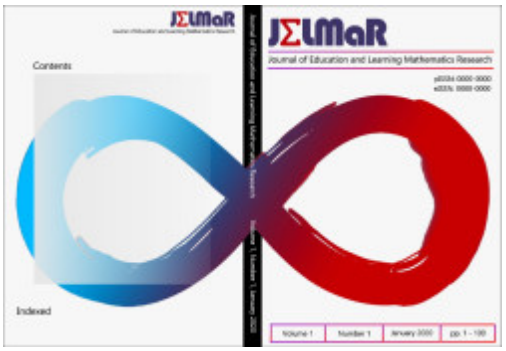

Journal of Education and Learning Mathematics Research (JELMaR)

Online ISSN : 2715-9787
Print ISSN : 2715-8535
Journal Homepage : http://jelmar.wisnuwardhana.ac.id/index.php/jelmar/index

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To cite this article Kowkas, S. (2024). My Conceptions shape my Practices', Palestinian Mathematics Teachers' Conceptions and Practices in Fostering Creativity. *Journal of Education and Learning Mathematics Research (JELMaR)*, *5*(2), 180-205. https://doi.org/10.37303/jelmar.v5i2.157

To link this article : https://doi.org/10.37303/jelmar.v5i2.157

Publisher
Department of Mathematics Education,
Faculty of Teacher Training and Education,
Universitas Wisnuwardhana Malang

Journal of Education and Learning Mathematics Research (JELMaR)
Volume: 5, Number: 2, November 2024, pp. 180-205
p-ISSN: 2715-8535, e-ISSN: 2715-9787

Received: 13 August 2024 *Revised: 18 October 2024* *Accepted: 7 November 2024* *Published: 24 November 2024*

'My Conceptions Shape my Practices', Palestinian Mathematics Teachers' Conceptions and Practices in Fostering Creativity

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Abstract: *As many abstract terms, creativity is understood differently by people, each according to his/her cognitive background. In addition, creativity is such a sophisticated concept, that its interpretation has constantly evolved over the progression of epochs and within the development of cultures and civilizations. Its schema has transformed over a wide spectrum of descriptions, from the notion of Divine inspiration adopted by early philosophers to the modern outlooks of originality and problem-solving skills. On the other hand, people behave according to their inner beliefs and based on their interacted ideologies. Wherefore, the current study explores 8th and 9th grade, Palestinian Mathematics teachers' conception of Mathematical Creativity (MC), as well as their teaching practices in fostering MC among students. The study used semi-structured interviews with twenty in-service Mathematics teachers, exploring their conceptions, teaching strategies and interpreting their features in the context of fostering MC in class. The findings revealed that many teachers have good, but not full conception of MC whereas few had misconceptions. Those of good conceptions also integrate teaching practices that aim to foster MC, while those with misconceptions do not. In addition, teachers who believe in their students' potentials adopt integrating MC-fostering' practices while those with little belief do not. Moreover, teachers who involve in teaching practices that foster MC were noticed to have positive attitude toward Professional Development. Common challenges and obstacle hindering MC were mentioned by teacher; including official textbook issues, insufficient number of periods and large class sizes.*
Keywords: mathematical creativity, teachers' conceptions, teachers' practices, fostering creativity, palestinian teachers

INTRODUCTION

Palestinian Education Context

This study is carried out on Palestinian Mathematics teachers in East Jerusalem (EJ) and in the West Bank (WB). The education in Palestine is divided into three types of school systems: state (public) schools, private (denominational) schools linked to one of the church communities and (exclusively for refugees) the United Nations Relief and Works Agency (UNRWA) schools. Of the three types, the education at the private schools has the highest ratings. It is worth noting that the three types of school systems obey the rules of the Palestinian ministry of education.

Special Political Constrain Issues

However, the Palestinian education faced a very hard situation due to the Israeli-Gaza war in October 2023. Being at war, the Israeli authorities has created frequent closure of all main roads in and between cities, towns and villages in the Palestinian territories. Several check points that either were closed or caused a lengthy time consuming, which made regular school attendance difficult for both teachers and students. As a result, the Palestinian Ministry of Education (MOE) has decided to conduct hybrid learning of three days of face-to-face teaching and two days of online teaching via Teams 2. Teams 2 is a template in Microsoft Teams for Education which has several features of creating and posting educational materials, organizing the learning process and is very beneficial for teachers (Guzmán, 2021).

Statement of the Problem

In the school education, there is a notable lack of knowledge regarding how teachers, especially Mathematics teachers, view and incorporate creativity, in their teaching methods (Kettler et al, 2018). The current study aims to highlight the 8th and 9th grade Palestinian Mathematics teachers and to explore the connection, between their understanding of creativity and the specific approaches they use to encourage or hinder their students' creative abilities and talents. The significance of the problem has been driven by the several sophisticated factors affecting the Palestinian education system, such as diverse school types, classroom sizes, cultural considerations, political issues and limited financial support. Therefore, by focusing on 8th and 9th grade Mathematics teachers, the researcher aims to provide insights that could lead to effective interventions and enhancements that foster a more creative learning environment in Palestinian classrooms.

The Study's Main Objectives

The study aims to illustrate deeper insights and holistic view of teachers' beliefs and practices in the context of fostering MC among their students in the classroom.

1. To explore the Mathematics teachers' conception of MC gender on their integration of teaching practices that foster Mathematical creativity among 8th and 9th grade Palestinian students.
2. To identify the ways that Palestinian 8th – 9th grade Mathematics teachers intentionally design and implement their teaching practices to foster MC within the classroom setting.
3. To illustrate how Palestinian 8th – 9th grade Mathematics teachers create learning experiences that facilitate the development of students' MC.
4. To highlight the challenges and obstacles that Palestinian 8th – 9th grade Mathematics teachers face in fostering MC in the classroom in order to provide appropriate suggestions and recommendations to the stakeholders.

Rational and Purpose of the Study

There have been massive attention paid to value Creativity in recent decades, as for both individuals and societies; Creativity has become a valuable resource as it has critical influences on both, personal and professional success (Schnugg, 2019; de Alencar, 2012). In addition, fostering MC in students is essential for their success in the subject (Nadjafikhah, Yaftian & Bakhshalizadeh, 2012). It is associated with intellectual abilities and personal traits (Grégoire, 2016). Integrating innovative teaching practices in the classroom can help students discover their potential (Bicer, 2021).

On the other hand, studies have suggested that people's behavior is directly influenced by their beliefs (Ajzen & Fishbein, 2000; Pajares, 2022). In particular, teachers' conceptions of MC directs their teaching practices that foster it (Lev-Zamir & Leikin, 2011). Moreover, other studies have indicated that teachers have different conceptions of MC, with some view it as developing different perspectives and problem-solving approaches (Aktaş, 2015; Waswa & Moore, 2020).

Wherefore, the purpose of the study is to observe Palestinian Mathematics teachers' conception of MC, to explore their teaching practices in that context and to identify challenges and obstacles that they claim to hinder MC in class. The research also attempts to add to the body of research done for the Palestinian case; since international studies may not apply for Palestinian teachers' case. Additionally, the study focus on school setting education whereas similar studies on MC are usually done for tertiary education.

Research Questions

1. How do Palestinian 8th – 9th grade mathematics teachers perceive and define MC, and how does this perception influence their teaching practices?
2. In what ways do Palestinian 8th – 9th grade mathematics teachers intentionally design and implement their teaching practices to foster MC within the classroom setting?
3. How do Palestinian 8th – 9th grade mathematics teachers create learning experiences that facilitate the development of students' MC?
4. What are the challenges and the obstacles that Palestinian 8th – 9th grade mathematics teachers face in fostering MC in the classroom?

In the field of Mathematics Education, fostering Creativity among students has long been highlighted by educational researchers for its significance as an aspect of Mathematical thinking (Schoevers, Kroesbergen & Kattou, 2018; Wessels, 2017). Creative thinking in Mathematics is the core of rational thinking in every subject in general and in Science particularly (Escultura, 2012). Thus, fostering Creativity in Mathematics leads to fostering learning in general.

Conceptual Theories on Mathematical Creativity

There is no clear definition of MC, and there are conflicting views on the relative importance of innate talent and acquired skills (Waswa & Moore, 2020; Kozlowski et al, 2019; Dickman, 2014). The consensus among academics is that MC, however, combines novelty or uniqueness with task-fitness or usefulness and exhibits fluency, flexibility, and originality in the way that one thinks (Levenson et al, 2018; Wessels, 2017). MC is seen as a thinking process that manifests in three 'products', or aspects: fluency, flexibility and originality (Levenson et al, 2018; Kozlowski et al, 2019; Molad et al, 2020). Fluency in the number of different correct solutions and discussions, and the ability to produce several solution strategies to a problem in the Mathematics learning process (Meier et al, 2021; Tabach & Levenson, 2018). Flexibility in the number of categories of those solutions and discussions; and originality in their uniqueness and insights (Cox et al, 2024).

Teaching Practices That Are Identified to Foster Mathematical Creativity

Creativity in Mathematics Education relies on the link between teaching Mathematics and fostering innovation, involving new ideas and diverse approaches to problem-solving. MC is essential for nurturing talent in Mathematics and enabling students to think outside the box (Byers, 2010; Barraza-García, Romo-Vázquez & Roa-Fuentes, 2020). Practices such as guessing, exploring different perspectives, and using various math skills enhance creativity in mathematicians. Mathematical reasoning promotes creativity by encouraging speculation and considering different views to solve problems (Nadjafikhah, Yaftian & Bakhshalizadeh, 2012; Grégoire, 2016). In addition, by combining multiple representation (MR), tools such as pictures, graphs, symbols, drawings, and writings, teachers can help students externalize internal mathematical notions leading to better understanding and enhanced creative thinking in mathematics (Tversky, 2015). Moreover, integrating Science-technology-Society (STS) supports students' critical thinking, logical reasoning and problem solving (Mulyanti et al, 2021). Other teaching scenarios were also highlighted to foster creativity, such as cooperative learning, problem solving and problem posing and utilizing digital media (Kynigos & Moustaki, 2014; Miranda & Mamede, 2022).

Previous Studies

Several studies on Mathematics teachers' conceptions of creativity have exposed diverse perspectives. Originality, problem-solving and multiple approaches are often linked to MC (Aktaş, 2015; Turan et al., 2023; Waswa & Moore, 2020). A previous study

have revealed that Mathematics teachers conceive MC pertaining to fluency, flexibility, originality and elaboration (Lev-Zamir & Leikin, 2011; Agustina et al, 2024; Pitta-Pantazi et al, 2018). Another study have shown that in-service primary teachers associated MC to problem-posing (Desli & Zioga, 2015). On the other hand, some studies have shown that some primary Mathematics teachers have a narrow conception of MC (Aktaş, 2015; Haavold & Birkeland, 2017).

On the other hand, several studies have revealed that teachers' beliefs about their students' potential influence their teaching practices (Aus et al, 2017; Utami, 2016; Bendahmane, 2023). Along other studies findings which indicated that Mathematics teachers believe in their students' potentials, even the difficult ones (students who are difficult to teach) (Cullicott, 2019; Peltenburg & Heuvel-Panhuizen, 2012).

Several studies have reported obstacles that Mathematics teachers claim to hinder creativity in the classroom. These include g the need for training, identifying creative students, and integrating creativity into the curriculum (Ayele, 2016), curriculum limitations, and the education system (Aktaş, 2015; Metu et al, 2023).

METHOD

Research Design

The researcher used a qualitative method via semi-structured interviews. Qualitative methods are important in understanding complex phenomena offering a deeper understanding of experiences, phenomena, and context, addressing "how" and "why" questions (Leko et al, 2021). The qualitative method consists mainly of semi-structured interviews. Semi-structured interviews are common qualitative tools being considered effective for obtaining in depth information and exploring teachers' attitudes, beliefs, motivations, and practices (Mashuri et al, 2022). Semi-structured interviews would allow for exploring the particular aspects deeply with flexibility that let participants expose their ideas and perceptions freely.

Participants

Twenty Palestinian Mathematics teachers participated voluntarily in the semi-structured interviews. An invitation was sent to a large number of schools all around the country in order to get enough number of participants and to ensure diversity. The participants were selected as to shape a good representation of the demographical aspects. Table 1 illustrates the demographics of the participants.

Table 1. Demographics of Participants in the Semi-Structured Interviews

Teacher ID	Gender	Experience (years)	Education Level	School Type	Governance
Teacher1	M	11	M.A.	Public	Jerusalem
Teacher2	F	6	M.A.	Public	Hebron
Teacher3	M	20	Bed	Public	Ramallah
Teacher4	F	23	B.A.	Private	Ramallah
Teacher5	F	18	Bed	Public	Ramallah
Teacher6	M	18	M.A.	Public	Jerusalem
Teacher7	M	14	B.A.	Private	Jerusalem
Teacher8	F	29	Bed	Public	Northern
Teacher9	F	6	M.A.	Public	Hebron
Teacher10	F	23	B.A.	Private	Jerusalem
Teacher11	F	16	Bed	Private	Jerusalem
Teacher12	F	6	B.A.	Public	Ramallah
Teacher13	F	7	B.A.	Public	Northern
Teacher14	F	11	M.A.	Private	Ramallah
Teacher15	M	19	M.A.	Private	Jerusalem
Teacher16	F	8	M.A.	UNRWA	Jerusalem

Teacher17	M	4	B.A.	Public	Ramallah
Teacher18	F	6	M.A.	Public	Hebron
Teacher19	F	16	M.A.	UNRWA	Northern
Teacher20	F	4	B.A.	Public	Hebron

Sampling

The researcher conducted semi-structured interviews with in-service teachers. The researcher was aiming to conduct about 18 – 25 interviews, since a range of twenty to thirty semi-structured interviews is commonly recommended (Mashuri et al, 2022). However, the researcher stopped when theoretical saturation was accomplished by the 19th and the 20th interview. Theoretical saturation in semi-structured interviews is the point at which additional interviews do not provide new information (Low, 2019).

Data Collection

The interviews were conducted online via video conferencing, Zoom platform, and they were recorded. Interviews duration were 45 – 60 minutes. The interviews were recorded after the participants' consent. The recordings were transcribed and each transcript was organized into a table of one column in order to separate questions from answers; allowing for a proper and easier coding process.

The interviews were carried out in Arabic language, also transcribed and coded in Arabic in order to keep exact, proper descriptive wordings in their original form. Finally, the resulting codes and themes were translated to English, as well as the quotes to be presented in the research paper. In order to maintain accuracy and authenticity of the original transcripts, the researcher used a back-translation procedure. The researcher had the transcripts of the interviews translated into English by an English teacher, and then another English teacher translated the translated version back into Arabic. Finally, the researcher and a third English teacher made a comparison between the back-translated version with the original transcripts; proper modifications were made on the English-version of the transcripts to be closest in meaning to the original text. It should also be noted that the Arabic-English translations were not literally done; some 'locally-used' phrases were interpreted and translated to the most proper English words that describe that phrase. The back-translation procedure was repeated few rounds for each interview, 2 – 4 rounds until final translation was closest in meaning to the original Arabic text.

Interview Guide

The interview guide (Appendix A) was painstakingly designed according to several qualitative methodology textbooks (Magnusson & Marecek, 2015; Gerson, 2020; Roberts & Rosanne, 2020). Moreover, since designing the interview guide requires a rich conceptual reference, the researcher carried out a thorough studying of scientific research papers that covers comprehensively the contextual aspects of the research topics, namely MC, teachers' teaching practices that foster this creativity among students and the main features of those teachers who engage in such teaching practices. The interview guide was specifically aimed at addressing the research questions, focusing on teachers' beliefs about mathematical creativity, their intentional practices to foster this creativity, and the challenges and obstacles that hinder fostering MC.

Data Analysis

The interview transcripts were analyzed using thematic analysis to identify patterns, themes, and insights related to teachers' perceptions, practices, and the fostering of mathematical creativity. The researcher used constant comparative data analysis (Glaser & Strauss, 2017) as a key method in qualitative research, especially in grounded theory (Fram, 2013). It consists of a systematic process of categorizing, comparison, inductive and refinement of data.

The coding procedure was initiated as soon as the transcription was finished for the first interview since the coding process is an integral part of the analysis of the transcript. In the coding process, the researcher used a combination of Descriptive Coding, Value Coding and In Vivo Coding.

Descriptive Coding: Descriptive Coding involves the development of coding schemes to standardize text units and reduce errors (Campbell, 2013), and it is useful in analyzing semi-structured interviews to identify categories, patterns and themes (Vila-Henninger, 2019).

Value Coding: Value Coding involves examining the values, beliefs, or attitudes expressed by participants in their responses in order to identify and categorize the underlying themes and patterns in the data, and hence to identify and prioritize key themes and concepts (Wilson, 2014).

In Vivo Coding: In Vivo Coding uses the participants' own words or phrases in order to capture the nuances and complexities of the data (Campbell, 2013), and it helps in exploring new issues or complex topics, allowing for a more in-depth understanding of participant experiences and perspectives (Wilson, 2014).

Meanwhile, the researcher grouped comparable concepts into subcategories and then group those subcategories into major categories (Creswell & Zhang, 2009). The coding process starts as soon as each interview is finished and while conducting other interviews in order to pay attention to the thematic saturation, the state at which new interviews add a little or no new information to the researcher, and thus, can decide when to stop conducting new interviews. The researcher employed open coding, axial coding and selective coding. These are key components of grounded theory methodology that clarify detailed perception of the coding process (Vollstedt & Rezat, 2019).

Open Coding: This is the initial step in the coding process, it involves breaking down the transcripts into smaller components, inspecting them closely to determine similarities and differences. The significant parts are labeled (coded) as key concepts (Brailas et al, 2023).

Axial Coding: This phase involves reassembling of the transcript and making connections between codes (categories and subcategories) that were highlighted in the open coding (Vollstedt & Rezat, 2019). This process aims to develop more abstract categories and integrate theory.

Selective Coding: This is the final phase in the coding process which involves integrating and refining categories around a core category (Berterö, 2012). This process aims to develop a cohesive theoretical framework that explains that explains phenomena under study. It is used to identify overarching themes and patterns in the transcripts to reduce data complexity into meaningful units (Campbell et al., 2013).

Using MAXQDA: The data analysis software, MAXQDA was used as part of the data analysis for the coding procedure. It has supported the coding management which involved categorization and organization of codes in a structured manner, allowing for simple visualization with reference to connections between various codes and themes.

The Coding Procedure in MAXQDA

The transcripts of each interview were imported to MAXQDA where the first codes (1st cycle) in a segment-by-segment manner. Its tools for categorization and code-linking facilitated this transition from initial to axial- selective coding through the software. MAXQDA was used to count the frequency of each code and co-occurrence amongst codes, quantifying qualitative data.

Development of Themes

The themes were developed via an iterative cyclic process, which involved several coding, and literature readings repeatedly to accomplish theme refinement. This

continuous procedure was employed to ensure that the refined themes truly emerged from the data and precisely describes the participants' views.

Following this coding process, the researcher have thoroughly analyzed the qualitative data from the semi-structured interviews' transcripts in order to produce useful, reliable understanding of the posed research questions. This painstaking procedure ensured that the proposed themes were intact and fully grounded in the data.

Research Trustworthiness

Credibility, Transferability and Dependability

The study's *Credibility* was confirmed by triangulation, this included comparison of the interview transcripts with literature to validate the results, in addition to member checking through sharing the initial themes with a diverse sample of the participants to verify the researcher's interpretations. To ensure *Transferability*, The researcher presents thorough comprehensive details of the study's context, participants and setting. To sustain *Dependability*, the researcher kept a continuous documentation while conducting the interviews, transcribing, coding, recoding and developing of themes throughout the progression of the research phases.

The Study's Limitations

Due to the Special political constrain issues that was mentioned earlier and the difficulty in reaching out to schools in person; the interviews were conducted online, via the 'Zoom' platform. Many participants kept their cameras off; this constrained the researcher from observing facial impressions that would have been useful for interpretations.

RESULT AND DISCUSSION

Development of Themes

The themes were developed via an iterative cyclic process which involved several coding and literature readings repeatedly to accomplish theme refinement. This continuous procedure was employed to ensure that the refined themes truly emerged from the data and precisely describes the participants' views.

Following this coding process, the researcher have thoroughly analyzed the qualitative data from the semi-structured interviews' transcripts in order to produce useful, reliable understanding of the posed research questions. This painstaking procedure ensured that the proposed themes were intact and fully grounded in the data.

Key Themes Identified

The analysis process of the interviews' transcripts has produced key themes that are related to the research questions. The main key themes as well as their subthemes are given below:

Theme 1: Teachers' Perceptions of MC

Teachers have expressed how they perceive MC, especially by describing a Mathematically creative student, and these beliefs were synthesized and categorized in the subthemes: Originality, Novelty, Fluency and Flexibility. The teachers mentioned these subthemes either explicitly or implicitly.

Subtheme 1.1: Originality and novelty

All teachers have emphasized that originality and novelty are of the main constituents of MC. Teachers frequently have pointed out that MC is expressed by an *original* thoughts and ideas as well as *unique unfamiliar* solution methods. The following are few quotes by participants:

Teacher 2: A female teacher holding an M.A. in Mathematics, with an experience of 6 years and teaches at a public school for girls, expressed her perception of MC by highlighting the originality aspect: "*It is implementing something new, aaa a new idea, or an innovative way of solving problems, aha, something unfamiliar and out of the ordinary. This is my opinion about what Mathematical creativity means*".

Teacher 8: A female teacher with a Bed, of an experience of 29 years and teaches at a public school for girls; she emphasizes on *originality* and on *novelty* as she replied:

"*Creativity is supposed to be something unfamiliar? More than the usual, for me, I mean, for example, when I ask a question in class, I mean, her answer is something distinguished? In this way, the girl will be creative in her solution, and I will have this creativity. From my point of view, it means something that is not familiar to the girls. I mean, it is not among the usual solution methods presented in the book or I have taught them, for example, but the solution depends on what she took, from my point of view, is creativity*."

Subtheme 1.2 Fluency and flexibility

Only few teachers have mentioned fluency and / or flexibility as a feature or representative of MC. The following are few quotes by Teacher 3 and Teacher 4, respectively. *Teacher 3*: A male teacher holding a Bed, with an experience of 20 years and teaches at a public school for boys, and *Teacher 4*: A female teacher with a B.A., with an experience of 23 years and teaches at a private school for girls

"*… It is* (Mathematical Creativity) *that the student responds quickly on the spot and gives a correct answer, eh… you know what, I had few students who sometimes even responds so quickly that I believed they were able to predict what I was going to ask*"

"*to me, the Mathematically creative girl is that one who receives the information but doesn't constrain herself to my methods of solution to problems, on the contrary, she always tries to find alternative methods, I had a girl in class nine who always tries to find other methods of shortcuts, her own shortcuts, ehhh, and she usually finds her own correct shortcut. And when I present two methods for the solution, one is from the textbook and the other different, she would comment: I will try to find another way of doing it because there must be another way*"

Lack of conception

It is worth noting here that none of the teachers has mentioned '*elaboration*' and/or '*communication*' as aspects (components) of MC, in accordance with literature (Lev-Zamir & Leikin, 2011; Agustina et al, 2024; Pitta-Pantazi et al, 2018).

Misconceptions

Moreover, several teachers have shown misunderstanding or misconception of the term MC, they have mixed it up with diligence, achievement, intelligence and motivation. As examples, Teacher 1 who is a male teacher, with an M.A., of an experience of 11 years and teaches at a public school for boys and Teacher 10, A female teacher, with a B.A., of an experience of 23 years and teaches at a mixed (coeducation) private school. They expressed, respectively, their conception of MC by:

"*aha, ah… its meaning to me, look! Talking about students, it is mastering the assigned tasks that are set to them, … eh. OK, that's how I see a mathematically creative student if he mastered the tasks I set for him*"

"*when a weak student studies hard and enhances his grades in Mathematics and elevates to an average student level, to me this is mathematical creativity, aha, eh… mathematical creativity is to be able to improve someone's grades in Mathematics*"

Theme 2: Teachers' Practices that Foster Creativity

While describing their teaching practices, teachers have revealed several teaching practices that do foster MC among their students. Several teachers have mentioned few teaching practices that foster MC.

Subtheme 2.1 Problem solving and problem posing

Several teachers have mentioned encouraging problem solving and problem posing as part of their teaching practices. The following are some examples of quotes by some teachers:

Teacher 2: A female teacher holding an M.A. in Mathematics, with an experience of 6 years and teaches at a public school for girls. She rhapsodized about an incident with one of her students who posed a question that reflected his creative, unusual thinking:

"*While I was solving a problem, a boy asked me a question, look! I am telling you something that really happened to me. That boy asked me about something that really chocked me, I told him 'how did you think about that, even I haven't thought about it!' He asked about an idea that was very brilliant and I never had thought about it that way, I encourage him and I guided him and his classmates to reach to the solution*"

Teacher 9: A female teacher, holding an M.A., with an experience of 6 years and teaches at a public school for girls. She describes the type of questions that she poses to her students:

"*I like to pose all kind of questions, closed questions and open-ended questions, but as for me I actually like those open-ended questions, no, ah, I mean I really, .. those open-ended questions let you see deeply how students think, different students give different correct answers, and sometimes the same student gives me, not at the same time, different answers, eh, eh you know how much does this way expands their horizons* (thinking range)".

She explicitly mentioned how essential to her to ask the students open-ended questions, as a main component of an open-atmosphere environment, to widen their cognitive thinking and thus, foster their Mathematical thinking. Then she added:

"*… when I address a problem, I always expose to them* (the students) *almost every possible way of solving the problem, then I give them the choice to use whichever way they liked most and find it easier when solving problems for homework or on the test*"

Subtheme 2.2: Diversity in teaching methods vs. traditional lecturing

Some teachers have expressed their continuous changing in their teaching methods according to the content of the current lesson, some of whom are presented below:

Teacher 2: A female teacher holding an M.A., with an experience of 6 years and teaches at a public school for girls. She explains how she employs diverse teaching methods: "*…in addition, eh… and sometimes I use project-based learning method where I partition the class into groups and each group has to work on a project together*". She uses here project-based learning method besides her regular teaching method. Then she added:

"*… I love to change my teaching methods, because every lesson in Mathematics needs a different teaching method. I don't, I don't use the same pattern of teaching because this would be boring. And when I feel that the students didn't master the learning tasks I wanted them to, then the first thing I think of is changing my teaching way, and I support my students' learning by making worksheets to use in the next lesson in which I use another method*"

Teacher 3: A male teacher holding a Bed, with an experience of 20 years and teaches at a public school for boys responded. He replied to the question on the teaching methods he uses by saying: "*most of the time I teach using several methods, every lesson should have its own special teaching method. But some classes that are weak, I have to use other teaching methods that are appropriate to their levels*", When asked to elaborate, he emphasized that any teaching method should take into considerations the students' level in such a way that the method must include tasks that are appropriate to their abilities:

"*I meant that I might use the, you can say same method, eh , of same name of method to two nine grade classes, but I would employ easier, shorter and less tasks for the weak class and harder, longer and more tasks to the stronger class*"

Teacher 6: A male teacher, holding an M.A., with an experience of 18 years, teaches at a public school for boys. He describes his diverse teaching methods, in addition to the quality of these methods to be attractive and interesting to students such as games or puzzles:

"*you see, to me, in order to implement creativity in mathematics among students, it is the teaching strategies. We must look for various teaching methods, not the same method, and not only any methods, but those that bring the boys* (students) *toward mathematics, I mean attractive methods. I always use games and puzzles, thinking puzzles that are relevant to the content of the lesson in order to attract the boys to the lesson, and you know what? It works just fine with me. The boys are happy, excited to learn the lesson and are active in class. It is true that they don't all master everything, but everyone accomplish at least half of the tasks I set*"

Teacher 9: A female teacher, holding an M.A., with an experience of 6 years and teaches at a public school for girls. She expresses her various teaching methods by explicitly mentioning these methods' names:

"*aha, as for teaching strategies, of course I sometimes use the traditional teaching, but I of course use many others, such as project-based learning, the five-hats strategy, peer-learning strategy, collaborative learning, and many other strategies which I can't remember right now*"

Teacher 10, a female teacher, holding a B.A., with an experience of 23 years and teaches at a mixed (coeducation) private school. She explained her teaching methods by saying: "*teaching methods, aha, I .. I don't believe in a fixed teaching method, there must be changing. Every time I must use a different method, I worry a lot about how can I let these girls understand this lesson*?". She keeps thinking about how to have her students learn, which leads her to change her teaching method accordingly.

Traditional lecturing

On the contrary, there were few teachers who preferred the traditional lecturing rather than diverse teaching method. Some teachers have declared that implicitly, as Teacher 1 or explicitly as Teacher 8:

Teacher 1, A male teacher, holding an M.A., with an experience of 11 years and teaches at a public school for boys, explains his teaching methods by saying:

"*you know, eh… Mathematics content for grades 8 and above is somehow abstract, o..or actually it is totally abstract, and this abstractness requires me as a teacher just to write the rule or formula on the board and explain the conditions of that rule*"

Then he added: "*yes, not only conditions of the rule, oh, but of course, I also present to them* (the students) *examples, in other words it is the lecturing method*", mentioning the lecturing method exclusively. Moreover, he justifies the non-diversity in his teaching methods by saying: "*you know it would be possible to use other teaching methods for younger..eh.. lower grades, but not for 8 – 9 graders whose lessons are all abstract*". Then, when asked if he has ever tried using other teaching methods, he replied:

"*yes, yes long .. long time ago I tried once teaching by groups, but oh my God, it was chaos, the boys made lots of fuss and it didn't work at all, you see we have a discipline problem in classes, so I never tried it again. As I have told you before, my method, only method is lecturing, traditional lecturing*"

Teacher 8: A female teacher holding a Bed, with an experience of 29 years and teaches at a public school for girls, when she expresses her basic teaching methods, she insisted on sticking to the traditional lecturing method:

"*Look mister, I have seen several teaching methods in the PD course, long time ago, but look, the most important thing for me is the chock and the board, I don't recognize any other method.*

Sometimes I present examples and then deduce the final rule and other times I present the final form of the rule and then show them examples"

Here the teacher explicitly mentioned her preference of using traditional lecturing method, moreover, she mentioned that she uses the lecturing inductively (from examples to general rule) and deductively (from general rule to examples). Then, she added:

"*I will never give up this method* (by lecturing), *very rarely that I might use, for once a year, the projector to show the girls a video lesson, but I solve a variety of examples, I don't just stick to the given examples presented in the book, but I add many examples from outside the book*"

Subtheme 2.3: Integrating Classroom Discussions and Engaging Students

Classroom discussions was mentioned as an inevitable part of every lesson by most of the teachers. Teachers emphasized on integrating classroom discussion as if it is part of the Mathematics content matter or the language of Mathematics in classes. This is not surprising since discussions and discourse are at the core to Mathematics learning (Stein, 2007; Dick & Springer, 2006).

Teacher 4: A female teacher holding a B.A., with an experience of 23 years and teaches at a private school for girls. She explained some of her teaching methods:

"*I always insist on having a classroom discussion in every lesson, aha, I, … I love to see the interaction among the girls when one girls suggests a way to solve a problem, and the other would suggest a different way, and sometimes both of their ideas are correct, then I raise the question which way would be simpler, which way is faster, and so on*"

The teacher mentioned both, classroom discussion and student engagement as well.

Teacher 7: A male teacher holding a B.A., with an experience of 14 years and teaches at a mixed (coeducation) private school. In expressing his teaching methods, he said:

"*it is something very crucial to me to held a classroom discussion in every lesson, you know what, if there weren't a discussion in a lesson then I consider that lesson a failure. If I just lecture, and eh .. there weren't any interaction with students, then this means that I haven't accomplished any of the learning goals that I have set. There must be interactive discussion*"

The teacher mentioned exclusively class discussion as an essential part of every lesson, and then he added:

"*The discussion doesn't have to be about the core subject of the Mathematical knowledge, but it can be about Mathematics in general, or about the lesson's applications in reality, for example, the other day we had a discussion about the leaning of Pisa tower, its length and its height and how it can be visualized in terms of geometrical planar shapes (right-angle triangle), and then relate it to trigonometry here, and so on*.."

Here the teacher emphasized the importance of having a discussion in class, not only as a core subject learning, but also for motivational purposes.

Subtheme 2.4: Integration of Reasoning and Concept-Based Learning

Several teachers emphasized the importance of implementing reasoning and concept-based learning in their lessons, especially when teaching a certain problem-solving skill or derivation of a Mathematical formula.

Teacher 8: A female teacher holding a Bed, with an experience of 29 years and teaches at a public school for girls. While explaining her teaching methods, she added:

"While I present a solution for a problem, for example, I emphasize on two things in every step, I emphasize on the Mathematical concept and previous skills that the girls know, so you can say that I merge the skills that the girls already know from previous years or lessons with basic Mathematics concepts and I relate them to the problem we are addressing. This way takes my girls (her students) half way of the solution process and makes the problem more clear (lucid) and of course simpler"

Teacher 15: A male teacher holding an M.A., with an experience of 19 years and teaches at a private school for boys. He explained part of his teaching methods:

"*Look mister! Explaining the solution steps and giving reasoning is very important, as I always believe that I must know how students think, I must understand why he think that way. I believe in this, I believe that learning Mathematics is about justification, is about reason, you don't just write something and say I think so, or it is an opinion, no, there is logic and reason, that what makes a small step either right or wrong, no step can be 70% right and 30% wrong*"

Subtheme 2.5: Multiple representations

Several teachers have mentioned that they usually try to teach their lessons via different forms and using different demonstration tools, thus implementing 'multiple representations' in their teaching.

Teacher 2: A female teacher holding an M.A. in Mathematics, with an experience of 6 years and teaches at a public school for girls. She described her algebra lesson saying:

"*For example, in the Algebra unit, for class 8, I illustrated and explained the difference between two squares formula by cutting out squares, I bring a cardboard square and I draw on one corner another smaller square, I cut off the smaller square and discuss with the girls how to find the remainder area. You know, and step by step, I write on the board the resulting algebraic term for each step, I deduce to them the formula of the difference between two squares*"

Teacher 9: A female teacher, holding an M.A., with an experience of 6 years and teaches at a public school for girls. She explained how she teaches volumes and surface area of geometrical shapes:

"In the geometry unit for grade 8, I draw the three dimensional shapes on the board, you know, cylinders, cones, prisms, cubes, cuboids, pyramids, etc. and I show the girls the concepts of volume and surface area, then I don't present to them the general rule for the volume or the surface area, instead of that, I bring with me these 3 dimensional shapes, these are hollow shapes which you can fill up with sand, yes I bring sand with me too to class, and I let several girls demonstrate to class by filling up a cone for example with sand, the girls see how that girl fills up the cone with sand three times with the same amount of sand used to fill up a cylinder of same base (circle). Thus they actually see that the volume of the cone is one-third that of a cylinder of same base, and so forth, etc."

The teacher uses real tangible tools, which the students observe to represent the general algebraic formula for the volume of three-dimensional shapes, an illustration of multiple representations in her teaching methods.

Teacher 11, A female teacher, holding a Bed, with an experience of 16 years of experience, she teaches at a private school for girls. She explained how she makes her lessons more interesting:

"*The girls usually are much more active and happy about the lesson content when they understand the purpose of learning that lesson, or its connection to their everyday real life. For example, when I showed them the relationship between the quadratic equation with real life views, before ever talking about the quadratic equation graph, I asked them to bring for the next lesson pictures that contained a U-shape in its form. I brought pictures too, then I demonstrated to the whole class what each girl has brought and I drew on the board sketches of these pictures. They were arcs of churches, arcs of mosques, branches of palm trees, a fountain water flow, a waterfall, a path of a football in the air, a missile, etc. then we concluded the common shape of all these was the U-shape which I told them it is the graph of the quadratic equation. Afterwards, I gave them as an assignment for fun, to make drawings with colors of anything they want but they are allowed to us only U-shapes in every part of their drawing, and they did very beautiful drawings which we posted on the wall of the classroom*"

Multiple representation is integrated in the teacher's method, she used pictures and integrated real life situations, she has engaged her students in bringing these examples, she has integrated art in the lesson by letting the girls draw with colors pictures related to the content of the lesson which made the lesson more exciting and interesting to the girls.

Moreover, by requesting that the girls only use U-shape in their drawings, made them use their imagination too. She has acknowledged their drawings by posting them on the wall.

Teacher 14: A female teacher, holding an M.A., with an experience of 11 years, teaches at a mixed (coeducation) private school. She added about her teaching methods:

"*I want to share with you a new experiment that I have conducted this year, my colleague at the same school has told me about it, it is that I allow my students to use their smart phones in class, you know it was a risk for me and strange too, especially that it is not allowed to let students use their phones in class, actually they have to pass their phones in the morning to their class teacher. However, I took a special permit from the principle and he let me do it after telling me that I will be responsible for any consequences. So, after spending one period on lecturing and summarizing the rules of graphing the quadratic function the usual traditional way, the next period I guided them to download GegGebra graphing App on their phone, and I taught them how to use it by demonstrating on the smart board, then they used it in class to draw graphs assigned to them by a worksheet. The whole class was active, even the very weak girls and boys they even did it*"

Using of digital tools after presenting the concepts and main rules of drawing the quadratic function with its various shifts is a clear illustration of integrating multiple representations in her teachings.

Subtheme 2.6: Outdoor activities

Even though only two teachers have mentioned that they implement outdoor activities sometimes, but they are worth mentioning. Outdoor activities is considered as one of the components of an open-atmosphere environment.

Teacher 5: A female teacher, holding a Bed, with an experience of 18 years, teaches at a mixed (coeducation) public school. When describing her methods of teaching, she added:

"*Ok, look! A theorem, let me tell you about Pythagoras' theorem, Pythagoras' theorem, I always take them* (the students) *outside to the playground, we set three points on the ground and we draw triangles, we us a meter* (measuring tape) *and I let them carry out all the measurements. We also use calculators to apply Pythagoras' theorem to know which triangle is a right-angle one. This is called the opposite of the Pythagoras' theorem, this is the applied activity that we do for that lesson*"

The teacher explains in details how she implement an 'open-atmosphere environment' method in her teaching of the Pythagoras' theorem.

Teacher 15: A male teacher holding an M.A., with an experience of 19 years and teaches at a private school for boys. The teacher describes his outdoor activity for the geometry lesson for grade 8:

"*ha, aha..aaa I in the Geometry Unit for grade 8 I love to take my students to the yard* (playground) *few times so that they draw geometrical shapes and measure the sides and calculate the areas. I divide the students into groups of four or five, I give each group a chock and a meter* (measuring tape) *and I give them tasks to draw and measure geometrical shapes, we make contest among the groups to see which group will come up with best shapes and whose calculations of the areas are correct and like this and all the students interact and participate meaning the activity is exciting*"

The teacher describes several methods into one by conducting this activity; he uses an 'open-atmosphere environment' method, with collaborative learning and gamification. A compound out of ordinary strategy.

Exceptions: Teachers' Practices That Do Not Foster Mathematical Creativity

There were few teachers whose teaching practices do not foster Mathematical Creativity:

Teacher 1, A male teacher, holding an M.A., with an experience of 11 years and teaches at a public school for boys. He expressed his teaching of problem solving strategies and Mathematical skills by saying "*I.. I present the solution by writing it on the board, and make sure that the students copy it*", and when asked about the details and explanation of the steps of the solution, he added:

"*no… no I don't have to, it is not required from us* (teachers) *to explain the details*". Moreover, in talking about how does he relate the lesson with real life problems, he said: "*no, no … eh… you see, we are talking about grade 8 and 9, if I were teaching lower grades, say grade 4 or 5 I could make relationship with real life problems, but for grade 8 and 9, the content is abstract and you can't find connection with real life problems to majority of lessons*"

Afterwards, I asked him about digital tools and technology, he commented:

"*I think students now are in class 8 and 9, they supposed to be and should be learning abstractness, there is no need to use cardboards and pictures, they are not young kids. Also, we don't have a smart board in the classrooms, but we have a projector and a computer, a laptop, also there is a computer room in the school, but I never used any of these*"

Moreover, when asked how he prepares for a lesson that would foster Mathematical Creativity among his students, he replied: "*To tell you the truth, I have never thought of doing so, I never had in mind fostering creativity when preparing for my lessons. I told you before, my students are weak*"

Teacher 17: A male teacher, holding a B.A., with an experience of 4 years, teaches at a public school for boys. When asked about his diversity in teaching problem solving strategies, he replied: "*no, as I mentioned before to you, mister, our students are weak, they barely can understand one method and I will be grateful. So I only present one, but the simplest strategy so that they can understand it well*". Thus, explicitly mentioning his belief in the low potential of his students, and accordingly, he teaches them one solution strategy.

Theme 3: Teachers' Features

The interpretation of the semi-structured interviews' transcripts has revealed two categories of teachers' features, each being consistent with these teachers' practices as fostering or hindering Mathematical Creativity among their students.

Subtheme 3.1 Teachers' features that foster mathematical creativity

The analysis revealed these teachers' features which are, according to literature, features of teachers who do foster Mathematical Creativity among students. It was noticed that these features were found mostly by those teachers whose teaching practices also foster Mathematical Creativity.

Teacher 2: A female teacher holding an M.A. in Mathematics, with an experience of 6 years and teaches at a public school for girls. When asked about how does she set the learning environment in her classes, she said:

"*I always tell my girls* (students) *that they are allowed to use any strategy when solving a problem, even if she has learned it from resources other than me or the book, I tell them that's it is OK to make mistakes, that's how you learn, when you try*".

Indicating the safe and encouraging learning environment that she set for her students, in addition to her flexibility in dealing with her students. Moreover, she expresses her willingness to develop and learn: "*I always love to consult my colleagues who are of longer teaching experience, this is a good chance for me to learn*". She also added, "*I love to take advantage of every professional development course that I take, every course that I take I find new useful tools that I can use in my classes*". The teacher expressed herself as a learner and her willingness to develop on individual bases and via the PD courses that she attends.

Teacher 4: A female teacher holding a B.A., with an experience of 23 years and teaches at a private school for girls. She described her students as: "*I see that creativity is*

within average girls (of a moderate level) *who don't usually study hard but they rely on their understanding and they always come up with their own solution strategies*", then she added:

"*… most of the girls are creative, but it is that we don't notice it because not all the girls like or can show it, it needs us, the teachers, to help them express it and show it and make use of it*".

The teacher has a strong belief in her students' potentials and emphasizes on the role of the teacher to help extracting out that potential and creativity. Afterwards, when asked about her teaching methods, she said: "*I always try to change and improve my teaching; I never teach using the same method, every year I change*", and she added:

"*I always learn and learn more about teaching methods, I always search on the net, looking for new methods, new strategies to solve certain problems, even worksheets and enrichment exercises and tests, I don't copy but I observe several resources and I learn some ideas, then I build my own. I even sometimes watch videos for teachers…. Last year I attended a course on GeoGebra and I learned it very well, and now I use it a lot, it helps me so much*"

The teacher expresses herself as a learner, willing to develop her teaching methods as she apply what she learns. Moreover, she expressed her passion for Mathematics by saying:

"*I love Mathematics and everything about it, I see Mathematics in everything, I see its beauty, that's why I love my girls* (students) *to see eh…to feel to understand it so that they can enjoy it as much as I do… I always tell them this: the moment you understand Mathematics is the moment you feel the excitement and joy of it*"

Not only she expresses her passion for Mathematics, but also she wants to reflect this passion onto her students.

Teacher 6: A male teacher, holding an M.A., with an experience of 18 years, teaches at a public school for boys. The teacher expresses his opinion about factors that foster Mathematical Creativity among students:

"*Most importantly, it is that the students must have a positive attitude toward Mathematics, and this is just a consequence of their positive attitude toward the Mathematics teacher, so, firstly they must like their teacher. And for this to happen, there must be a good relationship between the teacher and his students. Ah… this is to say, back to the first step, it is the teachers role to build a good respectful relationship with his students. That's why I always try to build this by treating them like my own kids, show care for them, help everyone with many things even outside the classroom, in the playground, the more you show caring and love the more they like you*"

The teacher highlights the main basic block for learning in general; it is the good relationship between the teacher and his students. He describes how he approaches his students in building that good relationship, which reflects on students to be more interested in the subject, and thus giving opportunity for the teacher to foster creativity among those students. In addition, he explained this relationship further by saying: "*Also when I teach them more than one strategy to solve certain problems, I give them the freedom to choose any way they like in solving homework and test problems*". Indicating the free environment to learn that he sets for his students; and the flexibility in the teaching-learning process that he adopts. These attitudes seem to be formed from his intrinsic belief in learning and developing, as he said: "… many things I learn from various resources, from my own experience, from observations that I made of colleagues' lessons, and even from the net". Then he added: "I love to try to use every method I learn, some methods don't work of course, but then I do some adjustments on that method and it works". The teacher is persistent to develop and promote his teaching methods. Not only he wants to learn some new methods, but also he apply these methods and do the proper adjustments to make good use of his knowledge. Moreover, he added:

"*It is true that professional development courses might not be very useful, but there is no course that I took without being benefited from it, I must get out of the course by something new that I learn and use in my classes, and there is always something new to learn*".

The teacher shows his positive attitude toward professional development courses, as it is clear in his own words, it is not the courses that were actually useful, but it is the teacher himself.

Teacher 8: A female teacher holding a Bed, with an experience of 29 years and teaches at a public school for girls. While talking about the overly comprehensive textbook problem, she said:

"*I.. instead of running fast in order to cover all the material in the book, the last unit in grade 8, the Probability unit, usually teachers either teach part of it or just skip it. But I don't, I summarized the unit, and I designed self-explained worksheets with exercises, this saved lots of time and we were able to cover the whole book and the girls didn't lose anything*"

The teacher's action reflects her caring toward her students' learning. Finally, she expressed her passion for Mathematics: "*I do love Mathematics more than you can ever imagine, since I was in the first grade till today and I love Mathematics, my grade average in Mathematics was always above 90 all my life*".

Teacher 13: A female teacher, holding a B.A., with an experience of 7 years, teaches at a public school for girls. She said about how she introduces herself to her students at the beginning of every academic year:

"*From the first day of school, in every class that I teach, I introduce myself, then I emphasize to the girls, anything that you don't understand ask me about it, no matter how small or large it is, ask! I will never put you down, I will always be there for you to show you what and how. There is nothing that you can't understand or can't do, I will support you and be beside you step by step until you do. But you must ask me about it, don't be shy! Eh…. but still you see, there are girls who still are shy to ask*"

The teacher shows her caring and full support to her students, especially on the first day of school, which is the first step in the student-teacher relationship.

Teacher 19: A female teacher, holding an M.A., with an experience of 16 years, teaches at an UNRWA school for girls. She expresses how she acts when she feels that the learning goals are not fully accomplished:

"When I notice that the girls don't understand the lesson, then right away, I switch to a different method, I sometimes unlock my phone and let a girl use it an open on Google, and I ask her to ask for the picture of something relevant to the lesson, she shows her classmates the picture. Sometimes I switch to create a puzzle on the board, sometimes I tell them a story, I am always ready and I have plenty of methods. The flexibility in changing the method always saves the situation"

The teacher speaks proudly of her flexibility in changing her teaching methods upon the learning requirement.

Subtheme 3.2 Teachers' features that hinder mathematical creativity

Teacher 1, A male teacher, holding an M.A., with an experience of 11 years and teaches at a public school for boys. When he was responding to the interview questions, he mentioned several times that his students are very weak:

"*eh.eh… you are asking me about creativity, you know what, reality is bitter, my students barely understand low level material, they barely master the given strategies in the book, and they don't want to, I wish, eh.. I wish I had such students who are able to think of different methods or even who want to know any of them*"

"*….I told you before, my students are weak*", and "my students are of very low achievement, but may be, they may be creative in something else". All these responds indicate the teacher's non-belief in his students' potentials.

In addition, when asked about the professional development courses, he replied:

"*To tell you the truth, I … anything called 'Education' I don't like, eh, that's why I have studied a master in pure Mathematics, because I don't like anything related to educational theories. eh, also as for the professional development courses, I participate in these courses, I see that they*

are, theoretically speaking, they are fine, but not applicable in our context, in real life, that's why I even stopped attending these courses, these courses are based on theories from different cultures, not from ours"

A clear and obvious negative attitude toward professional development courses, and not willing even to try any of the theories he was exposed to.

Teacher 17: A male teacher, holding a B.A., with an experience of 4 years, teaches at a public school for boys. When asked about who is the Mathematically creative student, he replied: "*I think only very few students might be mathematically creative, but mostly, no, they are very few who are..*". A direct indication of his non-believing in his students' potential.

When asked about his opinion of the professional development courses, he answered: "*The professional development courses, as you know, are mandatory, so I have to attend them non-voluntarily, but still I find them useless, not much to learn from, they don't fit within the scope of my teaching methods*". He frankly mention his non-interest in professional development courses or from learning any new teaching methods.

Theme 4: Obstacles Hindering Mathematical Creativity

Every teacher has mentioned the existence of some obstacles that hinder their implementation of Mathematical Creativity among their students.

Subtheme 4.1 Inappropriate textbooks

Most of all the teachers have mentioned that the textbooks are the main obstacle against nurturing Mathematical Creativity. They all have mentioned the same hindering features of the textbooks.

Teacher 6: A male teacher, holding an M.A., with an experience of 18 years, teaches at a public school for boys. He complained about the official textbooks saying:

"*There are few challenges that we face, aha, a..a.. the textbook, very clustered, too many units to teach, and it is not well structured*". Here the teacher mentioned that the textbook is clustered with lots of material to be taught to students.

Teacher 10, a female teacher, holding a B.A., with an experience of 23 years and teaches at a mixed (coeducation) private school. She commented on the official textbooks:

"*School textbooks need lots of modification, I mean, not enough illustrating examples, and the current examples are narrow, superficial questions, there aren't any creativity fostering questions, or high levels questions, all questions are obvious and direct, where is the creativity in asking: solve the exponential equation: two to the power x equals eight! Where is the creative part here*?"

The teacher's concern is about the shallow level of the content in the school textbook, while having the students exposed to such narrow, superficial questions would limit their creative thinking.

Subtheme 4.2 Short time

Another subtheme that equally mentioned as textbooks by most teachers is the short of time. They mean not enough number of Mathematics lessons per week. Every grade gets five 45-50 minute lessons of Mathematics per week.

Teacher 2: A female teacher holding an M.A. in Mathematics, with an experience of 6 years and teaches at a public school for girls.

She said about challenges she faces: "*In addition to that.. every semester, we only have five lessons per week, just five, and this number (of lessons) is not enough for teachers to foster creativity in their students, so the time factor is the biggest factor*". The teacher complains about the number of lessons per week is not enough. This factor is actually a consequence of the first factor, when there is too much content material to cover from the official textbooks, thus, there would be not enough time.

Teacher 15: A male teacher holding an M.A., with an experience of 19 years and teaches at a private school for boys.

"*The challenges are actually the number of lessons per week is very little..five lessons. I mean, there are many lessons that require two successive periods directly one after the other in order to be able to elaborate and enrich the lesson and really foster creativity. This would be really very exciting to have*"

The teacher here not only mentioned the problem of having not enough number of lessons per week, but also he has added the reason for the need of more lessons, which is to have two successive periods in order to foster creativity.

Subtheme 4.3 Large number of students per class

Most teachers have also mentioned this subtheme as a serious obstacle against fostering creativity in class.

Teacher 9: A female teacher, holding an M.A., with an experience of 6 years and teaches at a public school for girls. She described her class numbers by saying:

"*As a serious challenge we have is that the number of girls per class, the classes are clustered here, I am talking about forty to forty-five girls per class, I really feel sorry for these girls, I try, but I really cannot approach every girl among this crowded group. How can I foster creativity in every girl? maybe I succeed with few girls but not all*"

The teacher expresses her concern about not being able to foster creativity in every student in her classes. The large number of students is a real barrier.

Subtheme 4.4 Small physical space

Few teachers have mentioned other obstacles such as small classroom space and small school areas that the teachers claim that they cannot move around and cannot employ classroom activities.

Teacher 2: A female teacher holding an M.A. in Mathematics, with an experience of 6 years and teaches at a public school for girls. She complained about the small space in her classrooms by saying: "*The classroom, of course, it plays a big role. If I wanted to use a scientific tool, to make a representation or an activity, I really cannot employ it in very narrow space*". Her complaint not only represent the small space per class as an obstacle, but also it represents the teacher's awareness that fostering creativity can be accomplished by employing activities in class.

Teacher 6: A male teacher, holding an M.A., with an experience of 18 years, teaches at a public school for boys. The teacher explained that he learned some activities that do foster creativity among students, but he cannot employ these activities due to the small space in school:

"*I have learned some excellent activities to employ in Mathematics lessons, for example, in the trigonometry for eighth grade, I would love to conduct them, they are like taking students outside the classroom to the playground, using ropes and protractor, and a pen and a paper, we can measure heights of many things outside, but you see, there is no space, there is only one small playground, and usually it is occupied by another class who are having a sport lesson*"

The qualitative analysis sought to explore the diversity in which Palestinian 8th and 9th grade Mathematics teachers perceive MC and their teaching practices within that context. Many teachers have correct vision of some of its aspects, while few have misconceptions. Similarly, many teachers' practices are of those that foster MC and few other teachers' are not. Moreover, teachers' features are an indication of teachers who foster MC among students, while others are not. Finally, obstacles hindering MC were reported, showing common obstacles mentioned by most teachers, namely short time and large number of students. On the other hand, other obstacles that were claimed by very few teachers were also reported for authenticity.

Addressing Research Question 1

How do Palestinian 8th – 9th grade mathematics teachers perceive and define MC, and how does this perception influence their teaching practices?

The qualitative analysis has revealed that many teachers have correct, but partial perception of MC; however, they all agreed on having 'originality' as a common component. These teachers perceived MC as originality, novelty, fluency and flexibility. None of them has mentioned elaboration and/or communication. On the other hand, the analysis has also exposed that few teachers have misconception about MC, being confused up with diligence, achievement, intelligence and motivation. Moreover, the qualitative analysis also has revealed that teachers' perception of MC has a direct influence on their general teaching practices. Teachers who had a partially correct perception of MC actually implement some teaching strategies that tend to foster creativity in mathematics among students, and those teachers who had misconception of MC do not value these practices in their teaching methods.

Therefore, the findings imply that the way that teachers perceive MC has a direct impact on how they choose, implement and develop their teaching practices in the context of fostering Creativity in Mathematics among their students. Therefore, designing special PD courses that address elucidating the concept of MC can improve and enrich teachers' potential that would drive them in nurturing their teaching strategies on the track of fostering creativity among students.

Addressing Research Question 2

In what ways do Palestinian 8th – 9th grade mathematics teachers intentionally design and implement their teaching practices to foster mathematical creativity within the classroom setting?

The qualitative analysis has revealed a variety of teaching methods and strategies that teachers deliberately implement in their teaching practices in order to foster MC among their students. Some of these practices were:

- *Problem solving and Problem posing*: Many teachers have deliberately used multiple solving strategies in order to broaden their students' thinking by exposing them to a variety of thinking tactics. They also implement open-ended questions in the classroom discussions in order to open the way for their students to widen their cognitive spectrum and explore diverse solutions and solving strategies. This method is one of the main components of Open-Atmosphere Classroom, which is considered as an efficient method to stimulate and enrich MC. Some teachers have also engaged their students in constructing their own questions.
- *Diversity in teaching methods*: Various teaching methods were declared and supported by examples form teachers' experiences. These involved using technology, realistic contexts and interdisciplinary, thus assisting the development of the students' interest in Mathematics and stimulating their creative thinking skills. On the other hand, few teachers are still confining themselves to the old style traditional teaching, namely lecturing and summarizing. This rote learning procedure gives no chance for the promotion of creative thinking or even simple thinking skills.
- *Classroom discussions*: Almost all teachers reported classroom discussions as an essential part of every Mathematics lesson. It is the boosting tool that teachers use to drive action into students thinking by explaining their ideas, reasoning, giving examples and counterexamples. Such a method that engages students' thoughts and reasoning in the scenario of the lesson content provokes students' creative thinking.
- *Integration of reasoning and concept-based learning*: Many teachers have reported the significance of integrating logical reasoning in both, the way they address Mathematical problems in class and in encouraging their students to provide it when participating in class discussions. Similarly, teachers have also relied heavily on

concept-based learning in their lessons, especially when presenting problem solving strategies. Both methods of which are essential factors that allow for MC to develop among students.

- *Multiple representations*
  Several teachers indicated their frequent use of various visual aids, such as pictures, real videos, objects, along the Mathematical symbolic forms of the lesson's content. The integration of technology and digital tools in lessons enriches the lesson content, deepen conceptual understanding, complement any gaps or misconception as well as makes the lesson more exciting and interesting. All these factors reduce many possible barriers between students and their creativity.
- *Outdoor activities*
  Outdoor activities is one of the main components of an open-atmosphere environment. Few teachers have reported their integration of outdoor activities in some of their Geometry and Trigonometry lessons. Engaging their students in conducting collaborative tasks that involved using measuring tapes, ropes, protractors and calculators to carry out real measurements and calculations of the school's facilities represents the merging of several innovative teaching methods in an unusual, out of the room's walls environment. In such an environment, students' creativity can rise and develop.

Practices that do not foster Creativity

On the contrary, few teachers have frankly reported their non-integration of any of the previously mentioned teaching methods (methods that foster creativity). Their one method of teaching, one problem solving strategy, no integration of logical reasoning, no implementation of any real life situations, no technology or any multiple representation tools. In addition to their declaration of their non-belief in their students' potential. All these practices do hinder the development of any creativity among students.

Therefore, the findings from the qualitative analysis have revealed a spectrum of teaching practices that foster MC and are actually used by teachers. Moreover, teachers who fall in this category were found to implement most, and for some all, of these practices. Nevertheless, there are still few teachers who persist on using rote-teaching methods that give no chance for creativity. These teachers' practices draw attention for a systemic change by decision makers, including development of teachers' guide textbooks and well-designed professional development courses that walk teachers along the several teaching methods in the realm of fostering MC.

Addressing Research Question 3

How do Palestinian 8th – 9th grade mathematics teachers create learning experiences that facilitate the development of students' mathematical creativity?

The findings from the qualitative analysis have indicated a variety of teaching strategies and practices that teachers use to design learning experiences that facilitate the development of students' MC:

Exploration encouragement and open inquiry

- *Open-ended questions*: Teachers focus on open-ended questions to expand students' thinking horizon by exploring and comparing diverse solutions to the same problem. This method is a prominent tool that creates creativity and develop thinking skills.
- *Multiple solution strategy*: Teachers intentionally approach problem solving by presenting several solution methods to the same problem in order to expose to their students various solving tactics; thus empowering their skills and widening their thinking scope.

- *Classroom discussions*: Teachers emphasize on having classroom discussions as crucial part of their lessons. Students' participation, competition, reasoning and debating stimulate their thinking skills and foster their creativity.
- *Encouraging students' curiosity*: Teachers encourage their students questioning by appreciating their questions, transferring these questions to the whole class and creating a debate about it; thus creating a curiosity-fostering atmosphere that deepen students' understanding and raising their curiosity about Mathematical concepts.

Interactive activities

- *Hands-on activities*: Teachers engage their students in hands-on activities in which students design their own objects (geometrical 3-D shapes), carry out experiments in *measurements* of various volumes by using sand in hollow objects, conduct real measurements and carry out calculations. Making students positive participants in the learning process allows them to have deeper understanding of abstract concepts through real, tangible experiments; and thus promoting their creative thinking.
- *Project-based learning*: Some teachers assign to their students project assignments in which they conduct research, collect information, collaborate within groups and interpret their results. Such assignments provoke creative thinking in applying their knowledge. In addition, students' results are to be presented by PowerPoint presentations to the whole class, creating a competitive atmosphere that would drive motivation and creative thinking.

Collaborative learning environment

Teachers integrate collaborative learning in their lessons either by having it as part of another teaching method as mentioned earlier, or by having it the main teaching method such as group-based learning in class. This gives students the chance to participate, share ideas, discuss, assess and learn from each other.

Applying Mathematics to real world situations

Many teachers have emphasized the necessity of applying Mathematical knowledge to real life situations in order to make the lesson connected to students' life and thus making the lesson more interesting to learn. Not only that this approach answers students' question: "Why do I have to study this?", makes the lesson relevant and shows its usefulness, but also it deepen the understanding of Mathematical concepts.

Integrating technology and digital tools

Teachers make use of technology frequently for several reasons, such as demonstration purposes, making connections, explanatory and reasoning. While the usage of digital tools is an inevitable since digital devices are in every part of students' life. Teachers present online software programs (especially GeoGebra) as well as train their students how to use them in their Mathematics learning. This approach enriches students' Mathematical knowledge as well as equips them with a self-learner digital skill.

Therefore, the findings from the qualitative analysis imply that creating learning experiences that foster MC combines more than one approach at once. These approaches include open inquiry, interactive activities, collaborative learning, applying Mathematics to real world situations and integration of technology and digital tools. Even though, those teachers who declared that they do not use any of these approaches have claimed that it is due to persistent obstacles such as large number of students, short time vs. large curriculum textbook, small classroom size and students' discipline problems. Consequently, this suggests that special PD courses as well as textbook modifications or complementation by a teachers' guide to support teachers in implementing these

strategies. Not to ignore the concern about school buildings and classrooms sizes (physical size and number of students as well).

Addressing Research Question 4

What are the challenges and the obstacles that Palestinian 8th – 9th grade mathematics teachers face in fostering mathematical creativity in the classroom?

The findings from the qualitative analysis revealed several challenges and obstacles that prohibit the implementation of strategies that foster MC among students. Teachers, especially those who declared that they do not make use of strategies and methods fostering creativity, have reported many of these factors. Other factors were interpreted by the researcher from the context of the analysis.

Official textbooks

- *Densely packed*: Most teachers have complained about the excessive amount of content matter in the official textbooks mandated by the MOE. Teachers are supposed to cover the whole material with their students, which makes the teachers more concern about the quantity rather than the quality of learning. As a result, employing fewer activities and few methods that foster creative thinking.
- *Inappropriate*: Some teachers have highlighted that these textbooks are narrow and superficial. The textbooks neither present creative ideas nor address deep thinking problems. Consequently, teachers (especially new ones) design their teaching methods accordingly and students focus on the level of their textbook when studying.

Short time

As a direct consequence of having densely packed textbooks, teachers emphasized on not having enough time, represented by the number of lessons per week. Implementation of innovative strategies, according to teachers, will consume lots of the lesson's time. Moreover, some teachers have even highlighted that integrating certain methods that foster creativity requires two successive periods on the schedule.

Large class sizes

Teachers mentioned that large number of students per class several times as a big challenge for fostering creativity among students. Teachers find it difficult to employ certain teaching methods that foster creativity in such a large class. In addition to the difficulty in providing sufficient guidance and proper feedback on an individual bases.

Small space

Some teachers complained from having small space in classrooms as well as in school. Small classrooms makes class seem packed and clustered, and hinders the mobility of teachers as well as students; which makes it challenging to employ creativity fostering activities either in classroom or outside.

Teachers doubt their students' potential

This intrinsic obstacle was interpreted from teachers' description and intension implementation of teaching methods that foster creativity. Teachers, who declared that they only use the rote-learning, traditional lecturing method, have justified this attitude to their doubt in students' potentials. This inner thought belief is the origin source that prohibit teachers from altering their teaching methods and trying new ones. Therefore, it is essential to have special psychological PD courses that bring this issue on the table and work on replacing this negative attitude toward students' potential by a strong positive one in teachers.

CONCLUSION

These findings emphasize the main obstacles that Palestinian Mathematics teachers encounter when trying to integrate teaching methods that foster creativity in their lessons. One main issue is the official textbook that dictate the flow of the teaching across the academic year, hindering teachers from paying attention to anything but to finish the assigned material in the textbook by the end of the academic year. Another big challenge was the number of students per class and the small classroom size, a problem that needs attention from decision makers in the government, especially the ministry of finance, to provide sufficient aid for building new schools of large classroom sizes. Alongside, is the systemic structure of the education system, concerning the number of lessons per week to be balance by the amount of content matter in the curriculum syllabus.

REFERENCES

Agustina, L., Zaenuri, Isnarto, & Dwijanto (2024). Students' Creative Thinking Ability on Problems of Mathematics Literacy. Journal of Higher Education Theory and Practice. https://doi.org/10.33423/jhetp.v24i1.6760

Ajzen, I., & Fishbein, M. (2005). The Influence of Attitudes on Behavior. https://doi.org/10.4324/9781410612823.CH5

Aktaş, M.C. (2015). Turkish High School Teachers' Conceptions of Creativity in Mathematics. Journal of education and training studies, 4, 42-52. https://doi.org/10.11114/JETS.V4I2.1123

Aus, K., Jõgi, A., Poom-Valickis, K., Eisenschmidt, E., & Kikas, E. (2017). Associations of newly qualified teachers' beliefs with classroom management practices and approaches to instruction over one school year. European Journal of Teacher Education, 40, 28 - 45. https://doi.org/10.1080/02619768.2016.1251897

Ayele, M.A. (2016). Mathematics Teachers' Perceptions on Enhancing Students' Creativity in Mathematics. Journal on Mathematics Education, 11, 3521-3536. https://shorturl.at/9YhjF

Barraza-García, Z. M., Romo-Vázquez, A., & Roa-Fuentes, S. (2020). A theoretical model for the development of mathematical talent through mathematical creativity. Education Sciences, 10(4), 118. https://www.mdpi.com/2227-7102/10/4/118#

Bendahmane, M. (2023). The Influence of EFL Teachers' Educational Beliefs on Classroom Practices. ALTRALANG Journal. https://doi.org/10.52919/altralang.v5i01.287

Berterö, C.M. (2012). Grounded theory methodology - has it become a movement? International Journal of Qualitative Studies on Health and Well-being, 7. https://doi.org/10.3402/qhw.v7i0.18571

Bicer, A. (2021). A systematic literature review: Discipline-specific and general instructional practices fostering the mathematical creativity of students. International Journal of Education in Mathematics, Science and Technology, 9 (2), 252-281. https://doi.org/10.46328/ijemst.1254

Brailas, A.V., Tragou, E., & Papachristopoulos, K. (2023). Introduction to Qualitative Data Analysis and Coding with QualCoder. American Journal of Qualitative Research. https://doi.org/10.29333/ajqr%2F13230

Byers, W. (2010). How mathematicians think: Using ambiguity, contradiction, and paradox to create mathematics. Princeton University Press.

Byers, W.P. (2014). Deep Thinking: What Mathematics Can Teach Us About The Mind. https://doi.org/10.1142/9247

Campbell, J.L., Quincy, C.D., Osserman, J., & Pedersen, O.K. (2013). Coding In-depth Semi-structured Interviews. Sociological Methods & Research, 42, 294 - 320. https://doi.org/10.1177/0049124113500475

Cox, S.K., Burns, M.K., Hughes, E.M., Wade, T., & Brown, M. (2024). Defining, Measuring, and Teaching Mathematical Flexibility. The Elementary School Journal, 124, 479 - 498. https://doi.org/10.1086/728591

Creswell, J. W., & Zhang, W. (2009). The application of mixed methods designs to trauma research. Journal of Traumatic Stress: Official publication of the international society for traumatic stress studies, 22(6), 612-621. https://doi.org/10.1002/jts.20479

Cullicott, C.E. (2019). "They Have a Lot of Potential": High School Mathematics Teachers' Perspectives on Difficult Students. Proceedings of the 2019 AERA Annual Meeting. https://doi.org/10.3102/1440866

de Alencar, E. M. S. (2012). Creativity in organizations: Facilitators and inhibitors. In Handbook of organizational creativity (pp. 87-111). Academic Press. https://doi.org/10.1016/B978-0-12-374714-3.00005-7

Desli, D., & Zioga, M. (2015). Looking for creativity in primary school mathematical tasks. https://hal.science/hal-01287299/document

Dick, T.P., & Springer, G.T. (2006). Making the Right (Discourse) Moves: Facilitating Discussions in the Mathematics Classroom. Mathematics Teacher: Learning and Teaching PK–12, 100, 105-109. https://doi.org/10.5951/MT.100.2.0105

Dickman, B. (2014). Conceptions of Creativity in Elementary School Mathematical Problem Posing. https://doi.org/10.7916/D8MC8X69

Escultura, E.E. (2012). Creative Mathematics Education. Creative Education, 03, 45-54. http://dx.doi.org/10.4236/ce.2012.31008

Fram, S.M. (2013). The Constant Comparative Analysis Method Outside of Grounded Theory. The Qualitative Report, 18, 1-25. https://files.eric.ed.gov/fulltext/EJ1004995.pdf

Gerson, K. (2020). Constructing an Interview Guide. https://doi.org/10.1093/oso/9780199324286.003.0004

Glaser, B., & Strauss, A. (2017). Discovery of grounded theory: Strategies for qualitative research. Routledge. https://doi.org/10.4324/9780203793206

Grégoire, J. (2016). Understanding creativity in mathematics for improving mathematical education. Journal of Cognitive Education and Psychology, 15(1), 24-36. http://dx.doi.org/10.1891/1945-8959.15.1.24

Guzmán, N. L. (2021). Microsoft Teams como LMS en la educación superior virtual. Revista Compás Empresarial, 12(32), 58-75. https://doi.org/10.52428/20758960.v11i32.61

Haavold, P.Ø., & Birkeland, A. (2017). Contradictory Concepts of Creativity in Mathematics Teacher Education. https://doi.org/10.1007/978-3-319-21924-0_11

Kettler, T., Lamb, K. N., Willerson, A., & Mullet, D. R. (2018). Teachers' perceptions of creativity in the classroom. Creativity Research Journal, 30(2), 164-171. http://doi.org/10.1080/10400419.2018.1446503

Kozlowski, J.S., Chamberlin, S.A., & Mann, E.L. (2019). Factors that Influence Mathematical Creativity. The Mathematics Enthusiast. http://dx.doi.org/10.54870/1551-3440.1471

Kynigos, C., & Moustaki, F. (2014). Designing digital media for creative mathematical learning. Proceedings of the 2014 conference on Interaction design and children. https://doi.org/10.1145/2593968.2610479

Leko, M.M., Cook, B.G., & Cook, L. (2021). Qualitative Methods in Special Education Research. Learning Disabilities Research & Practice, 36, 278 - 286. https://doi.org/10.1111/ldrp.12268

Levenson, E.S., Swisa, R., & Tabach, M. (2018). Evaluating the potential of tasks to occasion mathematical creativity: definitions and measurements. Research in Mathematics Education, 20, 273 - 294. http://dx.doi.org/10.1080/14794802.2018.1450777

Lev-Zamir, H., & Leikin, R. (2011). Creative mathematics teaching in the eye of the beholder: focusing on teachers' conceptions. Research in Mathematics Education, 13, 17 - 32. https://doi.org/10.1080/14794802.2011.550715

Lev-Zamir, H., & Leikin, R. (2011). Creative mathematics teaching in the eye of the beholder: focusing on teachers' conceptions. Research in Mathematics Education, 13, 17 - 32. https://doi.org/10.1080/14794802.2011.550715

Low, J. (2019). A Pragmatic Definition of the Concept of Theoretical Saturation. Sociological Focus, 52, 131 - 139. https://doi.org/10.1080/00380237.2018.1544514

Magnusson, E., & Marecek, J. (2015). Designing the interview guide. https://doi.org/10.1017/CBO9781107449893.005

Mashuri, S., Rasak, M.S., Alhabsyi, F., & Syam, H. (2022). Semi-structured Interview: A Methodological Reflection on the Development of a Qualitative Research Instrument in Educational Studies. https://www.iosrjournals.org/iosr-jrme/papers/Vol-12%20Issue-1/Ser-5/E1201052229.pdf

Meier, M., Burgstaller, J.A., Benedek, M., Vogel, S.E., & Grabner, R.H. (2021). Mathematical Creativity in Adults: Its Measurement and Its Relation to Intelligence, Mathematical Competence and General Creativity. Journal of Intelligence, 9. https://doi.org/10.3390/jintelligence9010010

Metu, C.A., Ugwuanyi, C.C., Nwoye, N.M., Odo, I.O., & Nwachukwu, W.C. (2023). Unlocking Students Areas of Difficulties in Mathematics through the Teachers Creativity Fostering Behaviours. International Journal of Research and Innovation in Social Science. https://doi.org/10.47772/ijriss.2023.70932

Miranda, P., & Mamede, E. (2022). Appealing to Creativity Through Solving and Posing Problems in Mathematics Class. Acta Scientiae. https://doi.org/10.17648/acta.scientiae.7024

Molad, O., Levenson, E. S., & Levy, S. (2020). Individual and group mathematical creativity among post–high school students. Educational Studies in Mathematics, 104, 201-220. https://link.springer.com/article/10.1007/s10649-020-09952-5

Mulyanti, S., Halim, A., Murniati, Ilyas, S., Syukri, M., & Mursal (2021). The impact of the science technology society (STS) approach on critical thinking ability and student learning outcomes. Journal of Physics: Conference Series, 1882. https://doi.org/10.1088/1742-6596%2F1882%2F1%2F012026

Nadjafikhah, M., Yaftian, N., & Bakhshalizadeh, S. (2012). Mathematical creativity: some definitions and characteristics. Procedia-Social and Behavioral Sciences, 31, 285-291. http://dx.doi.org/10.1016/j.sbspro.2011.12.056

Pajares, F. (2022). Inviting Self-Efficacy. Journal of Invitational Theory and Practice. https://doi.org/10.26522/jitp.v3i1.3765

Peltenburg, M., & van den Heuvel-Panhuizen, M. (2012). Teacher perceptions of the mathematical potential of students in special education in the Netherlands. European Journal of Special Needs Education, 27, 391 - 407. https://doi.org/10.1080/08856257.2012.701063

Pitta-Pantazi, D., Kattou, M., & Christou, C. (2018). Mathematical Creativity: Product, Person, Process and Press. https://doi.org/10.1007/978-3-319-73156-8_2

Roberts, & Rosanne, E. (2020). Qualitative Interview Questions: Guidance for Novice Researchers. The Qualitative Report, 25, 3185-3203. https://doi.org/10.46743/2160-3715/2020.4640

Schnugg, C. (2019). Creativity. Palgrave Studies in Business, Arts and Humanities. http://dx.doi.org/10.1007/978-3-030-04549-4

Schoevers, E.M., Kroesbergen, E.H., & Kattou, M. (2018). Mathematical Creativity: A Combination of Domain-general Creative and Domain-specific Mathematical Skills. The Journal of Creative Behavior. http://dx.doi.org/10.1002/jocb.361

Stein, C.C. (2007). Let's Talk: Promoting Mathematical Discourse in the Classroom. Mathematics Teacher: Learning and Teaching PK–12, 101, 285-289. https://doi.org/10.5951/mt.101.4.0285

Tabach, M., & Levenson, E.S. (2018). Solving a Task with Infinitely Many Solutions: Convergent and Divergent Thinking in Mathematical Creativity. http://dx.doi.org/10.1007/978-3-319-99861-9_10

Turan, M., ŞENGİL AKAR, Ş., & YILDIRIM-SAYGI, E. (2023). Middle School Teachers' Views on Mathematical Creativity and Supporting Mathematical Creativity. Kastamonu Eğitim Dergisi. https://doi.org/10.24106/kefdergi-2023-0032

Tversky, B. (2015). Keynote Address: Tools for Thinking. https://doi.org/10.1007/978-3-319-15594-4_1

Utami, D.N. (2016). THE EFL TEACHERS' BELIEFS AND THEIR TEACHING PRACTICES. Okara: Jurnal Bahasa dan Sastra, 10, 135-144. https://doi.org/10.19105/OJBS.V10I2.974

Vila-Henninger, L. A. (2019). Turning talk into "rationales": Using the extended case method for the coding and analysis of semi-structured interview data in ATLAS. ti. Bulletin of Sociological Methodology/Bulletin de Méthodologie Sociologique, 143(1), 28-52. https://doi.org/10.1177/0759106319852887

Vollstedt, M., & Rezat, S. (2019). An Introduction to Grounded Theory with a Special Focus on Axial Coding and the Coding Paradigm. ICME-13 Monographs. https://doi.org/10.1007/978-3-030-15636-7_4

Waswa, A. N., & Moore, K. C. (2020). Investigating Elementary Pre-Service Teachers' Conceptions of Mathematical Creativity. North American Chapter of the International Group for the Psychology of Mathematics Education. http://dx.doi.org/10.1016/j.sbspro.2011.12.056

Waswa, A. N., & Moore, K. C. (2020). Investigating Elementary Pre-Service Teachers' Conceptions of Mathematical Creativity. North American Chapter of the International Group for the Psychology of Mathematics Education. http://dx.doi.org/10.1016/j.sbspro.2011.12.056

Wessels, H. (2017). Exploring Aspects of Creativity in Mathematical Modelling. https://doi.org/10.1007/978-3-319-62968-1_53

Wilson, C. (2014). Semi-structured interviews. Interview techniques for UX practitioners, 1, 23-41. http://dx.doi.org/10.1016/B978-0-12-410393-1.00002-8