Expectations of Undergraduate Students from Teachers in Learning Mathematics

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Abstract: This paper aims to explore the expectations of the learners from teachers in learning mathematics in undergraduate level. This is a qualitative study and all the students of undergraduate mathematics programs of Mid-west University are the population of this study. The undergraduate program of Mid-West University is of four years with eight semesters, although the odd or even semesters run correspondingly in each six months due to the annual new admission system. Altogether twenty students (five students from each even semester) were selected purposively as the participants of this study. Open-end questions were the tool of gathering information. The questions were sent to each participant through messenger using a link of Google form. The data were analyzed thematically using six steps of thematic analysis. On the basis of the participants' responses, it is concluded that the learners expect basic information, definitions, formula and relations before starting the new lesson in mathematics. Also, the learners expect motivation, support, basic concept as well as the opportunity to practice and discuss in the classroom to learn mathematics effectively. The findings of this study can be useful to the mathematics teachers of university level as well as the school level to teach mathematics on the basis of the learners' expectations.

Key Keywords: *Expectations, Feedback, Learning mathematics, Motivation, basic concept*

Introduction

Teaching mathematics at university level is not an easy job due to technological development and the needs of the students in 21st century. The rate of completion of all the papers of mathematics at university level also seems low in the Nepalese context. This might be the cause of mismatch between the expectations of the teachers and the learners. Expectation is a belief about what might happen in the future. It can be also taken as the supposition to what may happen. Everyone has different expectation in every activities and events in life. In teaching-learning procedure, teachers and students have different expectations from each other. If the teachers are unknown about the learners' expectations, learners cannot learn properly. The mismatch between the expectations of learners and the teachers might be the cause of failure and dropout of students. So, this has been an issue in the field of education. Stodolsky et al. (1991) mention that math and social studies differ in the instructional pattern found in

elementary classroom in the goals sought and in the actual content. Likewise, in a study, Ma (2001) found that students with high future expectation were more likely to participate in advanced mathematics. Peer influence and the teachers' expectation did not have strong effect and the effect of students' expectation was independent of peers and teachers' effect. The learners expect the tradition of regular homework encountered at school level with proper feedbacks from teachers to be continued at the university level, but most of the university mathematics courses and teachers do not follow it (Hirst et al., 2004).

Mathematics teacher educators can provide opportunities to prospective teachers to work in small cooperative groups while solving mathematical problems because it gives them opportunities to share their expertise and take leadership (Litster et al., 2020). The authors also recommend that selecting task-based reasoning and facilitating meaningful mathematics discourse promote active mathematics learning. Theoretical papers in major mathematics are taught by lecture methods that includes presenting definitions, theorems and proofs although the teachers and the students accepts that lecture methods are not as effective as they could be (Sarala & Kavitha, 2017). The authors also found that smooth relationship, conceptual understanding, motivation, explaining, mathematical modeling, and peer or group interactions are the main expectations of undergraduate students from their teachers in learning mathematics. To learn mathematics, learners are needed to change abstract concept into concrete concept and to understand while doing it. Technology may support the learners to concretize the complicated abstract concepts and facilitate the configuration in students' mind through some known graphics or patterns (Taleb et al., 2015). Studies indicate that learning mathematics meaningfully is itself a challenge without the support and motivation of teachers. So, this study is concerned with the identification of learners' expectations in learning mathematics at undergraduate level.

In an investigation of students' expectations on studying mathematics at university in UK and Portugal, Hirst et al. (2004) found that students would not enjoy mathematics in university as much as a school and also they felt difficulty in university mathematics than school level. The participants expected less lectures and more interactive mathematics classes, active involvement and conceptual understanding in learning mathematics. Most of the participants expected high from teachers in the first years of university enrolment. If their expectations

could not be fulfilled in early years, they could leave studying mathematics and there would be high rate of dropout.

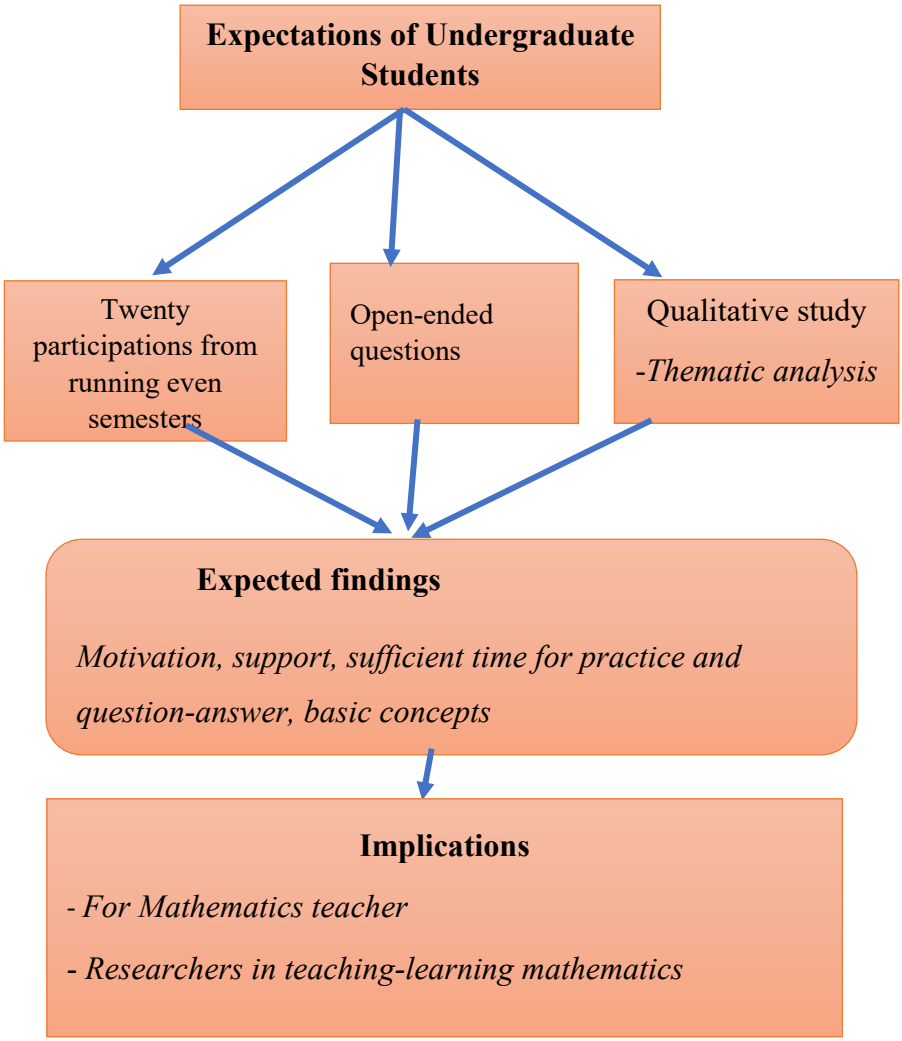
Similarly, Sarala and Kavitha (2017) measured the teachers' beliefs and students' expectations on learning mathematics in Tamilnadu, India using a fuzzy conjoint model. The measurement indicated that teachers were strongly agreed in drill and practice as one of the best ways of mathematics learning. The authors found that connecting mathematics in real world life, motivation, covering syllabus, and conceptual understanding were the main expectations of learners in mathematics learning. Warwick (2010) identifies that timetabled support session, a model of learning process with key feedbacks, way of working with students through support sessions as well as the ways of minimizing anxieties are the basic techniques to fulfil the learners' expectation in leaning mathematics. Problem-solving, reasoning and proving, reflecting, connecting, communicating, representing, and selecting tools and strategies are the procedures for learning mathematics (Winter, 2022). Similarly, an analysis of beliefs, attitudes, and emotional reactions of learners in learning mathematics pointed that success in learning mathematics is dependent on effort and dedication of the learners and the learners expect motivation and support as well as basic understanding and repetition (Ignacio et al., 2006).

In an analysis of learning expectations related to grade I- VIII algebra across several U.S. states and high performing Asian countries, Chen and Cai (2009) pointed that recalling the terms, formula and procedure, developing relationship between mathematical concepts, application of mathematics in contexts outside of mathematics, synthesis of contents and ideas from several sources are the expectations of learners in learning mathematics. The students of all levels expect a supportive environment, better understanding and opportunities to think and discuss in learning mathematics, engineering and science, and technology (Education & Resources, 1996). Mura (1987) found no sex-related difference in expectations and the level of confidence to complete bachelor's degree in mathematics in Canada. When students move to college from school, they should face many challenges, social, academic and personal. In this transitional phase, undergraduate students expect more support and encouragement from the teachers for better performance and completion of the undergraduate degree (Hirst et al., 2004).

This paper aims to explore the expectations of undergraduate students in learning mathematics and their recommendations to make mathematics learning effective as well. To guide this study process, a conceptual framework has been designed and discussed in the next section.

Conceptual Framework

I have developed the following conceptual framework for this study that links the student expectations with the process of exploring those expectations:



Methodology

This is a qualitative research design based on the open-end questions. A qualitative research is a less structured research methodology used to gain in-depth information about people's underlying reasoning and motivations. The aim of qualitative research is to develop a deep understanding of a topic, issue, or problem from an individual's perspective. According to Jansen (2010), this approach gives respondents the freedom to say exactly how they feel about a topic, which provides the exploratory data that may reveal unforeseen opportunities, issues, or quotes. There are three main forms of qualitative survey: face to face survey, phone survey,

and online survey. This study is based on an online survey because the information has been collected through Google form shared with the participants.

Mid-west University, the government funded university of Nepal, was established in June17, 2010 by the Government of Nepal. It has launched different programs through six different faculties that are Education, Humanities and Social Sciences, Engineering, Science and Technology, Management, and Law. All the undergraduate students of even semesters (second, fourth, sixth and eighth) of the year 2022 of Faculty of Education who were studying Mathematics as the major subjects were taken as the population of this study. Among them, five students from each even semester (altogether 20) were selected randomly as the participants for the study. I have used the first letter (capital) of their name as the pseudonyms of participants. The subscript denotes the semester of the participants.

Table1: *List of Participants*

S.N.	Students' code	Gender	Semester
1	M_2	Male	B.Ed. second
2	D_2	Male	B.Ed. second
3	P_2	Female	B.Ed. second
4	R_2	Male	B.Ed. second
5	T_2	Male	B.Ed. second
6	L_4	Male	B.Ed. fourth
7	T_4	Male	B.Ed. fourth
8	K_4	Male	B.Ed. fourth
9	D_4	Male	B.Ed. fourth
10	R_4	Female	B.Ed. fourth
11	S_6	Female	B.Ed. sixth
12	K_6	Female	B.Ed. sixth
13	J_6	Female	B.Ed. sixth
14	T_6	Male	B.Ed. sixth
15	G_6	Male	B.Ed. sixth
16	S_8	Male	B.Ed. eighth
17	K_8	Male	B.Ed. eighth
18	L_8	Female	B.Ed. eighth
19	R_8	Male	B.Ed. eighth
20	M_8	Male	B.Ed. eighth

Instrument and Procedure

Ope-end questions were the instrument of data collection that contained the opinions, expectations, experiences, and the feedbacks of the learners for mathematics teachers to make

mathematics teaching more effective. A list of open-end questions was sent through messenger individually using a Google form. Since all the participants were in contact through Facebook messenger, phone numbers and emails as well, it was easy to send the questions and request to express the views on time.

Procedure of Data Analysis and Interpretation

The data has been analyzed using software by using thematic analysis procedure. According to Clarke and Braun (2017), there are six steps of thematic analysis: familiarization with the data, coding, searching for themes, reviewing themes, defining and naming themes, and writing up. I used ATLAS.ti9 as the software of qualitative data analysis to code the data and generate themes. At first, I transferred the data into Atlasti9 and highlighted the different 37 point of interests on the basis of research questions. After that, I generated the initial codes and combined different codes to search overarching themes. Conceptualizing codes as the building blocks and combining similar multiple codes to generate themes in relation to research questions is very important and critical stage in thematic analysis (Dawadi, 2021). After reviewing the codes, I renamed, merged and discarded some themes. Then, I defined the themes and discussed them.

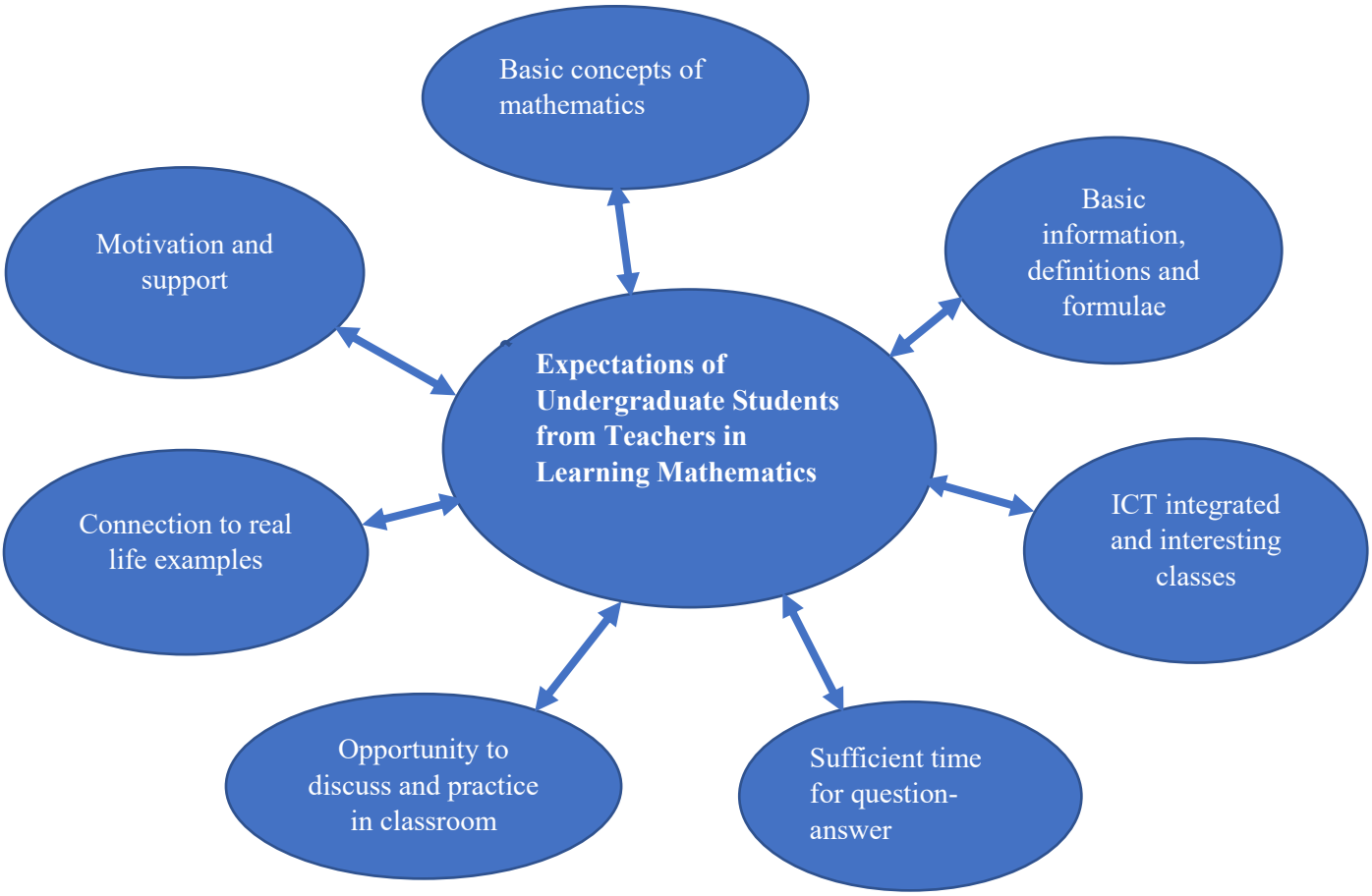
Findings and Discussion

This qualitative study explored the expectations of undergraduate students in learning mathematics. Open-end questions were sent through semester-wise messenger groups using Google form. Altogether twenty participants in this study represented each even semester of B. Ed. Program in Mathematics Education at Mid-west University, Nepal. The opinions of the participants are described as follows:

Table 1: *Familiarization of data*

Research questions	Codes	Initial point of interest
1. What are the expectations of undergraduate students in learning mathematics?	previous formulae, encouragement, explaining scope, connecting to daily life, basic concept, support, use of technology	19
2. How do the undergraduate students recommend teachers to teach mathematics effectively?	time to practice, discuss and question-answer, encouragement, interesting classes, real-life examples	18

The above multiple codes were reviewed and merged according to similarity and developed the following themes:



Theme 1: Motivation and Support

According to participant S_6, *"contents of mathematics in college level is different in nature and more theoretical than school level. So I expect more support to learn and encouragement from teachers to do better in future by taking major mathematics*." Likewise, participant D_4 told that *without support of teachers, students cannot get success in major mathematics. He also focused that teachers should clarify the scope and importance of university level mathematics courses.* The views of the learners indicate that they have a fear of failure and low grade in mathematics due to theory-based courses. The students of undergraduate level expect motivation and support to learn and get success in major Mathematics. Yıldırım (2012) also identified that teachers' motivation and support was positively related to learning strategy used in mathematics and this relation was mediated through self-efficacy and anxiety. Teacher support influenced student mathematics achievement indirectly through students' mathematics self-efficacy, and also influenced students' interest in mathematics courses (Yu & Singh, 2018).

Theme 2: Basic Concepts

Not only in mathematics, is basic concept of subject matter needed in each subject and content. According to the views of the participants, mathematical content of the university level is more abstract in nature and difficult to connect in daily life, but the teachers should try to clarify the contents by giving more and more examples. "*Teachers' duty is not only giving lecture, they should be updated in contents and try to satisfy the students by addressing their queries in classroom*" (participant L_8). This opinion indicates that students expect the expertise of teachers in contents and sufficient examples related to daily lives to take basic concept in mathematical contents. Most of the participants expressed their expectation on clarification of contents and expertise of teachers on the subject matters.

Theme 3: Basic Information, Definitions and Formulae

Most of the participants of this study expected the basic information, definitions and formulae before starting a new lesson on mathematics. Participant P_2 wrote, "*Most of the mathematics teachers start new contents/chapters without informing previous basic concepts. Teachers think that students have already learned that, but we have forgotten and expect to learn it again. We cannot question in the class due to hesitation*." Another participant D_2 shared, "*I feel hesitation to ask question because it seems that teacher thinks that I don't know that much" (मलाई प्रश्न सोध्न अप्ठ्यारो लाग्छ किनकि प्रश्न सोध्दा सरहरुले यत्ति पनि नजानेको भन्ने सोच्नु हुन्छ कि जस्तो लाग्छ).* This view indicates there is a hesitation on questioning in the classroom at the university level mathematics. Therefore, the learners expect all the required basic information from teachers to learn new contents easily.

Theme 4: ICT Integrated and Interesting Classes

Participants in my study expected ICT integrated classroom to learn mathematical contents effectively. One of the participants said, *"I feel bored when teacher enters classroom by taking daily note book as usual. Teaching mathematics by lecture is not interesting and effective. Teachers should change their teaching strategy to be a good mathematics teacher in 21st century*" (participant K_4). Integrating ICT in teaching-learning mathematics from school to university level is the need of developing countries, like Nepal in 21st century, although developed countries had already used ICT integrated pedagogy. In the developing countries like Nepal, there is still a lack of expert manpower in mathematical software to use in teaching-learning mathematics. Undergraduate students expect newness in classroom by using technology. Studies indicate that traditional lecture system at the university level has been the

cause of a high failure rate in mathematics. So, mathematics teachers at the university level should be expert in using technology and mathematical software to make classroom interesting. Estapa and Nadolny (2015) argue that technology provides teachers and students with opportunities to engage in mathematical learning. They also focused that technology helps in conceptual understanding and enhances student motivation in mathematics learning.

Theme 5: Sufficient time for Question-answer

In my own experience, most of the mathematics classes in university level runs through lecture methods. There is no more option for question-answer in the classroom. Generally, teachers start the classes, speak continuously and end the class after completion of the lesson. Students usually listen to the teachers' talk and take a note if they think important. According to participant G_6, "*neither the teachers ask nor we speak in our mathematics classes*. *Sometimes our teachers ask questions, but there is no opportunity of discussion among friends and teachers.*" This view indicates the traditional lecture method is mostly used at the university level mathematics teaching. The participants emphasized on at least 5-10 minutes for question-answer to make mathematics teaching effective. Teacher-student interaction affects mathematical understanding and involves the learners actively in learning activities (Ayuwanti & Siswoyo, 2021).

Theme 6: Opportunity to Discuss and Practice in Classroom

Classroom discussions and practices are the important aspects of classroom teaching of mathematics. It helps students express thoughts, listen others and remove errors and confusions. One-way talk-of-teachers without discussion makes classroom dull. Discussion also helps teachers to give basic concept on the subject matter. Likewise, problem-solving practices in the classroom helps students to ask teachers if any confusions arise. Undergraduate students can discuss on any new and unknown topic. Most of the participants of this study expected the opportunity to discuss and practice in mathematics classroom. Participant R_4 mentioned, "*There are many confusions on lesson that can be removed through discussion and practice in the classroom. We have no more time and opportunity to discuss in the classroom."* Classroom discussion also helps teachers to generate new strategy in teaching and helping students to ask teachers on time to remove confusions. Other participants also focused on the discussion among students and the discussion among students and teachers to make teaching effective and generate new ideas from the teaching-learning activities. They also emphasized

on classroom practices to remove confusions and ask teachers and friends question or seek help on time.

Theme7: Connection to Real-Life Examples

Most of the participants in this study expected real-life examples of new mathematical contents to learn mathematics easily. Students feel difficulty in learning mathematics at the university level because the content at the university level is more abstract in nature than at the school level. The learners also suggested that the teachers should try to connect the new concepts to real life situation as much as possible. One of the participants expressed his expectation as:

> *Usually, our teachers describe new mathematical contents without giving examples. It would be easy to understand the concepts if they could connect the contents to real life or previous known concepts. Sometimes our teachers provide example, but the examples could not be related to daily life. Without connecting the contents in real life examples, it is very difficult to understand and generalize in similar contents. So, the teachers should be more intelligent and experienced to connect every concepts in real life* (Participant K_8).

The above-mentioned themes regarding the expectations of undergraduate students indicate that the teachers should try to understand the learners' expectations and support the learners individually to learn mathematics. Most of the participants expressed their fear of failure and anxiety of future profession by taking major mathematics at the university level. In my perspective, all the mathematics teachers as well as the seniors should motivate the undergraduate students in early years of enrolment to learn mathematics meaningfully.

Conclusion

From discussion and analysis, it was found that the learners expect motivation and support as well as basic concept of subject matter in learning mathematics at the undergraduate level. It is also found that the participants expected sufficient time for question-answer, discussions, and practices in the classroom. Most of the learners expected that review of basic concepts, definitions, relations, and formula before starting a new lesson. It can be also concluded that the learners recommended the teachers to integrate ICT in teaching mathematics, and to provide the examples of daily life as much as possible in teaching new concepts of mathematics.

References

Ayuwanti, I., & Siswoyo, D. (2021). Teacher-student interaction in mathematics learning. *International Journal of Evaluation and Research in Education*, *10*(2), 660-667.

Chen, J.-c., & Cai, W.-t. (2009). Exploration of the learning expectations related to grades 1-8 algebra in some countries. *Online Submission*, *6*(1), 1-11.

Clarke, V., & Braun, V. (2017). Thematic analysis. *The Journal of Positive Psychology*, *12*(3), 297-298. https://doi.org/10.1080/17439760.2016.1262613

Dawadi, S. (2021). Thematic analysis approach: A step by step guide for ELT research practitioners. *Journal of NELTA*, *25*(1-2), 62-71.

Education, N. S. F. D. f., & Resources, H. (1996). *Shaping the future: New expectations for undergraduate education in science, mathematics, engineering, and technology* (Vol. 1). National Science Foundation, Division of Undergraduate Education.

Estapa, A., & Nadolny, L. (2015). The effect of an augmented reality enhanced mathematics lesson on student achievement and motivation. *Journal of STEM education*, *16*(3), 40-48.

Hirst, K., Meacock, S., & Ralha, E. (2004). Student expectations of studying mathematics at university. *Proceedings of the 27th Annual Conference of the Mathematics Education Research Group of Australasia (MERGA27)* Vol. 1, pp. 295-302).

Ignacio, N. G., Nieto, L. J. B., & Barona, E. G. (2006). The affective domain in mathematics learning. *International Electronic Journal of Mathematics Education*, *1*(1), 16-32. https://doi.org/ https://doi.org/10.29333/iejme/169

Jansen, H. (2010). The logic of qualitative survey research and its position in the field of social research methods. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, 11(2), 1-21. http://nbn-resolving.de/urn:nbn:de:0114-fqs1002110

Litster, K., MacDonald, B., & Shumway, J. (2020). Experiencing active mathematics learning: Meeting the expectations for teaching and learning in mathematics classrooms. In A. Appova, R. M. Welder, and Z. Feldman, (Eds.), Supporting Mathematics Teacher Educators' Knowledge and Practices for Teaching Content to Prospective (Grades K-8). *The Mathematics Enthusiast,* 17 (2 & 3), 615-640. https://doi.org/10.54870/1551-3440.1499

Ma, X. (2001). Participation in advanced mathematics: Do expectation and influence of students, peers, teachers, and parents matter? *Contemporary Educational Psycholog26*(1), 132-146. https://doi.org/https://doi.org/10.1006/ceps.2000.1050

Mura, R. (1987). Sex-related differences in expectations of success in undergraduate mathematics. *Journal for Research in Mathematics Education*, *18*(1), 15-24. https://doi.org/https://doi.org/10.5951/jresematheduc.18.1.0015

Sarala, N., & Kavitha, R. (2017). Fuzzy conjoint model in measuring students' expectation and teachers' beliefs on learning mathematics. *International Journal of Advanced Trends in Engineering, Science and Technology*, *2*(2), 6-10.

Stodolsky, S. S., Salk, S., & Glaessner, B. (1991). Student views about learning math and social studies. *American Educational Research Journal*, *28*(1), 89-116. https://doi.org/https://doi.org/10.3102%2F00028312028001089

Taleb, Z., Ahmadi, A., & Musavi, M. (2015). The effect of m-learning on mathematics learning. *Procedia-Social and Behavioral Sciences*, *171*, 83-89.

Warwick, J. (2010). Exploring student expectations in mathematics learning and support. *Teaching Mathematics and Its Applications*, *29*, 14-24. https://doi.org/10.1093/teamat/hrp030

Winter, R. (2022). I am a mathematician…. This reference is incomplete. Please, complete it.

Yıldırım, S. (2012). Teacher support, mtivation, learning strategy use, and achievement: A multilevel mediation model. *The Journal of Experimental Education*, *80*(2), 150-172. https://doi.org/10.1080/00220973.2011.596855

Yu, R., & Singh, K. (2018). Teacher support, instructional practices, student motivation, and mathematics achievement in high school. *The Journal of Educational Research*, *111*(1), 81-94. https://doi.org/10.1080/00220671.2016.1204260