

Evaluating the practices of student teachers in teaching mathematics in resource rooms in Jordan

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Abstract: The study aimed to determine the extent to which pre-service teachers practice mathematics instruction in learning disabilities resource rooms, as perceived by learning disabilities teachers in Jordan. To achieve the study's objective, the researchers employed the descriptive survey method using a questionnaire. The researchers developed an instrument to measure mathematics teaching practices, consisting of 40 items distributed across four domains: instructional planning, classroom management and organization, instructional implementation, and instructional assessment. The instrument was administered to a sample of 75 male and female teachers working with students with learning disabilities in resource rooms in the governorates of Amman and Zarqa.

The results indicated that the level of mathematics teaching practices by pre-service teachers, from the perspective of learning disabilities teachers, was moderate. The results also revealed statistically significant differences in the level of mathematics teaching practices attributed to the university GPA variable. These differences favored pre-service teachers with a "Good" GPA compared to those with a "Very Good" GPA, except in the domain of classroom management and organization, where the differences favored pre-service teachers with an "Excellent" GPA. Meanwhile, the results showed no statistically significant differences in the level of teaching practices attributed to the variables of gender, number of completed credit hours in the bachelor's program, or the field training institution.

Keywords: mathematics teaching practices, student teachers, learning difficulties resource rooms, Teachers of students with learning difficulties.

تقييم ممارسات الطلبة المعلمين في تدريس الرياضيات في غرف المصادر في الأردن

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المستخلص: هدفت الدراسة إلى تحديد درجة ممارسات الطلبة المعلمين في تدريس الرياضيات في غرف مصادر صعوبات التعلم، كما يدركها معلمو صعوبات التعلم في الأردن. ولتحقيق هدف الدراسة، استخدم الباحثون المنهج الوصفي المسحي بالاستبانة، حيث طوّر الباحثون أداة لقياس ممارسات تدريس الرياضيات، اشتملت على (40) عبارة موزعة على أربعة مجالات: تخطيط التدريس، إدارة وتنظيم التدريس، تنفيذ التدريس، وتقييم التدريس. تم تطبيقها على عينة الدراسة بلغت (75) معلماً ومعلمة ممن يعملون مع الطلبة ذوي صعوبات التعلم في غرف المصادر في محافظتي عمان والزرقاء. وأظهرت نتائج الدراسة أن مستوى ممارسات الطلبة المعلمين في تدريس المهارات الرياضية من وجهة نظر معلمي الطلبة ذوي صعوبات التعلم كان (متوسطاً). كما بينت النتائج وجود فروق ذات دلالة إحصائية في مستوى ممارسات تدريس الرياضيات لدى الطلبة المعلمين تعزى لمتغير التقدير الجامعي، وكانت الفروق لصالح الطلبة المعلمين الحاصلين على تقدير "جيد" مقارنة بالحاصلين على تقدير "جيد جداً"، والحاصلين على تقدير "جيد"، باستثناء مجال إدارة وتنظيم التدريس، حيث كانت الفروق لصالح الطلبة المعلمين الحاصلين على تقدير "ممتاز". في حين لم تُظهر النتائج وجود فروق ذات دلالة إحصائية في مستوى ممارسات تدريس الرياضيات تعزى لمتغيرات جنس الطلبة المعلمين، وعدد الساعات المنجزة في برنامج البكالوريوس، ومؤسسة التدريب الميداني.

الكلمات المفتاحية: ممارسات تدريس الرياضيات، الطلبة المعلمون، غرف مصادر صعوبات التعلم، معلمو صعوبات التعلم.

1- Introduction

Field training in special education serves as the fundamental cornerstone of pre-service special education teacher preparation programs. Its purpose is to furnish student teachers with a wide range of experiences, educational methodologies, and professional competencies. Field training offers the chance to implement educational theories and principles while also gaining insight into the practices of educators who work with students who have learning difficulties in authentic learning environments, specifically in learning resource rooms.

Since learning resource rooms are among the most significant venues for training student teachers in special education, particularly in learning difficulties, and among the most significant educational alternatives for teaching students with learning difficulties, it is imperative to ascertain the nature of the practices used by student teachers in order to activate the learning and teaching that is already taking place there. This is especially true in the area of acquiring mathematical teaching skills, which is a major area of focus for work in the resource rooms and necessitates both the provision of instruction tailored to each student's unique needs and the adoption of teaching strategies that address their weaknesses in this area (Alkhaldeh & Khasawneh, 2021). Teachers of students with learning difficulties are regarded as the most critical success factor for resource rooms, given that they must possess a sincere desire to assist students with learning difficulties and a set of qualities and skills that empower them to instruct (Brunsting et al. 2023). As a result, scholars and practitioners with an interest in the field of learning difficulties have increasingly focused on evaluating the performance of instructors who work with students with learning difficulties. This evaluation is based on the outcomes of their professional practices and the strategies they employ to determine the true extent of their competencies and skills, with the overarching goal of enhancing and refining them. Teaching students with learning difficulties is a profession that requires a high degree of preparedness, adaptability, and specialized training (Smith-Moyler, 2020).

Research findings indicate that pre-service student teachers are inadequately prepared because their programs emphasize theoretical methods rather than practical classroom needs. Additionally, Teachers of students with learning difficulties in resource rooms have limited knowledge of fundamental mathematics skills and content (Wright, 2018; Borko, (2019); Ye (2016)) which makes student teacher exposed to many field difficulties related to teaching and classroom management. The American National Council for Accreditation of Teacher Education (NCATE, 2024) has always emphasized the importance of assisting student teachers in showcasing practical knowledge and skills during field training. This includes offering opportunities for real-world teaching experiences and providing necessary resources to support teaching methods and meet the requirements for effective teaching. More information can be found at <https://www.chea.org/national-council-accreditation-teacher-education>.

It should be noted that pre-service teacher preparation programs should transition to competency-based education, incorporating micro-learning and multimedia interactive learning analysis to enhance practical teaching skills in student instructors, as the proficient student teacher is the one who develops their teaching competencies and applies them effectively in authentic classroom settings (Al-Jassar & Al-Tammar, 2019); to achieve this, student teachers must be exposed during their field training to innovative teaching methods that spark curiosity, encourage active engagement, foster critical thinking, value learners' contributions, and prompt justification of ideas, thereby enabling them to teach mathematics effectively, support the conceptual understanding of mathematics among students with learning difficulties, and apply appropriate strategies to solve mathematical problems using visual aids, diagrams, models, and varied forms of mathematical communication to make mathematical language learning both accessible and enjoyable (Beirat & Al-Khateeb, 2018). Student teachers must actively communicate and collaborate with special education teachers in resource rooms to acquire the necessary competencies for teaching mathematics to students with learning difficulties. This collaboration aims to minimize the level of difficulty in mathematics and decrease errors in teaching students with learning difficulties in resource rooms (Neumann, et al., 2021). Additionally, the effect of artificial intelligence on enhancing education quality and reducing the levels of future anxiety among Jordanian teachers has been explored, highlighting the importance of integrating AI into teacher preparation programs to enhance both teaching quality and student outcomes (Beirat et al. 2025).

To enhance the student teacher's effectiveness in teaching mathematics to students with learning difficulties in resource rooms, they should implement continuous evaluation models for daily, weekly, and monthly teaching performance. This should be coupled with a strong grasp of mathematical content that integrates new knowledge with previous cognitive requirements, promotes cooperative learning, utilizes educational games, encourages brainstorming, fosters mathematical communication skills, facilitates classroom dialogue, and employs conceptual maps to connect mathematical ideas and summarize discussions (Voss & Vangsness, 2020).

The successful completion of this endeavor would not have been possible without the establishment of an interactive and collaborative relationship between the Teachers of students with learning difficulties and the student teachers in the resource room. The student teachers are influenced by the beliefs and the professional model of the Teachers of students with learning difficulties, which has been developed through years of experience in education and possession of expertise and qualities in mathematics instruction.

1-2-Previous studies

Opoku's (2022) study explored the perspectives of specialist teachers, including those working with students who have learning difficulties, on the adoption of inclusive education in African nations like Ghana. This is despite teacher training institutions providing courses in inclusive education to equip teachers with fundamental pedagogical skills for teaching in diverse classrooms. This study is crucial for understanding the objectives of specialized teachers in assisting student teacher trainees who are educating children with disabilities, particularly those with learning difficulties in secondary schools. The study gathered qualitative data from 12 specifically selected participants from various regions in Ghana. The findings indicated that regular teachers were ill-equipped to teach in secondary schools due to factors such as job requirements and insufficient teaching resources. The study suggested that policymakers reassess the role of specialist instructors in educating children with disabilities and the successful adoption of comprehensive educational strategies, including those tailored for students with learning difficulties.

The study (Peltier et al., 2020) demonstrated the need to create laws that require student teacher trainees and current teachers to receive professional development. The aim of this study, which consisted of student teacher trainees ($n = 97$), was to create a significant conceptual change in the knowledge of student teacher trainees compared to current working teachers.

According to a study by Urbani (2019), instructional strategies like dialogic reading—which is grounded in scientific findings from Teachers of students with learning difficulties—have a significant impact on the development of language delay in children with hearing impairments (deaf and hard of hearing). The current study identified the difficulties in implementing dialogic reading and the necessary adjustments for children who are deaf and hard of hearing by using case research and design approaches with three Teachers of students with learning difficulties in elementary schools. Lectures and cooperative teacher meetings served as the primary data sources. There were also video recordings of dialogic reading available. The results indicated that teachers struggled because of their insufficient understanding of language delay and implementation components; furthermore, the adjustments for children who are deaf and hard of hearing conflicted with academic duties. In fact, teachers need enhanced preparation and assistance to effectively handle the intricate and multidimensional responsibility of teaching.

In their research, Al-Shammari and Al-Kathiri (2019) sought to ascertain the teaching abilities exhibited by female students who had received training in the domain of learning difficulties, as perceived by female educators. The study sample consisted of 373 cooperating teachers who were knowledgeable about learning difficulties in Saudi Arabia. The findings of the research indicated that, as perceived by the instructors, the female trainees consistently demonstrated teaching abilities in the domain of learning difficulties. Specifically, their proficiency in implementation skills ranked highest, followed by planning and evaluation skills. In contrast, the female student teachers' command of classroom management skills was ranked last. The findings additionally indicated that there were statistically significant variations in the responses of the members of the study sample concerning the teaching abilities demonstrated by female student teachers in the domain of learning difficulties when viewed from the perspective of the teachers. These differences were influenced by the variable number of years of experience, with a preference for those with five to ten years of teaching experience.

A study was conducted by Al-Jaberi and Al-Shawarb (2018) to examine the instructional practices employed by student teachers when instructing mathematics, as well as the kindergarten teachers' perception of the most crucial mathematical content. The research sample comprised 71 kindergarten teachers located in the urban area of Amman. The findings revealed that student teachers implemented the greatest number of practices pertaining to communication and mathematical communication, followed by mathematical symbols. Mathematical modeling and representation, as well as the utilization of tangibles and tools in mathematics, received the least attention. In addition, the results demonstrated that numbers and operations on them are the most essential instructional material, followed by measurement and algebra, probabilities, data and patterns. The findings did not indicate statistically significant variations with regard to the study variables of years of experience, academic level, and specialization. However, one exception was specialization, which demonstrated a significant difference in engineering-related practices involving acting and modeling, as well as academic level.

Al-Khuzaim (2017) also carried out a study that sought to ascertain the perspectives of student teachers regarding mathematical ideas and methods of instruction as well as the connection between the idea of teaching and learning mathematics and mathematics students at the University of Hail's College of Education. The researchers created a questionnaire about the idea and methods of teaching and learning mathematics using the descriptive approach. The study's findings demonstrated the student teachers' inadequate comprehension of both the idea of teaching and learning mathematics as well as the methods involved in doing so. The findings also showed that there was no statistically significant correlation between the field practical education teachers' practices and the idea of teaching and learning mathematics.

The study conducted by Al-Qumizi (2015) aimed to determine, in light of academic accreditation standards and quality standards, the extent to which teaching competencies are available to students enrolled in practical education programs in the special education specialty at the College of Education, Al-Majma'ah University, Saudi Arabia. The study sample consisted of 35 students who had completed the field training program. The findings indicated that the participants in the study demonstrated significant teaching competencies and applied them effectively during their teaching practice at learning difficulties schools where they received their training.

Al-Mutrib (2015) conducted a study with the aim of investigating the nature of the competencies in teaching mathematics to deaf students and the extent to which student teachers in the field of hearing impairment possess these competencies, as perceived by 80 male and female students in the field of hearing impairment at the College of Education, King Faisal University. The results indicated that mathematical knowledge competencies of students specializing in hearing impairment were generally low, with the lowest competencies in mathematics teaching methods being in the aspects of embodying mathematical concepts, finding the necessary signs for them, and teaching verbal problems to deaf students. The area of instructional design competencies received an average score, with behavioral goal-setting and establishing suitable assessment techniques for deaf students receiving the lowest scores. The findings in the area of teaching implementation competence revealed that while the students' overall average of competencies was average, there were deficiencies in managing classes for deaf students and applying evaluation methods. Additionally, the study's findings did not demonstrate any statistically significant variations in teaching abilities based on the students' gender.

Haris et al. (2014) undertook a study to train (30) Teachers of students with learning difficulties on an approach for teaching the usage of mathematical terminology (such as addition and subtraction) to students with disabilities in inclusive settings. The trainee teachers received 10 hours of training over the course of five weeks. In addition to individual interviews, the researchers used a pre- and post-measurement to determine how much advantage the trainees received from teaching mathematics terminology to their students. The findings revealed a significant change in the extent to which teachers benefit from this program, and the study found that programs designed to empower and enhance the knowledge and skills of Teachers of students with learning difficulties in teaching mathematics can be beneficial.

Al-Anizi (2014) also carried out research with the goal of determining the challenges that math teachers have when instructing during the field training phase. A total of 185 student teachers made up the study sample. They answered the 66 items on the study tool, which was divided into three categories: math-related cognitive difficulties, teaching challenges, and challenges in assessing performance using personal competencies, teaching planning competencies, teaching implementation competencies, teaching management competencies, practical competencies, and evaluation competencies. The findings showed that student teachers do not disregard the competence and emotional components of mathematics, but rather struggle with the precision of mathematical expressions and a variety of mathematical tasks and their techniques. When it comes to assessing the work of student teachers, the findings in the area of personal competency indicated that they require further field experience and that they must encounter emergency scenarios while in the classroom. Student instructors seem to lack the ability to define behavioral goals when it comes to class planning, but when it comes to implementing lessons, they need more practice in real-world settings to improve their teaching abilities. The findings also demonstrated the importance of making the most of the training time for classroom leadership and lesson management.

Upon careful examination of prior research findings, the researchers have discerned that an abundance of general educational studies have focused on examining the teaching practices of teachers and student teachers, as well as the significance of these practices in imparting mathematical concepts and skills to students. However, no study has been identified that specifically investigates the identification of practices pertaining to the instruction of mathematical skills within the domain of special education in gene.

1-3-Study Problems and Questions

The researchers observed that most pre-service teacher preparation programs for teachers of students with learning difficulties do not adequately address the specific needs of academic disciplines. This gap presents a significant issue for the current study. This oversight regarding the particularities of academic fields raises several key questions: What are the characteristics of the teaching practices implemented by student teachers in resource rooms for students with learning difficulties? To what extent do these practices impact teaching effectiveness? How effective are these practices, considering the limited availability of academic theoretical resources related to mathematics instruction and the restricted opportunities for practical application during the theoretical study phase prior to field training? Additionally, a recurring question is: Does the duration of field training in resource rooms influence the ability of trainee teachers to develop and apply effective mathematics teaching practices?

The researchers conducted a review of the theoretical literature in order to gain insight into the results of previous studies. However, their findings also showed that there are not many studies in the theoretical literature that address teaching practices related to teaching mathematics skills, particularly when it comes to working in learning resource rooms and providing instruction to individuals with learning difficulties. This led the researchers to conduct the current study, which aims to ascertain the level of teaching practices among student teachers in learning difficulties resource rooms, given that their experience in field training programs has consistently shown a wide range of teaching abilities and practices among student teachers, particularly in learning difficulties. As a result, the study's main issue is addressing the following research questions:

- 1- What is the level of student teachers' practices in teaching mathematics skills in learning difficulties resource rooms in Jordan?
- 2- Does the level of practice of student teachers trained in learning difficulties resource rooms in teaching mathematics skills differ depending on the gender of the student, university grade, number of credit hours taken in the specialization, and type of training institution?

1-4-Study importance

There are two practical and one theoretical dimensions that illustrate the significance of the present study. Improving the theoretical educational literature in the field of study is the significance of the research from a theoretical standpoint. Anticipatedly, the present investigation will serve as a foundation for subsequent scholarly inquiries within the domain being examined. As for the practical side and addition to identifying the necessity for training courses in the domain of pedagogical approaches, it furnishes a practical instrument for assessing and evaluating the methodologies employed in learning resource rooms to instruct mathematical skills. It is also hoped that the results of the current study will provide the opportunity to review the content of theoretical academic subjects before training, especially those related to teaching methods, to judge their effectiveness in providing trainee students with the teaching skills they need, in addition to the opportunity that the results of the current study may yield in identifying training needs among student teachers in the field of teaching practices for mathematical skills, and providing teachers in training institutions with the levels of (student teachers) in the field of teaching mathematics teaching skills.

1-5-Study limitation and constraints

This study identified a number of limitations, which are as follows:

- Human-related limitations: The study sample consisted of (75) Teachers of students with learning difficulties, working cooperatively in schools that have resource rooms in the cities of Amman and Zarqa during the first semester of 2023/2024.
- Spatial limits: This study was limited to resource rooms in the cities of Amman and Zarqa, which have student teachers in the specialization of special education.
- Time limits: This study was conducted in the first semester of the 2023/2024 academic year. The study's constraints were as follows:
- The validity and reliability of the study tools that were used to collect data.
- Objectivity of the study sample and honesty in response

1-6-Terminological and procedural definitions

Mathematics teaching practices technically: It pertains to the specific approaches and methodologies employed by teachers when teaching mathematics subject. It incorporates a variety of instructional strategies and techniques designed to improve students' comprehension of mathematical concepts and skill development (Al-Abssi, 2020). The present study, on the other hand, focuses on the practical procedures that mathematics teachers employ when teaching students in grades two through six at the elementary level. It involves lesson planning, the application of appropriate educational strategies and methods, the provision of assessment and observation to gauge students' progress, and the modification of teaching methods in response to students' interactions and needs.

Student teachers: They are students enrolled in educational programs designed to help them earn their teaching certification. They are referred to as trainees in field training or as students in pre-service teacher preparation programs. Students are provided with essential practical and theoretical training to acquire the skills and information required to become qualified teachers in particular educational areas (Al-Azzali, 2016). The current study defines student teachers as university students pursuing a bachelor's degree in special education, participating in the field training course in special education, and undergoing training in resource rooms at government schools located in Amman and Zarqa.

Learning Difficulties Resource Rooms: They are regular school rooms furnished with specialized tools and materials. Within these rooms, a teacher of learning difficulties delivers pedagogical, educational, and behavioral services that are essential for students with learning difficulties. These students have been referred to the resource room in accordance with a daily schedule that specifies which classes they are required to attend in order to address their particular academic weaknesses (Buday, 2009). The present investigation defines "learning resource rooms" as classrooms set aside for the instruction of students with learning difficulties by teachers who specialize in special education or learning difficulties. During the training session, which lasts for full semester with the goal of providing practical training in the field of learning challenges, students teachers from universities also accompany them.

Learning Difficulties: This term refers to any disruption or incapability to fully benefit from educational opportunities as a result of difficulties with perception, concentration, organization, language proficiency, studying, or attention, or apathy. The term "learning difficulties" does not pertain to challenges that individuals face due to their socioeconomic status, cultural background, or social standing. Failure to address learning difficulties may result in challenges pertaining to both academic achievement and social integration (American Psychiatric Association, DSM-5 (APA), 2013). Regarding the learning difficulties in the current study, they are issues that have an impact on students' capacity to comprehend and use mathematical ideas in meaningful ways. These include difficulties with mathematical analysis, paying attention and focusing while solving mathematical problems, remembering and retrieving information, logical and organizational thinking, and mathematical communication. Addressing these challenges calls for a thorough understanding of each student's needs as well as the application of a variety of effective teaching strategies.

Teachers of students with learning difficulties: These are teachers with a focus on teaching and supporting children with learning difficulties who work in general education or special education settings. These teachers specialize in helping students who struggle with reading, writing, math, concentration, focus, memory, language, social skills, organization, and other fundamental school-related abilities (Jordanian Ministry of Education, 2024).

2- Study methodology& procedures

2-1-Study methodology

The goal of the current descriptive study was to determine, from the perspective of teachers of students with learning difficulties, the quality of teaching strategies used by student teachers when teaching mathematics in learning resource rooms.

2-2-The study population and its sample members

The study population comprises all teachers who were present in the learning resource rooms that were accessible in Amman and Zarqa throughout the first semester of the 2023/2024 academic year. A total of 75 Teachers of students with learning difficulties and cooperative workers were included in the research sample; these individuals were selected at random from the study population.

2-3-Study tool

In order to accomplish the study's objective, the researchers reviewed scholarly works pertaining to the field of teaching practices, including the elements of effective teaching (Algozzine et al., 2021), the National Council for Teaching Mathematics standards (NCATE, 2024), and studies by Barkat and Al-Khasawneh (2010), Haris et al. (2014), and Martin (2018). In order to create a study tool, some questions were posed to identify the methods of instruction used to teach mathematics to students with learning difficulties. The experience of several field training supervisors in special education and resource room teachers was also tapped into. The items of the study tool were distributed on four dimensions representing classification elements: teaching planning, teaching management and organization, teaching implementation, and teaching evaluation, according to a graded response scale of (1-5) degrees which follows the five-point Likert scale, in the manner: (Always, Grade 5), (Often, Grade 4), (Sometimes, Grade 3), (Rarely, Grade 2) and (Never, Grade 1).

2-4-Study procedures

To achieve the goal of the study, the researchers took the following measures:

- Reviewing the relevant theoretical literature on mathematics teaching practices.
- Building the study tool in its initial form and reviewing it by a number of experts in the field of special education
- Building the study tool in its final form after extracting the implications of its validity and reliability.
- Distributing the study tool to Teachers of students with learning difficulties working in resource rooms in the cities of Amman and Zarqa
- Collecting the study tool, entering the obtained data, conducting appropriate statistical analyzes and extracting the results.

2-5-Statistical processing

To answer the study questions, arithmetic means and standard deviations were used to answer the first study question, and to answer the second and third questions, one-way analysis of variance (One Way ANOVA) was used for the question variables. For the purposes of the study, the performance levels of the study sample were calculated by subtracting the lower limit of the response alternatives (1) from the upper limit (5) and then dividing the difference between the two limits by three levels, as shown as follows: $4 \div 3$ (levels) = 1.33, and therefore the low level is from 1-2.33, the medium level is from 2.34-3.66, and the high level is from 3.67-5.

3- Study results

3-1-Results related to the first question: What is the level of student teachers' practices in teaching mathematics skills in learning difficulties resource rooms in Jordan? In order to address this inquiry, the arithmetic means and standard deviations of the responses provided by the members of the study sample regarding the overall scale of teaching practices for mathematical skills and its sub-dimensions were computed. The results are presented in Table 1.

Table (1) Arithmetic analyses, elastic deviations, and advanced technology for mathematical skills

Variables	Arithmetic mean	Standard deviation	Level
Teaching Planning	3.15	0.46	Medium
Teaching management and organization	3.06	0.53	Medium
Teaching implementation	2.89	0.68	Medium
Teaching evaluation	3.01	0.62	Medium
Teaching practices of mathematics skills	3.03	0.53	Medium

With an arithmetic mean of 3.03, it is evident from Table (1) that the level of practices in teaching mathematics skills among student teachers, as perceived by Teachers of students with learning difficulties, was medium. Additionally, it is evident from Table (1) that the teaching planning dimension achieved the highest mean score of 3.15, followed by the teaching management and organization dimension with a mean of 3.06, the teaching evaluation dimension with a mean of 3.01, and teaching implementation with a mean of 2.89, which placed it in last place. As shown in Tables 2, 3, 4, and 5, the arithmetic means and standard deviations of the responses of the study sample members to the items on the dimensions of teaching practices for mathematical skills were also computed.

3-1-1-Planning for teaching dimension

Table (2): Arithmetic means and standard deviations for item of teaching planning

St. No.	Statement	means	Sd	Rank	Level
2	He performs a suitable evaluation tool for mathematical skills	3.68	0.91	1	High
1	He plans to teach the mathematical skill in an organized and controlled manner.	3.22	0.99	2	Medium
5	He plans to provide a safe and supportive classroom environment for mathematical learning	3.17	1.12	3	Medium
3	He plans on an ongoing basis	3.01	1.22	4	Medium
4	He plans the mathematical task in an applicable manner.	2.66	1.06	5	Medium
	Overall teaching planning dimension	3.25	0.46		Medium

It is clear from Table (2) that Paragraph No. (2), which states, "He performs a suitable evaluation tool for mathematical skills," ranked first with a mean of (3.68), while Paragraph No. (4), which states, "He plans the mathematical task in an applicable manner" ranked last with a mean of (2.66).

3-1-2-Teaching management and organisation

Table (3) Arithmetic means and standard deviations for item of teaching management and organisation

St. No.	Statement	means	Sd	Rank	Level
8	He is keen on building positive human relationships	3.72	0.92	1	High
1	He organises the educational situation in a way that provides all students with opportunities for success	3.21	1.04	2	Medium
7	He uses the lack of success or error in solving a mathematical problem for any reason to improve the learning behavior of the mathematics student.	3.18	1.04	3	Medium
3	He organises students individually or cooperatively depending on the nature of the mathematical task and the educational characteristics of the students	3.09	1.06	4	Medium
4	He gives an appropriate time to complete the mathematical task required from students	3.09	1.09	4	Medium
2	He is keen to provide tools, techniques and means that support students' mathematical learning	2.97	1.10	6	Medium
6	He takes into account Sequence in presenting the teaching content.	2.64	1.06	7	Medium
5	He diversifies the situation and questions in which mathematical information is used.	2.61	1.06	8	Medium
	Overall teaching management and organisation dimension	3.06	0.53		Medium

It is clear from Table (3) that Paragraph No. (8), which states, "He is keen on building positive human relationships," ranked first with an arithmetic average of (3.72), while Paragraph No. (5), which states, "He diversifies the situation and questions in which mathematical information is used" ranked last with a mean of (2.61).

3-1-3-Teaching implementation dimension

Table (4) Arithmetic means and standard deviations for item of teaching implementation

St. No.	Statement	means	Sd	Rank	Level
15	He encourages students to work cooperatively to carry out mathematical tasks.	4.01	0.95	1	High
3	He explains the objectives of the required mathematical task and ensures that students understand them.	3.40	0.95	2	Medium
8	It takes into account individual differences between students in mathematical abilities and shows interest in students who do not show progress.	3.40	1.12	2	Medium
2	He is keen to attract students' attention to the subject of the sports lesson in a language and style that suits the students' abilities.	3.06	1.01	4	Medium
10	He uses the steps to solve arithmetic word problems and pays attention to each step..	3.04	1.20	5	Medium
9	He encourages students to self-learn mathematically.	3.01	1.16	6	Medium
7	He uses various methods to illustrate mathematical concepts, such as pictures, drawings, and models.	3.00	1.15	7	Medium
5	He raises students' motivation to learn mathematics teaching skills.	3.00	1.38	7	Medium
4	He paves the way for mathematical skills in an exciting way to learn.	2.92	1.08	9	Medium
17	He uses different and appropriate reinforcement methods in teaching students mathematical teaching skills.	2.90	1.10	10	Medium
11	He encourages students to observe and make the necessary comparisons to learn mathematical concepts.	2.86	1.10	11	Medium
6	He reminds students of prior mathematical knowledge needed to learn new mathematics teaching skills.	2.77	1.03	12	Medium
18	He simplifies mathematical concepts and follows the method of analyzing the mathematical task to facilitate its delivery to students.	2.72	0.99	13	Medium
1	He directs and guides students during their mathematical activities.	2.56	1.08	14	Medium
12	He links mathematical ideas with aspects of public life such as buying and selling.	2.41	1.07	15	Medium
16	He teaches mathematics skills moving from the tangible to the semi-tangible to the abstract.	2.33	0.96	16	Low
13	He diversifies the methods of solving mathematical problems, such as drawings, tables, and the use of mathematical operations.	2.32	1.09	17	Low
14	He shows interest in students' responses and interactions within the framework of learning mathematical concepts.	2.29	0.94	18	Low
	Overall teaching implementation dimension	2.89	0.68		Medium

It was shown from Table (4) that Paragraph No. (15), which states: "He encourages students to work cooperatively to carry out mathematical tasks" ranked first with an arithmetic mean of (4.01), while Paragraph No. (14), which states: "He shows interest in students' responses and interactions within the framework of learning mathematical concepts" ranked last with an arithmetic average of (2.29).

3-1-4-Teaching evaluation dimension

Table (5): Arithmetic means and standard deviations for item of teaching evaluation

St. No.	Statement	means	SD	Rank	Level
9	He maintains records that reflect students' progress.	3.53	1.04	1	Medium
8	He informs Students of the progress they are making.	3.49	0.79	2	Medium
7	He is keen to highlight students' work related to their mathematical learning on the classroom walls or in the school environment.	3.26	1.15	3	Medium
5	He assign students mathematical skills relevant to daily life.	3.24	1.12	4	Medium
6	In his evaluation, he is keen to deal effectively with the strengths and weaknesses of students.	2.93	1.00	5	Medium
1	He evaluates students' athletic performance using various methods, such as worksheets, observations, checklists, and rating scales.	2.93	1.16	6	Medium
2	He provides students with opportunities to apply mathematical skills and concepts.	2.86	1.04	7	Medium
4	He assign students a variety of different open mathematical problems.	2.74	1.10	8	Medium
3	He is keen to provide immediate feedback on students' performance and mathematical learning.	2.13	1.09	9	Medium
	Overall teaching evaluation dimension	3.01	0.62		Medium

It is clear from Table (5) that Paragraph No. (9), which states, "He maintains records that reflect students' progress" ranked first with a mean of (3.53), while Paragraph No. (3), which states, "He is keen to provide immediate feedback on students' performance and mathematical learning," ranked last with a mean of (2.13).

3-2-Results related to the second question: Does the level of practice of student teachers trained in learning difficulties resource rooms in teaching mathematics teaching skills differ depending on the gender of the student, university grade, number of credit hours taken in the specialization, and type of training institution?

To answer this question, the arithmetic means and standard deviations were calculated for the responses of the study sample members on the scale of teaching practices for mathematical skills as a whole and on its sub-dimensions according to the variables of the study, as shown in Table (6).

Table (6): Arithmetic means, standard deviations, and level of teaching practices for mathematical skills according to variables

Variable	Level	Teaching planning		Teaching management and organization		Teaching implementation		Teaching evaluation		Overall	
		M	S	M	S	M	S	M	S	M	S
Sex	Males	3.11	0.39	3.03	0.42	2.91	0.64	3.01	0.50	2.98	0.47
	Females	3.17	0.50	3.08	0.58	2.87	0.71	3.01	0.69	2.98	0.56
University grade	Excellent	3.08	0.50	3.15	0.54	2.92	0.61	2.84	0.61	2.97	0.52
	Very good	2.95	0.36	2.76	0.44	2.72	0.75	2.96	0.60	2.81	0.50
	Good	3.00	0.25	3.04	0.33	2.59	0.35	2.91	0.38	2.80	0.23
	Acceptable	3.46	0.49	3.31	0.58	3.20	0.72	3.21	0.75	3.26	0.59
No. of hours	Finished all requirements	3.15	0.49	3.02	0.52	2.90	0.74	3.04	0.65	2.99	0.58

Variable	Level	Teaching									
		Teaching planning		Teaching management and organization		Teaching implementation		Teaching evaluation		Overall	
		M	S	M	S	M	S	M	S	M	S
	Finished 90 hours	3.14	0.44	3.11	0.54	2.87	0.62	2.98	0.60	2.97	0.47
Training institution	Public	3.18	0.47	3.09	0.50	2.92	0.68	3.02	0.66	3.01	0.53
	Private	3.06	0.46	2.99	0.60	2.81	0.69	3.00	0.54	2.92	0.53

It is clear from Table (6) that there are apparent differences in the arithmetic means in the level of teaching practices for mathematical skills according to the variable of the student teacher's gender, his university grade, and the number of hours taken in the bachelor's program and the training institution. To determine the significance of these differences, a four-way analysis of variance (*Four Way ANOVA*) was used. As shown in Table (7).

Table (7) Results of the four-way analysis of variance on the effect of gender, university grade, number of hours, and training institution on teaching practices for mathematical skills

Variable	Source of variance	SS	df	MS	F-value	Probability
Teaching practices for mathematical skills	Sex	0.005	1	0.005	0.020	0.88
	University grade	2.856	3	0.952	3.629	0.01
	No. of hours	0.001	1	0.001	0.005	0.94
	Training Institution	0.061	1	0.061	0.231	0.63
	Error	17.840	68	0.262		
	Corrected total	20.880	74			

It is clear from Table (7) that there are no statistically significant differences in the level of teaching practices for mathematical skills due to the variables of the student teacher's gender and the number of hours taken in the bachelor's program and the training institution, as all *F-values* were not statistically significant. It is also clear from Table (7) that there are statistically significant differences in the level of teaching practices for mathematical skills attributed to the university grade variable, where the *F-value* was (3.629), which is a statistically significant value at the significance level ($\alpha = 0.05$). To determine the significance of these differences, the Scheffé test was used for post-comparisons, as shown in Table (8).

Table (8): Scheffé test results for post-hoc comparisons according to the university grade variable

Variables	Overall grade	Mean	Excellent	Very good	Good	Acceptable
Teaching practices for mathematical skills	Excellent	2.97				
	Very good	2.81				-0.45
	Good	2.80				-0.46
	Acceptable	3.26		0.45	0.46	

It is clear from Table (8) that there are statistically significant differences in the level of teaching practices for mathematical skills among sample members due to the university grade variable. It turns out that the difference is in favor of the students who received an acceptable grade, compared to the students who received a very good grade and the students who received a good grade. Also, a *Four Way ANOVA* was used to analyze the dimensions of teaching practices for mathematical skills, as shown in Tables (9-15).

3-2-1-Teaching planning

Table (9): Results of the four-way analysis of variance on the effect of gender, university grade, number of hours, and training institution on teaching planning

Variable	Source of variance	SS	df	MS	F-value	Probability
Teaching planning	Sex	0.246	1	0.246	1.384	0.24
	University grade	3.555	3	1.185	6.654	0.00
	No. of hours	0.057	1	0.057	0.322	0.57

Variable	Source of variance	SS	df	MS	F-value	Probability
	Training Institution	0.152	1	0.152	0.856	0.35
	Error	12.110	68	0.178		
	Corrected total	16.227	74			

It is clear from Table (9) that there are no statistically significant differences in the level of planning for teaching due to the variables of the student teacher's gender, the number of hours completed in the bachelor's program and the training institution, as all *F-values* were not statistically significant. It is also clear from Table (9) that there are statistically significant differences in the level of planning for teaching due to the university grade variable, where the *F-value* was (6.654), which is a statistically significant value at the significance level ($\alpha = 0.05$). To determine the significance of these differences, the Scheffé test was used for post-comparisons, as shown in Table (10).

Table (10): Scheffé test results for post-hoc comparisons according to the university grade variable

Variables	Overall grade	Mean	Excellent	Very good	Good	Acceptable
Teaching planning	Excellent	3.08				-0.38
	Very good	2.95				-0.51
	Good	3.00				-0.46
	Acceptable	3.46	0.38	0.51	0.46	

It is clear from Table (10) that there are statistically significant differences in the level of planning for teaching among the sample members due to the university grade variable, and it turns out that the difference is in favor of the students who received an acceptable grade, compared to students who received an excellent grade, students who received a very good grade, and students who received a grade of good.

3-2-2-Teaching management and organization

Table (11): Results of the four-way analysis of variance on the effect of gender, university grade, number of hours, and institution on teaching management and organization

Variable	Source of variance	SS	df	MS	F-value	Probability
Teaching management and organization	Sex	0.001	1	0.001	0.003	0.95
	University grade	3.220	3	1.073	4.332	0.00
	No. of hours	0.221	1	0.221	0.894	0.34
	Training Institution	0.611	1	0.611	2.468	0.12
	Error	16.847	68	0.248		
	Corrected total	21.073	74			

It is clear from Table (11) that there are no statistically significant differences in the level of teaching management and organization due to the variables of the student teacher's gender, the number of hours taken in the bachelor's program, and the training institution, as all the *F-values* were not statistically significant. It is also evident from Table (11) that there are statistically significant differences in the level of teaching management and organization due to the university grade variable, where the *F-value* was (4.332), which is a statistically significant value at the significance level ($\alpha = 0.05$). To determine the significance of these differences, the Scheffé test was used for post-comparisons, as shown in Table (12).

Table (12): Scheffé test results for post-hoc comparisons according to the university grade variable

Variables	Overall grade	Mean	Excellent	Very good	Good	Acceptable
Teaching management and organization	Excellent	3.15		0.39		
	Very good	2.76	-0.39			-0.55
	Good	3.04				
	Acceptable	3.31		0.55		

Table (12) shows that there are statistically significant differences in the level of teaching management and organization among sample members due to the university grade variable, and it turns out that the difference is in favor of students who received an excellent grade, compared to students who received a very good grade. It is also clear from Table (12) that there are statistically significant differences in the level of teaching management and organization among the sample members due to the university grade variable, and it turns out that the difference is in favor of the students who received an acceptable grade, compared to the students who received a very good grade.

3-2-3-Teaching implementation dimension

Table (13): Results of the four-way analysis of variance for the effect of gender, university grade, number of hours, and institution on teaching implementation

Variable	Source of variance	SS	df	MS	F-value	Probability
Teaching implementation	Sex	0.017	1	0.017	0.038	0.84
	University grade	4.203	3	1.401	3.132	0.03
	No. of hours	0.003	1	0.003	0.007	0.93
	Training Institution	0.060	1	0.060	0.134	0.71
	Error	30.424	68	0.447		
	Corrected total	34.848	74			

It is clear from Table (13) that there are no statistically significant differences in the level of teaching implementation due to the variables of the student teacher's gender, his university grade, and the number of hours completed in the bachelor's program, as all *F-values* were not statistically significant. It is also clear from Table (13) that there are statistically significant differences in the level of teaching implementation due to the university grade variable, where the *F-value* was (3.132), which is a statistically significant value at the significance level ($\alpha = 0.05$). To determine the significance of these differences, the Scheffé test was used for post-comparisons, as shown in Table (14).

Table (14): Scheffé test results for post-hoc comparisons according to the university grade variable

Variables	Overall grade	Mean	Excellent	Very good	Good	Acceptable
Teaching implementation	Excellent	2.92				
	Very good	2.72				-0.48
	Good	2.59				0.61
	Acceptable	3.20		0.48	0.61	

Table (14) shows that there are statistically significant differences in the level of teaching implementation among sample members due to the university grade variable, and it turns out that the difference is in favor of the students who received an acceptable grade, compared to the students who received a very good grade and the students who received a good grade.

3-2-4-Teaching evaluation

Table (15): Results of the four-way analysis of variance on the effect of gender, university grade, number of hours, and institution on teaching evaluation

Variable	Source of variance	SS	df	MS	F-value	Probability
Teaching evaluation	Sex	0.112	1	0.112	0.279	0.59
	University grade	1.697	3	0.566	1.405	0.24
	No. of hours	0.313	1	0.313	0.777	0.38
	Training Institution	0.095	1	0.095	0.235	0.62
	Error	27.384	68	0.403		
	Corrected total	29.252	74			

It is clear from Table (15) that there are no statistically significant differences in the level of teaching practices for mathematical skills due to the variables of the student teacher's gender, his university grade, and the number of hours taken in the bachelor's program and the training institution, as all the *F-values* were not statistically significant.

4-Results discussion

In light of the results of the study, the researchers explain the medium level of student teachers' teaching practices of mathematical skills from the teachers' point of view, to the nature of the students' abilities in general and their ability to reflect what was acquired in the theoretical subjects in the bachelor's program, in addition to the lack of inclusion of theoretical subjects in the pre-service teacher preparation stage and the insufficient practical aspects, especially with regard to teaching mathematics teaching skills; these results are totally in concurrence with the result of Opoku's study (2022) which aimed at revealing mathematics teaching practices among student teachers during the field training period, and their relationship to some variables related to their teaching practices. The study's findings showed that student teachers teaching practices fell somewhere between "medium" and "little" practice, rather than reaching a high level. This finding, however, was different from what the study by Urbani (2019) on educational practices (for student teachers) suggested, which was that teachers need better preparation and support for the multifaceted teaching responsibilities of education since they stumble due to lack of knowledge.

The arithmetic mean of 3.15 assigns the teaching planning dimension the highest position among the teaching practice dimensions; this ranking is attributed to the relative simplicity of theoretical planning in comparison to practical implementation. Effective planning necessitates the oversight and documentation of pedagogical approaches that are essential for instructing classes and providing training to students with learning difficulties. This is frequently delineated in writing through preceding procedures, which comprise introductory and preparatory measures, class presentation protocols, and the criteria that govern the selection of instructional methods and the characteristics of the activities to be conducted, This is in conjunction with the concluding procedures that are facilitated by essential assessment instruments for ensuring that students who have learning difficulties have satisfactorily attained the educational goals. The teaching management and organization dimension ranked second in the dimensions of teaching practices with an arithmetic mean of 3.06. This is attributed by researchers to the nature of pre-planning, which involves determining and distributing time, as well as organizing pre-session procedures, presentation procedures, and closing procedures. The researchers report that the teaching evaluation dimension secured the third position with an average score of 3.01. This rating pertains to the student teachers' recognition of the methods employed to assess teaching abilities, which may encompass direct observation, worksheets, written or oral question responses, brief assessments, or other similar approaches. The researchers attribute the teaching implementation dimension's final position (2.89 mean score) to the procedural and executive nature of this aspect, which necessitates specialized knowledge and educational experience in working with children who have learning difficulties. A semester-long field training period is inadequate to provide these instructional experiences.

Regarding the existence of statistically significant differences in the level of student teachers' teaching in mathematics across all dimensions of the teaching practices tool—aside from the dimension of teaching management and organization—that are attributable to the university grade variable, as well as the trend favoring students who received an acceptable grade over those who received a very good grade and good grade, they attribute it to the large number of students with acceptable grades who were the focus of the study's investigation of their levels in the area of mathematics teaching skills, as well as the lack of a necessary and significant correlation between grade and performance. It is possible that students who receive acceptable grade will have performance skills that students who receive an excellent or very good grade would not. This is in line with the findings of Al-Khuzaim's (2017) study, which sought to understand the perspective of student teachers on mathematical concepts and the methods for teaching and learning them. It also sought to understand the relationship between the concept of teaching and learning mathematics and mathematics students at the University of Hail's College of Education. The study's findings showed that there is no statistically significant relationship between the concept of teaching and learning mathematics and the students' practices for teaching in practical field education.

Regarding the presence of statistically significant differences in the dimension of teaching management and organization among student teachers attributed to the university grade variable in favor of students who obtained an excellent grade, the researchers attribute it to the nature of what characterizes students with an excellent grade of cognitive and practical skills in organization and

perseverance in learning and teaching, whether by employing academic skills that have been learned or new skills learned within the rooms and resources they are enrolled in.

5-Conclusion and recommendation

The results of the research suggest that student teachers possess a moderate level of proficiency when it comes to teaching mathematics to students who have learning difficulties. Furthermore, the dimension of teaching planning emerged as the most consistent and applied within the study tool, with teaching management and organization, teaching evaluation, and teaching implementation following suit. The research findings unveiled statistically significant variations in the practices taken by university student teachers to teach mathematics, with preferential treatment given to those who obtained an acceptable grade point average over those who obtained a very good and good grade point average. The absence of statistically significant differences in mathematics teaching practices as a function of the variables (student teacher gender, number of hours completed in bachelor's program, and field training institution) was demonstrated by the study's findings. The current study has provided important indications about the level and quality of mathematics teaching practices among student teachers and highlighted some of the factors influencing these practices, which would ultimately contribute to identifying areas of development, improvement, and quality in pre-service teacher training programs. Consequently, researchers advise that theoretical materials in special education should have real-world applications, particularly when it comes to teaching and acquiring mathematical skills. The researchers also suggest carrying out additional research to determine the methods of teaching various types of skills, like language skills, in addition to research focused on the levels of teacher support for student teachers in practical training institutions. The researchers also recommend the necessity of directing field training students to the need to benefit from the expertise of cooperating teachers, in addition to the necessity of holding meetings and training courses for student teachers to increase their effectiveness in achieving the goals of field training programs in special education and addressing the weakness of students with learning difficulties in resource rooms.

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