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Investigating students' perceptions of self-directed learning in mathematics at the basic school level

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ABSTRACT

Self-directed learning (SDL) is an educational approach, where individuals take initiative and responsibility for their own learning, choosing what, how, and when to learn. It is assumed that SDL empowers students to tailor their educational experiences to personal interests and pace of learning, fostering autonomy and lifelong learning habits. This study aims to investigate on students' attitudes toward SDL in mathematics at basic school level using quantitative research design (survey). The data were collected from students using SDL attitude scale. Total papulation of the survey consists of students from six publics and eight private schools, out of which students from two purposefully selected schools from each category for the sample. From the four school, 120 students were selected. Attitudes towards SDL in mathematics scale developed by the researchers were applied to collect the data and were analyzed using SPSS version26 based on the research questions. The study revealed that students had negative attitude toward self-management, self-monitoring and self-motivation as required for SDL in mathematics at basic level school. Moreover, there is no significant difference in student's attitudes toward SDL in mathematics between public and private school, and between male and female students. The result shows that student's attitude towards SDL changes positively as they participated in different teaching learning techniques applied for engaging them in learning such as KWL, jigsaw, reciprocal teaching, think-share-pair, and cooperative, and collaborative instruction. This implies that negative attitude towards a pedagogical approach does not mean that students pay less attention to the approach but changes when applied appropriately.

Keywords: self-directed learning, mathematics, attitudes, basic level, instructional strategy

INTRODUCTION

Mathematics is omnipresence among different disciplines as a language and tools for their development. The development of science and technology resides on mathematical grounds, equally important to other subjects too. In addition, mathematical knowledge and thinking is a basic competency for a successful course. Schools is a formal set up for the preparation of individuals for daily needs and foundation in higher study in every field. With this contributing value of mathematics, it has a key position in school education all over the world. It is, therefore, considered as the queen of science (Burton, 2003). Moreover, it is assumed that mathematical power influences the process and learning outcomes of a person to achieve skills, attitude, and knowledge of other disciplinary areas of study and advancing mathematics discipline itself. It also aims to stimulate and motivate the achievement of students in interdisciplinary studies (Kusmaryono, 2004).

Despite the above mentioned fact, many students contemplate mathematics as a difficult subject (Yadav, 2017) and are indifference towards learning mathematics in each level from university to school (Pandit, 2007). In context of Nepal, series of studies conducted by education review office (ERO) on students achievements in mathematics indicate a consistent trends of poor achievements at school level and students' failed in school leaving certificate examination in three core subjects viz mathematics, science and English. ERO (2010, 2011, 2012) show the increasing failure rate of students 29.62% of students failed in mathematics in 2010, increased to 38.79% in 2011, and 42.09% in 2012. Similarly, ERO (2017) has made a periodic study on basic level students' achievement in mathematics, shows decreasing trend of mathematics achievement at basic school level grade eight. ERO (2017) reported that an average achievement score grade of class eight students in mathematics was 50.80% in 2015, whereas ERO (2020) reports that less than 32.00% of students meet competency in class eight, and one-third perform below the national average in mathematics (Pokherel et al., 2024; Poudel, 2020). This figure indicates that mathematics learning achievement declining trends has been continuing. ERO (2020) report mentions that students struggle to acquire basic knowledge and are unable to solve higher-order thinking problems. Pinpointing the causes, the report explains poor teaching environments, lack of qualified teachers, lack of remedial classes, traditional didactic teaching methods, and ineffective communication between school staff and

parents are contributing factors to declining mathematics achievement. Khanal (2015) argued that mathematics students at secondary school in Nepal has difficulty in understanding, investigating, and generalizing the mathematic situation, and it has increased the achievement scores in mathematics examination. Similarly, Panthi and Belbase (2017) figure that the enrollment of the student in mathematics from the school to the university level in Nepal is satisfactory, though the pass percentage is relatively low. These studies highlight the need of rethink on pedagogical approach of mathematics teaching at school level to make students self-confident in learning mathematics to grow them as an independent learner rather than be a teacher fed learner of mathematics. Further research is needed to introduce newer approaches to mathematics teaching to address the issues from the basic school. Basic school level students' mathematics learning and their performance can be an important factor for poor achievement at secondary level.

Two mathematics classes were observed to understand the current classroom teaching environment in secondary school if there is improvement in classroom pedagogy or not. Observation shows that teachers are using a non-interactive teaching approach, with teachers focused, using maximum time in providing solutions on white-board, without using alternative methods of engaging students on thinking and sense making in solving problem, leading to student's indifference towards learning mathematics. So, in this context of mathematics learning, new pedagogical approach should be introduced, which make students engage themselves and become active in learning process. In the present landscape of mathematics learning, self-directed learning (SDL) approach can be a transformative pedagogical approach that makes students active and engaging. SDL is a process, where students make the key decision regarding how to plan, continue, and evaluate their educational experience (Merrian et al., 2007). Moreover, in SDL, learners take charge of determining their own learning requirements, setting objectives, locating resources, putting tactics into practice, and assessing learning results. Borich (2011), Burke (2006), Knowles (1975), and O'Shea (2003) confirms that SDL helps students to think critically, reason, solve issues, and feel more independent and self-driven in learning. In order to achieve desired results, SDL calls for students to assume responsibility for their own learning (Pham, 2011). SDL is an active approach that encourages students to play an engaged role in their own learning and promotes the development of higher-order thinking skills (Borich, 2011). It also nurtures their creative and intuitive abilities. According to Hamlet (2006), SDL becomes meaningful when students take the initiative to plan and initiate their learning independently. Learners engaged in SDL exhibit characteristics such as setting clear goals, demonstrating self-motivation, self-assuredness, self-control, a proactive attitude, and a willingness to absorb new knowledge (O'Shea, 2003). Self-directed learners are confident and responsible with metacognitive skills in learning process, which makes engaging and autonomous learning (Askin & Denirel, 2018; O'Shea, 2003; Oswalt, 2003). SDL assumes that learners actively participate in the planning, engaging themselves in learning process refers to a student's readiness to participate in learning activities defined by the student rather than by the teacher, helps a student to develop life-long learning skills (Nerali et al., 2016). Through SDL approach, students can conjure up ideas and make decisions based on their judgment and reasoning with the help of a teacher (Agustiani, 2019). Therefore, a deep study is needed to determine the students' attitudes towards their own readiness and beliefs in shifting the didactics, confidence on using their knowledge and skills in planning for their own learning specially focused on domain-specific attitudes towards learning needs, readiness, and confidence in learning. So, identifying students' attitude is the preliminary preparation need to introduce a new pedagogical experiment in the present context as a replacement. This study is focused on what is students attitudes in mathematics classes have, in order to facilitate engaged, self-directed and meaningful learning, and recognizing the need for innovative approaches to counteract the prevalent challenges observed in traditional teaching settings.

Moreover, attitude measurement is the process of getting information, which can be subjected to analysis and relate to the process of measuring an individual towards an object. Attitude is the degree of positive and negative affect associated with the object (Bagdi et al., 2021). In this research, attitude measure to analyses the degree of positive or negative feeling, opinion, and action of students towards SDL based on self-motivation, self-monitoring, and self-engagement. Identifying positive or negative attitude is an important factor for planning and implementing meaningful SDL learning approach in school mathematics classroom. Positive attitude increases the students' academic performance in mathematics and attitudes of students toward mathematics affect how well they perform in the subject and how often they engage in the subject (Capuno et al., 2019). In this regard, student's positive attitude toward SDL plays a vital role that they actively learn mathematics, furthermore student's attitudes change knowledge, skills and comprehension for promoting meaningful learning (Byrne et al., 2020). In the same vein, Auliana and Hadijah (2022) argued that identifying attitude of students is one of the main factors for promoting learning mathematics in school and positive attitude towards SDL to improve students' academic performance. Concerning this issue, this study investigates on attitudes toward SDL mathematics at basic school level.

In course of preparing attitude scales, A focused attribute is needed for a learning and level specific attitude measurement. As it is concerned with the basic level students, SDL approach should proceed on from teacher guided engagement to self-engagement of the students in learning as goal of pedagogical engagement. Grow (1991) contends that SDL often commences with teacher-directed instruction, but over time, the responsibility for learning gradually shifts from the teacher to the learner. In the current mathematics teaching scenario, teachers are primarily focused on coaching and evaluation, while SDL involves teachers as motivators, need analysts, counselors, organizers, facilitators but not a coach (Brandt, 2020; Hamlet, 2006). The shift towards SDL is crucial for promoting students' learning engagement and ownership of their learning in current mathematics classroom. Moreover, successful SDL implementation demands appropriate learning management of the major components of learning such as self-management, self-monitoring, self-motivation, and SDL environment (Garrison, 1997). Students' attitudes to engagement in each components plays significant roles for reaping the benefit. Self-monitoring includes being aware of one's own weaknesses, linking pieces of information when learning, paying attention to all details before planning, setting goals, correcting oneself when one makes a mistake, being a responsible person, judging one's own abilities fairly, thinking deeply when solving a problem, and establishing criteria to evaluate one's own performance (Fattah, 2010). Self-monitoring start with students' awareness of their own learning progress and students set their own learning objectives and goals, and self-monitoring enables

them to measure their progress toward these objectives, keeping them on track (Garrison, 1997; Knowles, 1975). Self-motivation involves accepting learning challenges, taking progress, learning from mistake, enjoying learning, and trusting ability (Fattah, 2010). Self-management involves learning autonomy and willingness to contract for proceeding in learning (Song & Hill, 2007). It includes structured learning, time constraints, excellent time management, planned problem-solving, job priorities, and the ability to efficiently arrange one's own learning (Fattah, 2010). SDL environment contains teaching environment, learning environment and the technology and administrative supports (Rashid et al., 2016).

In a nutshell, SDL is grounded in theoretical foundations that emphasize the key components of self-motivation, self-management, self-monitoring, and a conducive SDL environment. Self-motivation involves transitioning from induced motivation to intrinsic motivation for fostering students' inner drive for learning. Self-management signifies the shift from teacher-managed to student-managed learning tasks, promoting autonomy and efficient task management.

Self-monitoring encourages students to assess their progress, engage in metacognition, and maintain engagement and responsibility for their learning. SDL environment encompasses a supportive teaching environment, flexible learning options, effective use of technology, and administrative support. These components are interrelated and work together to create an environment, where students take ownership of their learning, set goals, manage their time, collaborate, and engage deeply with mathematics content, ultimately fostering SDL. So, these factors are considered while assessing students' attitudes towards SDL approach before implementation in advance.

Examining SDL attitudes in mathematics classes at the basic school level is a fundamental requirement for planning the intervention comprehending the ways in which these elements interact and support students' capacity to take charge of their learning, establish objectives, and actively engage with mathematical ideas, thereby improving the learning process in the context of basic school. Concerning this issue, this study is focused on investigating attitudes toward SDL mathematics on basic level.

STATEMENT OF PROBLEM

Student's meager achievement, distraction to mathematics learning, teachers' unwillingness to change teaching method are the current issues of mathematics education. Studies suggest that pedagogical transformation can be one of the major factors that can improve lower achievement in mathematics. The concern now is how effectively students accept and engage in the new pedagogical approaches, SDL, in place of the ones they are accustomed from years of schooling in which they get more from students and engage too less in thinking and working while learning mathematics. Students' attitude towards SDL approach associated teaching methods, techniques related components is important to practice this approach.

The current problem is the ineffectiveness of teacher-centered pedagogical approach in teaching mathematics in Nepali Basic schools. This approach results in low student engagement, understanding, and interest in mathematics. To address this issue, there is a need to investigate on attitudes toward SDL mathematics on basic level as basic information for planning a pedagogical approach for SDL for school age students. SDL for adult may not fit to the cognitive and social development level of school age children. So, it needs to devise a new pedagogical approach empirically verified and justified for the extensive implementation for school age children.

OBJECTIVE OF STUDY

Keeping in view the lower performance of the students in mathematics under the above discussed phenomenon, the objective of this study is to investigate the student's attitude toward SDL in mathematics at basic level.

Research Questions

In reference to the objective of the study, the article is based on the following research questions.

1. Do the students studying in public and private schools have different attitude on self-management, self-monitoring and self-motivation for mathematics learning?
2. Does the gender makes difference in attitude in learning mathematics through the self-directed approach?

DELIMITATIONS OF STUDY

The delimitation of the study are, as follows:

1. The attitudes towards SDL to achieve the higher marks in mathematics is based in sampling in the schools of Pokhara valley. The schools selected for sample constitute of private and public schools located in Pokhara Metropolitan City; one and two.
2. The measure of attitude toward SDL based on SDL scale (attitudes towards self-directed learning in mathematics [ATSDLM]) modifying from Fattah's (2010) attitude scale.
3. The tools is questionnaire method. The measure of self-management, self-motivation and self-monitoring is through the questionnaire listed in **Appendix A**.

METHODOLOGY

Methods

The study is based on quantitative research design to determine the student's attitudes on SDL. A survey design is an efficient method for collecting data from a small population size, as it allows for quick and easy administration, timely data collection, and reliable comparisons (Creswell, 2013; Fowler Jr, 2013). The present study is the background for searching out the students' attitude towards the constructs of self-directed in the present context. We had used standardized instrument (ATSDLM) enables reliable comparisons and analysis of responses, despite the small sample size (Auliana & Hadijah, 2022; Babbie, 2016). Hence, this design is well-suited for studying students' attitudes towards SDL in Pokhara Metropolitan City wards one and two, despite the small sample size. The data is collected from primary sources through SDL attitude scale (constructed by researcher) and students. The secondary sources include reviews of related literature, books, journal articles, research papers, forum, dissertation, and online documents.

Population & Sample

The population of the study consists of all the grade eight students studying at basic schools of Pokhara Metropolitan Ward No 1 and Ward No. 2. Multi-stage sampling method is used to select sample students for the study. First stage sampling is purposive for selecting the schools. Creswell (2013) explains that "in purposeful sampling, researcher intentionally select individual and sites to learn or understand the central phenomena" (p. 206). There were six public and eight private schools in Ward No.1 and Ward No.2. Two school one from each category were selected with the purpose of making their student demography, achievement level and the available physical and educational facilities compatible for comparison. All the students studying in grade eight of the selected public and private school were the sample students for the survey. The sample size is 120 students, 65 were from private and 55 were from public school.

Research Tools

This study has used a questionnaire prepared in Likert scale as a survey tools. The questionnaire on attitude test consists of components: SDL, induced motivation to self-motivation, teacher managed to self-management of learning tasks (self-management); guided to self-monitoring (self-monitoring) (Fattah, 2010; Garrison, 1997). We used attitude scales of the scholars Fattah (2010), Garrison (1997), Guglielmino (1977), Gunduz and Selvi (2016), and Knowles (1975) related to SDL. The attributes used in these scales are in majority similar however, we used Fattah's (2010) attitude scale with modification and validation. This scale was developed for adult in different context and population necessitates adjustments to ensure its relevance to school students at basic school level particularly for learning mathematics. Fattah (2010) scale consists of 26 statements adjusted and created 16 statements and named ATSDLM scale. It is a five-point Likert-scale with five response options: strongly agree (SA), agree (A), undecided (U), disagree (D), and strongly disagree (SD), with each item score range from one to five, respectively. The mean weight of mention points is three. Each statement is favorable or positive if the score is less than three, equal three neutral and negative(unfavorable) if the score is greater than three based on ATSDLM scale (Bagdi et al., 2021). The survey slip format is kept in **Appendix A**.

Reliability & Validity of Tool

Reliability and validity of ATSDLM were established with expert judgement for face validity and Cronbach's alpha for internal consistency of the scales. Face validity is defined as the degree of expert's judgement response to which items of measurement are appropriate to meet objectives of assessment and construct (Alreshidi, 2016). The prepared tool was given to three experts for checking and to give their views. The expert's remarks were carefully incorporated. After piloting the revised ATSDLM among students and internal consistency for sub-scale tests had used to test the reliability. Cronbach's alpha measures internal consistency, indicating the interrelatedness of test items. Cronbach's alpha score range 0.70-0.95 is acceptable (Alreshidi, 2016). It's attitudes scale (ATSDLM) is 0.84, which is in acceptable range.

ANALYSIS & INTERPRETATION

Data obtain on attitude measuring scale (ATSDLM) from the students were analyzed through SPSS. All analyses were carried out using IBM SPSS v22 and was interpreted based on the research questions.

Summary of Respondent Demography

The component of SDL attitude is based on self-management, self-monitoring, self-motivation and SDL environment (Garrison, 1997). Self-management involves learning autonomy and willingness to contract education (Song & Hill, 2007). It includes structured learning, time constraints, excellent time management, planned problem-solving, job priorities, and the ability to efficiently arrange one's own learning (Fattah, 2010). SDL environment contain teaching environment, learning environment and the technology and administrative supports (Rashid et al., 2016). It involves their willingness to start engaging with mathematical content or activities. Induce motivation focus to self-motivation involve accepting learning challenges, taking progress, learning from mistake, enjoying learning and trusting ability (Fattah, 2010). Self-monitoring includes being aware of one's own weaknesses, linking pieces of information when learning, paying attention to all details before planning, setting goals, correcting oneself when one makes a mistake, being a responsible person, judging one's own abilities fairly, thinking deeply when solving a problem, and establishing criteria to evaluate one's own performance (Fattah, 2010). Under those component and

Table 1. Population distribution (n=120)

	School		Gender	
	Private	**Public**	**Male**	**Female**
Number of students	65	55	65	55

Table 2. Attitude related to self-management for learning of public & private schools

No	Statement	ST	Response					WM	Notes
			1	**2**	**3**	**4**	**5**		
1	I am well-organized in mathematics learning.	Public	1	9	12	24	19	3.56	Unfavorable
		Private	3	11	6	24	21	3.75	
2	I have strict time frames to learn new mathematics concepts.	Public	1	5	12	27	10	3.75	Unfavorable
		Private	4	8	5	26	22	3.83	
3	I have trouble managing my time effectively for mathematics tasks (I always managing my time effectively for mathematics tasks).	Public	13	4	12	4	22	3.32	Unfavorable
		Private	6	5	9	34	11	3.6	
4	It's challenging for me to decide the priority of my work (it's easy for me to decide the priority of my work).	Public	1	13	4	5	32	3.98	Unfavorable
		Private	10	1	8	11	35	3.92	
5	I make plan for my own learning.	Public	1	2	13	21	18	3.96	Unfavorable
		Private	4	6	11	30	14	3.68	
			Frequency			STD			
Total self-management for SDL of private school		Public	55			0.468		3.97	Unfavorable
		Private	65			0.465		3.76	

Note. SC: School type & WM: Weighted mean

attitudes scale, we had analyzed each component based on school and gender. The research questions for the study and their analysis is given below.

The study of SDL is centered to attitudes of SDL in mathematics. To meet this objective, different variables were considered that were measured through following indicators mentioned in **Table 1**. In coding system, negative statement coded reverse order of responses and all negative statement convert in positive statement in each table.

Attitude Related to Self-Management for Learning in Public & Private Schools

For above mention research question, mean weight was used for analysis. Calculated mean weight is equal to or greater than three, it assumes that students had negative attitude toward self-management for SDL. From **Table 2**, It can be interpreted that the student disagrees for well-organized mathematics learning, strict timeframes to learn new mathematics concepts, trouble managing time effectively for mathematics tasks, plan for own learning, but agree for challenging to decide the priority work for both public and private schools in average mean of self-management for SDL for public school in case of mathematics is 3.97, whereas it is 3.76 for private schools. This value is unfavorable for SDL. It can be concluding that the students had negative attitude toward self-management for SDL in mathematics in both types of schools. Also, standard deviation (STD) is, respectively, 0.465 and .468 in self-management for mathematics learning for the case of public and private schools. There is a significant difference in student's attitudes toward self-management for SDL in mathematics between public and private school by using t test at 0.05 level of significant. It concludes that self-management for SDL in mathematics of public school is greater than private school.

Attitude Related to Self-Motivation for Learning in Public & Private Schools

For this research question also mean weight was used to for analysis with the similar connotations. From **Table 3**, we can see that student disagree on enjoying learning new mathematics concepts. This creates the challenge to learn mathematics, to analyze new ideas, check mathematics learning progress by own-self and to trust own abilities to learn new things related to mathematics. The mean of self-motivation for SDL in mathematics for public schools is 3.67, whereas it is 3.63 for private schools and both conditions are unfavorable for SDL. Thus the students had negative attitude toward self-motivation for SDL in mathematics in both public and private schools. Also, the respective STD are 0.477 and 0.468, respectively for mathematics learning. There is no significant difference in student's attitudes toward self-motivation for SDL in mathematics between public and private school at 0.05 level of significance.

Attitude Related to Self-Monitoring for Learning Mathematics in Public & Private Schools

The measure self-monitoring was done through similar process as self-management and self-monitoring. From **Table 4**, students are disagreeing on being aware of their own weaknesses in learning mathematics, think deeply in solving mathematics problem, set goals in mathematics learning, and responsibility for own learning mathematics. The mean of monitoring for SDL is in public schools is 3.67 and for private schools it is 3.78. The results are unfavorable for SDL for both public and private schools. Thus the students had negative attitude toward self-monitoring towards SDL in mathematics in both types of schools. Also the respective STD are 0.488 and 0.575, respectively for mathematics learning. There is no significant difference in student's attitudes toward self-monitoring for SDL in mathematics between public and private school at 0.05 level of significance.

From the above results, Self-management, self-monitoring and self-motivation toward SDL of mathematics in public and private school are negative, which is unfavorable to SDL.

Table 3. Attitude related to self-motivation outcomes for learning in public & private schools

No	Statement	ST	Response					WM	Notes
			1	2	3	4	5		
1	I enjoy learning new mathematics concepts.	Public	5	9	3	23	15	3.62	Unfavorable
		Private	4	11	4	24	22	3.75	
2	I face the challenge to learn mathematics.	Public	1	13	3	30	8	3.56	Unfavorable
		Private	6	13	5	18	23	3.60	
3	Occasionally, I analysis new mathematics ideas and knowledge (I always analysis new mathematics ideas and knowledge).	Public	2	16	10	29	8	3.38	Unfavorable
		Private	2	16	10	29	8	3.38	
4	I do not always check my mathematics learning progress as I should (I always check my mathematics learning progress as I should).	Public	3	9	18	14	11	3.43	Unfavorable
		Private	3	12	12	24	14	3.52	
5	I would like to learn mathematics from my mistakes.	Public	7	11	4	18	15	3.84	Unfavorable
		Private	5	9	2	31	18	3.74	
6	I trust my abilities to learn new things related to mathematics.		2	7	10	15	21	3.76	Unfavorable
			2	4	18	23	18	3.78	
			Frequency			STD			
Total self-motivation for SDL of private school		Public	55			0.477		3.67	Unfavorable
		Private	65			0.468		3.63	

Note. SC: School type & WM: Weighted mean

Table 4. Attitude related to self-monitoring for learning of public & private schools

No	Statement	ST	Response					WM	Notes
			1	2	3	4	5		
1	I am aware of my own weaknesses when learning mathematics.	Public	2	10	4	22	17	3.76	Unfavorable
		Private	2	3	14	33	13	3.80	
2	I think deeply when solving mathematics problem.	Public	6	10	3	21	15	3.53	Unfavorable
		Private		10	4	28	17	3.61	
3	I do not like to set up my goals in mathematics learning.	Public	2	6	14	13	18	3.67	Unfavorable
		Private	1	6	17	31	10	3.66	
4	Sometimes, I doubt my ability to learn in mathematics (I always clear of my ability to learn mathematics).	Public	5	1	12	9	22	3.65	Unfavorable
		Private	1	4	21	13	25	3.87	
5	I take responsibility for learning mathematics.	Public	2	3	16	20	14	3.74	Unfavorable
		Private	3	8	11	7	35	3.96	
			Frequency			STD			
Total self-monitoring for SDL of private school		Public	55			0.488		3.67	Unfavorable
		Private	65			0.575		3.78	

Note. SC: School type & WM: Weighted mean

Table 5. Comparison of mean & standard deviation

	Category	Mean	Standard deviation
Self-directed learning	Private	3.72	0.273
	Public	3.77	0.330
	Male	3.60	0.282
	Female	3.62	0.321

Analysis of Self-Directed Learning

SDL attitude is composition of self-management, self-motivation and self-monitoring to ward learning mathematics. I had developed 16 statements related to SDL base on those components. Some statements are negative but in codding it manage reverse order of response. Respondents were given five options on a Likert scale: strongly agree (one), agree (two), undecided (three), disagree (four), and strongly disagree (five), each item scored from one to five. Using those scores, weight mean, and average mean was calculated. If the calculated mean weight is equal to or greater than three, it indicates the problems. The weighted mean of SDL in mathematics is 3.75, which is greater than three. So basic level students have negative attitudes toward SDL in mathematics.

Interpretation of Attitude Toward Self-Directed Learning for Mathematics Learning in Public & Private Schools

There were 65 public and 55 private school students whose mean of SDL are 3.77 and 3.72 with respective STD are 0.330 and 0.273, respectively. There is no significant difference in student's attitudes toward SDL in mathematics between public and private school at 0.05 level of significance. It concludes that for SDL in mathematics is not significant.

Interpretation in Gender Basis

From **Table 5**, the mean of male and female are 3.60 and 3.62 with STD 0.282 and 0.321, respectively in SDL for mathematics learning, which is greater than three. So basic level male and female students have negative attitudes toward SDL in mathematics. Moreover, there is no significant difference in student's attitudes toward SDL in mathematics between male and female at 0.05 level of significance. It concludes that for SDL attitude in mathematics is not significant.

For develop positive attitudes for SDL in mathematics at basic level school, we used self-directed strategy, which make empowers students to take control of their learning, engaging, fostering autonomy, motivation, and self-responsibility (Bosch & Pool, 2019; Francom, 2009; Golightly & Guglielmino, 2015; Grow, 1991). For develop positive attitudes toward SDL, to established teacher training and professional development in SDL based on reflective and critical model. Moreover, teacher use a constructive and collaborative approach in teaching mathematics for develop metacognitive strategy in teaching mathematics (Bishara, 2021). Furthermore, instructional strategies like KWL, think-dhare-pair, brainstorming, cooperative teaching and learning, jigsaw, and reciprocal, which empower students to engage in self-assessment, goal setting, independent thinking, collaboration, in-depth exploration, and teaching others, fostering critical thinking and SDL (Fattah, 2010; Leach, 2000). Hence, I suggest that teacher should use self-directed pedagogy with guided, collaborative and cooperative instruction in mathematics teaching in basic level, students develop positive attitudes toward SDL. Moreover, SDL demands certain attitude and commitments from the parts of the students. Without student preference if a teacher implement self-directed/engaged learning cannot be effective. The results of the study conclude that students' attitude is negative to their self-engagement in learning activities, meaning that they expect much support from the teacher. This shows that it is necessary to create at first the positive attitude towards SDL with a modified approach of SDL.

RESULTS & DISCUSSION

Some important facts emerged during the course of study:

1. Students have negative attitude toward self-management, self-motivation and self-monitoring for SDL in mathematics in both public and private schools and thus is unfavorable for SDL.
2. The weighted mean of total SDL in mathematics is 3.75, which is greater than three. It indicates that basic level students have negative attitudes toward SDL in mathematics.
3. There is no significant difference in student's attitudes toward self-management, self-monitoring and self- motivation in SDL in mathematics among public and private school according to t test at 0.05 level of significant.
4. There is no significant difference in student's attitudes toward SDL in mathematics between public and private school and also within male and female at 0.05 level of significance.

CONCLUSIONS

The current problem is the ineffectiveness of teacher-centered pedagogical approach in teaching mathematics in schools. This approach results in low student engagement, understanding, and interest in mathematics. To address this issue, my research objective is investigating the student's attitude toward SDL in mathematics at basic level. The present study is based on quantitative research design (survey) to find students attitudes about SDL at basic school. On the basis of the findings, I concluded that Students had negative attitude toward self-management, self-motivation and self-motivation for SDL in mathematics at basic level school. Moreover, there is no significant difference in student's attitudes toward SDL in mathematics between public and private school at 0.05 level of significance and same vein, no significant difference in student's attitudes toward SDL in mathematics between male and female at 0.05 level of significance.

For develop positive attitudes for SDL in mathematics at basic level school, we used self-directed strategy, which make empowers students to take control of their learning, engaging, fostering autonomy, motivation, and self-responsibility. The results of the study conclude that students' attitude is negative to their self-engagement in learning activities, meaning that they expect much support from the teacher. This shows that it is necessary to create at first the positive attitude towards SDL with a modified approach of SDL.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from the author.

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APPENDIX A

Table A1. Scale of ATSDLM

Factors	Attitude toward SDL	SA (1)	A (2)	U (3)	D (4)	SD (5)
Self-management for learning	1. I am well-organized in my mathematics learning.					
	2. I set up strict timeframes to learn new mathematics concepts.					
	3. Sometimes, I have trouble managing my time effectively for mathematics tasks.					
	4. It's challenging for me to decide the priority of my work.					
	5. I make plan for my own learning.					
Motivation for learning	6. I enjoy learning new mathematics concepts.					
	7. I face the challenge to learn mathematics.					
	8. I often analysis new mathematics ideas and knowledge.					
	9. I do not always check my mathematics learning progress as I should.					
	10. I would like to learn mathematics from my mistakes.					
	11. I trust my abilities to learn new things related to mathematics.					
Self-monitoring for learning	12. I am aware of my own weaknesses in learning mathematics.					
	13. I think deeply when solving mathematics problem.					
	14. I do not like to set up my goals in mathematics learning.					
	15. Sometimes, I doubt my ability to learn in mathematics.					
	16. I take responsibility for my learning in mathematics.					