance, and coordinate systems like longitude and latitude.

All participants (n = 14) mentioned the following basic concepts of space: 1-location, 2-boundary, 3-region, 4-distance, 5-direction, 6-connection, 7-movement, 8-shape, 9-latitude, and 10-longitude. Of these, a majority (n = 9) noted that they focused most heavily upon location.

Regarding complex concepts of space, only a few teachers (n = 4) mentioned using them within their instruction (e.g. spatial association, pattern, and distribution).

Theme 2. Tools of Representation

Each teacher emphasized the importance of using spatial representation tools for spatial thinking instruction, referring to some specifically: 1-maps, 2-diagrams, 3- graphs. Of these, they all stated that maps were their most powerful tool for engaging students in spatial thinking. For example, T6 stated: "I always use maps to ask students to think spatially." Expanding on this, T9 stated:

Maps are very important... In my classroom I show maps... For example [one] map describes global vegetation... I ask students to think about this map... What did they see? How did the vegetation differ from place to place? Why? I ask them to make comparisons between one region and another or maybe between our country and Europe or Western Asia,.... Sure, the maps will help them to think effectively.

Five teachers indicated that they used diagrams and graphs to engage students with spatial thinking, explaining that they asked students to read and analyze the spatial data embedded within these tools. Furthermore, three teachers said that they asked students to draw graphs or diagrams to spatially organize their data. When the teachers talked about diagrams, they specifically referred to examples like 'mind maps', schematics, and arrow diagrams, while with graphs they referenced line, bar, and pie charts. For example, T11 stated:

For example, I asked students to read a paragraph, and create a diagram to classify countries into high and low population growth. The arrow diagram is fine... sometime I asked them go deeper by creating a mind map with more information about these countries... On the other hand, I have taught students about economic conditions in the world... [Here] I asked students to create a bar chart or line chart to visualize the data, which helps them to compare between developing and developed countries.

Regarding technology, teachers indicated that their classroom technology use centers upon showing visual-spatial elements. For example, T14 stated: "Yes, I have used technology in my classroom... I showed maps... [and] sometimes graphs." When asked about the kind of maps she used, she stated: "Traditional maps... maps in an image format." When asked about geospatial technology like GIS, not one teacher mentioned using multilayered maps, GIS maps, or Google maps in their classroom.

Theme 3. Spatial Reasoning

Teachers recognized the role which spatial reasoning plays in developing student thinking skills; each of them commented on its importance in their classroom. For example, T10 stated: "Spatial reasoning is very important, and it is a goal I work to achieve in my classroom." When asked what techniques/methods they used to develop student spatial reasoning, the teachers noted: (1) information extraction, (2) map reading and interpretation, (3) spatial relationships, and (4) classification. Each teacher listed information extraction as the technique they most frequently used in their classroom. For example, teachers

would ask students to extract information related to a given lesson, such as the names of oceans, countries or continents relevant to a specific topic. T1 gave a clear explanation for this technique:

I ask students to extract specific information from maps... I show a map and ask them, "How many continents in the world? Extract their names... What is the biggest continent? [etc.]" Some students may go to the map and point at the required continent... This helps students to learn how they can get the information from a map.

Half of the teachers (n = 7) identified the importance of map reading in a social studies classroom, with T2 stating: "Map reading skills are important in social studies subjects." To the teachers, map reading is a fundamental skill that helps students understand their world. When asked about how they taught map reading, teachers indicated that they needed to help students understand the myriad symbols a typical map uses so they could fully interpret the document. They noted several map characteristics, such as title, legend, scale, symbols, colors, etc., which they always emphasize to students. As T6 noted, "If students can read the map, then they will be able to understand and interpret the information." Expanding upon this, T9 stated:

Map reading is very important. If students do not understand the symbols or other elements, they might not understand and interpret what the map is describing... I always ask students to [first] read the title to understand the major ideas of the map. Then, I ask them to look at the legend to see what the symbols mean or what the colors show... I teach students some basic symbols, such as how roads are shown on a map... what streams and rivers look like... what contour lines mean, [etc.]. All these basic details help them interpret information, such as where the highest mountain is, or how vegetation changes with location?

Teachers also confirmed that developing spatial relationships is a fundamental skill they employ to enhance student thinking and reasoning about a space; T7 stating: "Using spatial relationships is a unique way to understand the world through analyzing spatial pattern relationships." Forming spatial relationships requires students to use critical thinking skills, such as analysis, to build relationships between objects. T3 supported this point, stating: "Students who build spatial relation-

ships between objects will understand the location knowledge, and the affecting factors on locations.'' Indeed, when a student understands spatial relationships, it helps them see the world's interconnectivity. T10 offered an example for how she engages spatial thinking in her classroom, stating:

In my classroom, I focus on building the spatial relationships between objects... For example, asking ''why or where'' is an essential question to enhance student [ability] to think spatially... I ask them why northern parts of the world are very cold.This helps students make relationships between the location and climate... Moreover, I ask them about the ''space-time'' relationship... For example, I ask them to compare population numbers from 1960 and now... This engages students to make relationships between time and space, and to think about the reasons [behind them].

Four teachers noted that the spatial classification technique supports student spatial reasoning, arguing that it helps them place data into specific categories/groups depending upon shared properties. Describing this, T1 noted: ''Students read a map and consider the similarity of the specific human or natural properties [it contains], and then think about classifying them in multi-classes.'' T3 added that this technique engages students in''not just reading a map, but understanding its content.'' Elaborating further, T8 stated:

My students looked at maps, and I asked them to classify global population growth... They read the map legend, look at the colors, and begin to classify world population growth into very high, high, low, and very low... Sometimes students classify countries depending on economic, physical, human, or cultural features... Students may [also] classify the world according to language, religion, or culture.

Discussion

The results address the research focal question: ''How do social studies teachers develop their spatial thinking instructional practice regarding the three components of spatial thinking: concepts of space, tools of representation, and spatial reasoning?''

Regarding concepts of space, the results reveal that teachers consider them crucial to social studies instruction, because students will always need to use maps. Goodchild & Janelle (2010) argue that in

developing student critical spatial thinking, teachers must focus them on the concepts of space to gain essential knowledge, and that these concepts must be a fundamental educational theme. However, social studies teachers in Kuwait tended to focus more on teaching basic concepts, like location, distance, direction, etc., with less emphasis on complex concepts like buffer, layer, map projection, clustering, etc. This result agreed with what Verma&Estaville (2018) found in their study; it showed that just 27% of students understood complex concepts of space. Zwartjes et al. (2017) indicated that while basic spatial concepts are critical to improving student spatial knowledge, there is need to expand this knowledge by considering higher-level spatial concepts. This would enable students to understand the world around them more fully and to conduct spatial reasoning.

Regarding tools of representation, the results showed that social studies teachers use diagrams, graphs and maps as spatial representation elements, with the latter being most employed. According to the NCSS (2013), maps are important to social studies instruction because they are tools of geographic communication; they help students communicate with other parts of the world and understand relationships between their nation and others. Teachers said that they use these tools regularly, asking their students to think about them in various ways by, for example, making relationships, classifications, or determining the distributions of certain properties. Maps serve as effective tools for spatial reasoning and trigger complex spatial proofs (NRC, 2006). Moreover, the NRC (2006) argues that these representation tools also help students understand most concepts of space. However, technology still plays only a limited role in spatial representation in Kuwaiti social studies classrooms. The study results revealed that while teachers in Kuwaiti social studies classes regularly employ basic technology, like a computer, to show traditional sources such as maps, graphs, or diagrams, none of them acknowledged using geospatial technologies such as GIS, remote sensing, satellite imagery, or even Google Maps, as representation tools. Indeed, many international studies have confirmed this kind of situation elsewhere around the world (Alazmi, 2020; Kerski, 2000; Milson, 2012). For example, just 2% of U.S. schools use GIS in their classrooms (Kerski, 2000). However, research indicates that geospatial technology can have a significant impact upon developing

student critical spatial thinking (Goodchild & Janelle, 2012). Therefore, this study's results emphasize the strong need to work harder towards integrating geospatial technologies into social studies classroom practices.

Results reveal that social studies teachers in Kuwait use four methods to support spatial reasoning: (1) information extraction, (2) map reading and interpretation, (3) spatial relationships, and (4) spatial classification. Each method is important because it supports a student's individual capacity to think, understand and make sense of the world (Jo & Bednarz, 2009). The NCSS (2013) argues that social studies must emphasize spatial thinking by focusing upon complex ideas about place and space, and how people interact with them. Despite the teachers in this study applying important techniques, like spatial relationships, classification, and interpretation, their efforts mostly involve only basic information, such as the extraction of specific locations or selecting continents, oceans, and mountains, processes which only require simple spatial reasoning techniques (Zwartjes et al., 2017). According to Jo and Bednarz (2009) classifications of spatial reasoning, social studies teachers in Kuwait are using the input and processing levels of spatial thinking, but largely ignoring the highest level, the output level, which involves generating new knowledge from prior levels, such as creating a new map, reaching a solution, or making decisions. Zwartjes et al. (2017) indicated that the highest level of spatial reasoning requires students to use the information from their analysis to judge, evaluate, predict, create or build a model, and draw conclusions to solve problems or make decisions.

Furthermore, Goodchild & Janelle (2010) argue that while many teachers use spatial thinking in their classrooms, very few focus upon teaching critical spatial thinking. This is true of middle school social studies teachers in Kuwait; despite using traditional and basic spatial thinking in their classrooms, not one of this study's teachers acknowledged using high-level concepts, such as spatial modeling, argument mapping, spatial problem solving, or collaborative research into spatial topics. It seems that the attention they give to spatial thinking is driven by the content of text books they use, or because they must focus on preparing students for standardized tests/exams. Moreover, these teachers made no mention for the role which geospatial technologies play

in supporting student spatial thinking. Many studies argue the importance of GIS in supporting student critical thinking skills, which better enable them to solve problems and make decisions. For the most part, GIS is not presently integrated or even used in Kuwaiti social studies classrooms.

Conclusion

As noted earlier, few studies presently address spatial thinking within social studies curricula (Goodchild & Janelle, 2010). Indeed, as far as the researcher is aware, no prior studies in Kuwait have addressed this concept at all. Therefore this study fills a gap in the literature by providing an explanation for how spatial thinking is implemented in real Kuwaiti social studies classrooms. Moreover, this study explores middle school social studies teacher instructional experiences with spatial thinking, thereby providing understanding for the current situation which enables identification and future improvement for areas of weakness.

Since teaching critical spatial thinking is a challenging task, a recommendation for future research and practice emerged. There is an urgent need to focus on developing teacher knowledge and instructional skills for implementing critical spatial thinking techniques in their classrooms. Designing and developing appropriate professional development or short training courses for both pre-service and in-service social studies teachers might alleviate this problem, improve their understanding and reveal the best practical ways for teaching critical spatial thinking. Moreover, future research could assess student spatial thinking to identify areas for further improvement or those upon which social studies teachers should focus more attention.

For future practices, critical spatial thinking must be listed explicitly within social studies curricula standards. It must become a core competency, incorporated within social studies content that teachers must provide. Moreover, educational institutions which train pre-service social studies teachers must focus more deeply on spatial thinking in their coursework to help their trainees understand this competency more effectively. Furthermore, the Kuwaiti MoE could offer short training courses and/or workshops to help in-service social studies

teachers better understand the importance of spatial thinking and how best they can teach it. The MoE could also offer teacher training courses on using GIS to support spatial thinking.

While this study investigated Kuwaiti social studies teacher instructional experiences regarding spatial thinking, it does include some limitations. This study used semi-structured interviews to gather information, but the dataset may not be large enough to accurately reflect the overall situation regarding the teaching of spatial thinking in Kuwaiti social studies classrooms. Future research could include more teachers and also integrate observations, lesson plan analysis, and interviews to provide a richer data source for analysis.

خبرات معلمي مادة الاجتماعيات في تدريس التفكير المكاني في صفوف مادة الاجتماعيات في المدارس المتوسطة في دولة الكويت: دراسة استطلاعية

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ملخص

هدفت هذه الدراسة النوعية إلى استقصاء خبرات معلمي مادة الاجتماعيات في تدريس التفكير المكاني في مدارس المرحلة المتوسطة في الكويت. جُمعت المعلومات من خلال المقابلات شبه المقننة مع 14 معلماً ومعلمة ممن يدرسون مادة الاجتماعيات في المرحلة المتوسطة. وبعد تحليل النتائج، تم تصنيف خبرات المعلمين في تدريس التفكير المكاني إلى ثلاثة موضوعات رئيسة؛ هي: 1- المفاهيم المكانية، و 2- أدوات التمثيل المكاني، و3- المنطق المكاني. أبدى كل معلم ومعلمة تجاربهم في كل موضوع من هذه الموضوعات وخبراتهم الفعلية داخل فصولهم الدراسية. كشفت النتائج أن معلمي الاجتماعيات في دولة الكويت يستخدمون مفاهيماً مكانية بسيطة. وعلى الرغم من تنوع أدوات التمثيل المكاني إلا أن هناك قصوراً في استخدام التفكير المكاني الناقد. وفي ضوء ماتوصلت إليه الدراسة من نتائج، تم اقتراح بعض التوصيات؛ من أهمها توفير برامج تدريبية تساعد معلمي مادة الاجتماعيات في تدريس مهارات التفكير المكاني الناقد.

الكلمات المفتاحية: التفكير المكاني، التفكير المكاني الناقد، المفاهيم المكانية، أدوات التمثيل المكاني، المنطق المكاني.

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