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Interactive Class Talk and the Development of Transversal Competencies among Seventh Grade Science Students

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Abstract

Development of transversal competencies is crucial for employee's endurance in the 21st century job market. The education system promises the development of these skills. It is vital to explore the classroom talks suitable for the development of transversal competencies at school level. This study aimed at exploring the talk in science classroom and respective developed transversal competencies among 7th grade students (11-12 years age). It was mix-method sequential design to achieve the devised objective. The population was science teachers teaching at grades 6-8 and their students. Ten teachers teaching through interactive talk were purposively selected along with their students (255). The nature of teacher's talk used in the classroom was marked on the observation sheet during their teaching. Students were assessed of skills, reflective thinking skills, communication skills and teamwork via observation sheet. Both teachers and students were interviewed to explore the underlying reasons certain initiation, student-initiation, response and feedback with some other moves were observed during teaching. While interviewing teachers reported student's active involvement, in classroom discussions, is enriched source of student's as well as teacher's development. However, they highlighted administrative constraints, overcrowded classes, workload of teachers, lack of time and trainings. It is found that exploratory and explanatory talks develop communication skills, responsibility and organizational skills among students. While questioning and involvement in discussions cause reflective thinking, teamwork and communication skills development. It is concluded that interactive class talks are suitable for development of transversal competencies at elementary school level. The students should be engaged in collaborative classroom activities and develop a culture to involve them personally in the process of holistic development.

Keywords: Class talk, sense of responsibility, teamwork, reflective thinking, communication skill, organization skill

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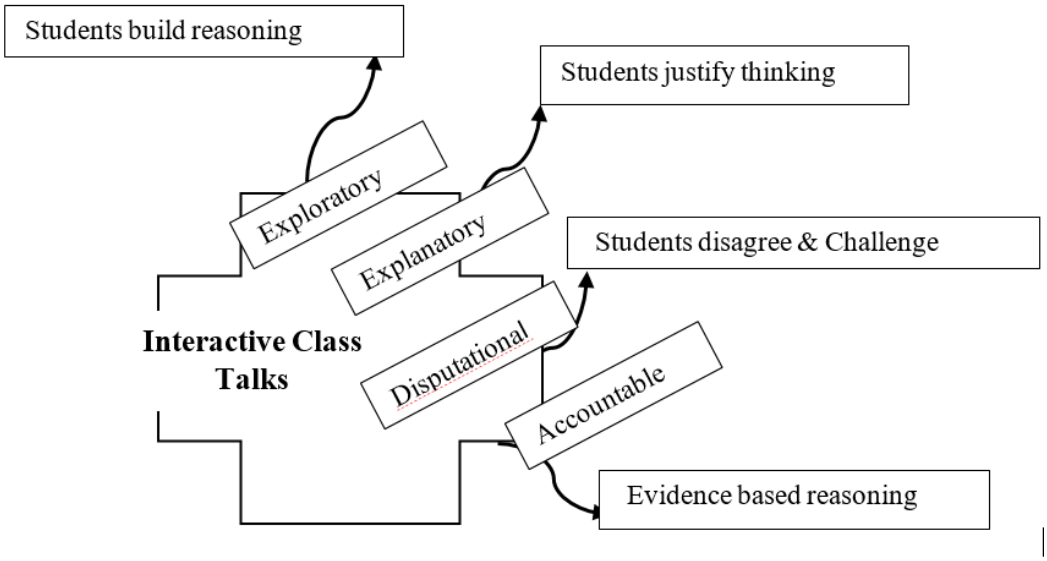
Introduction

Development of transversal competencies among 21st century students is crucial (Novak, 2024). It is evident from various frameworks proposed time by time to define them under one umbrella like, DigComp, OECD Competency Framework, EntreComp, 21st Century Skills, LifeComp, European Framework for Key Competencies, Skills Framework for the Information Age (SFIA), Employability Skills Framework, Competency Framework by the World Economic Forum and Transversal competencies Framework by ERI-Net (Shaheen, 2023). All these frameworks are contributing to making and understanding of the wider landscape of transversal competencies and demand to inculcate among students (Osipovskaya & Coelho, 2024). Transversal competencies development is demanded by 21st century employers (Shaheen, et al., 2023). Individuals with such skills can contribute efficiently to their careers in a variety of organizations (Belchior-Rocha, et al., 2022) like education, healthcare, politics, leadership, consultancy, advertising, marketing, charity and voluntary work etc.

The social constructivist point of view of talk has been well known since long it's also endorsed by many educationists like Vygotsky (1978). Educationists have been working on exploration of class talk from both teachers and students' perspectives for its significance (T'Sas & Daems, 2024). However, still there are many areas to be explored for its efficient and productive input into the field of classroom development. Firstly, the concept of students centered talk in which they jointly construct knowledge with dialogue and hypotheses formulation and testing to reach consensus, was introduced by Douglas Barnes (Barnes, 2010). With implementation and domination of social constructivist point of views it is further refined and explored by researchers like, Iqbal & Mahmood (2020).This research also has its roots in Vygotsky's social constructivism, dialogic teaching frameworks. Interactive talk occurs when students get involved in sharing and construction of ideas in classroom discourse (Clark, 2024).It is considered as conversational practice in which students are encouraged to participate, share ideas and listen each other's opinions constructively and critically with specific focus to reach agreed upon solution of problem (Shaheen, 2024).By providing students with talk opportunities in classroom allow them to induct the contextual knowledge and generate or construct new one aligned with fresh knowledge gained (Alexander, 2004).The significance of talking opportunities for overall development of children emphasizes the need of adding listening and speaking collaborative activities for teaching in national science curriculum (Sutherland, 2006). It can take any suitable form like; accountable talk, exploratory talk, disputational, explanatory or cumulative talk (Muhonen, et al., 2020).



Demand of individuals with well-developed transversal competencies has enforced the policy makers, curriculum developers and educators to integrate latest interactive practices in classroom learning environment. The education system has dynamically shifted their focus from teacher driven to student centered teaching approaches (Donkoh & Amoakwah, 2024). In order to equip learners with capabilities and skills needed to adapt in various dynamic situations employing logical reasoning, reflective thinking and extraordinary impressive communication skills. This shift of focus has opened the avenues for an active and interactive learning environment for students where the teacher plays the role of facilitator and guide to smoothen the learning process for learners. To cope up with the needs of 21st century students need to be an intelligent problem solver utilizing maximum of their reflective, rational thinking and reasoning (Thornhill-Miller, et al., 2023). Utilizing student's individual or group explorations within learning environment can strengthen said skills of the students. Learning is meant to be personalized and student driven ending at attainment of fully developed individual with exquisite communication skills, team spirit and reflection (Nouman, et al, 2024).

Suparno, et al, (2018) found that exploratory talk is an interactive strategy for students in which they investigate at their own liable to their learning while solving contextual problem (Mavrikis, et al., 2022). Interaction and involvement of students in the real-world problem increased their interest and demanded the utilization on their logical thinking and communication along reflective practices to come up to the right solution with the help of teachers which ultimately enhance their learning and applicability of lifelong learning to real life situations (Kutbiddinovaa, et al., 2016). Group work is suitable with respect to active and interactive participation of students in

their own learning. Students utilize their cognitive abilities in supportive environment (Almulla & Al-Rahmi, 2023) in sorting of information, making connections and links between information set and reaching the correct solution in light of previous knowledge body and involvement of continuous reflection. Hence logical questioning, explanatory talk and exploratory talk are the best initiative of teachers to strengthen student's communication, logical and reasoned decision making along habit of reflective practices (Budiwati & Yuliyanti, 2017). Exploratory talk is contextual teaching and involves reflection and improves logical reasoning of the participants of the activity (Kuzle, 2015) hence helps in development of communication, reflective thinking and responsibility.

A South Texas based case study narrated by Novak (2024) on secondary school students explored that soft skill education is crucial for development of 21st century students. An individual well developed on transversal competencies can diligently bear workplace readiness, demands, challenges and pressures. Social interaction is not only significant for development of organizational skills, communication, reflective thinking at secondary level. It is equally significant for the development of stated workplace skills at elementary level. It is evident from the research studies conducted in Asian settings (Shaheen, et al., 2024). It is also found in a mix-method study that social interaction triggers the development of reasoning skills among young learners (Iqbal & Mahmood, 2020). Teacher's questioning during teaching instigates students thinking process and becomes source of communication and reflective thinking development among corresponding students.

Social collaborative activities while teaching mathematics and science promote student's analytical, reflective, creative, interpersonal, communicative and teamwork abilities to solve variety of real-life problems (Vauras, et al., 2019). Science teachers play an important role in development of habits of reflection and to think about thinking and communicating to audience in students at elementary and secondary levels (Zhu, et al., 2024). Exploratory talk ensures students interaction, reflection and reasoned decision making (Pleschová & McAlpine, 2024). Considering the importance of transversal competencies development among students at school level, this study was conducted with objectives.

- To identify the nature of talk during science teaching and development of transversal competencies among students.
- To explore reasons of employing certain type of class talk by science teachers and corresponding competencies developed among students.
- To explore student's experience of interactive class talk and corresponding transversal competencies development.

Following research questions were formulated to achieve these objectives;

1. What is the direction and nature of association between class talk and development of transversal competencies (organizational, reflective thinking, communication, teamwork, sense of responsibility) in science students at elementary level?
2. What is the teacher's stance about reasons behind nature/direction of relationship between class talk and developed transversal competencies?
3. Why teachers prefer to involve student's during their teaching?
4. How students attribute certain types of talk and corresponding transversal competencies?
5. Why students like to participate in interactive classroom learning environment?

Methodology

Populations and Samples

Two populations in this study consisted of science school teachers and seventh grade students. Science teachers (N = 98) of grade 6-8 students in public schools in a metropolitan city of Pakistan and the ages of these students ranged from 11-14 years. A purposive sample of n =10 teachers were selected to collect quantitative data on interactive class talk. All teachers were similarly qualified and held positions (BPS-15) administered by Education Department of the Punjab Government. Age of teachers ranged between 36-39 years, their periods ranged between 30-42 per week, class time between 35-45 minutes and their class sizes between 30-45, (Table 1). The second population comprised of all seventh-grade students (N = 8000) that were under the tutelage of these science teachers. A purposive sample (n = 255) of seventh grade students was taken from the population to document transversal competencies development among them.

Table 1
Demographics of the Teachers in the Qualitative Study

Alias	Age	Gender	Periods/week	Class Time (Min)	Class Size
Alpha	36	F	30	35	39
Beta	37	F	36	35	37
Delta	39	F	30	45	39
Zeta	37	F	42	40	30
Eta	38	F	35	45	45
Theta	39	F	33	35	35
Iota	38	F	36	45	30
Mean	37.71		34.57	40.00	36.43

Instrument

Teacher Talk Observation Sheet (TTOS). The TTOS consisted of 11 items that assessed interactive talk engagements made by teachers in classroom and the rating of these items was carried out by the observers. Each item was rated on 5-point response format and was divided into seven subscales which included, announcement, invitation, monitoring, scaffolding, explanation and elaboration. Higher composite score on TTOS or its subscales depicted greater talking engagement, These subscales were established by extensive reading of literature (Arsenis, et al., 2021; Lee, 2020; Mandal & Naskar, 2019; OECD, 2018) validated and improved by five experts in the field of education or related areas. In a pilot study teacher talk revealed a moderate (α = .76) internal consistency.

Student Transversal Competency Observation Sheet (STCOS). The STCOS assessed interactive talk engagements made by teachers in classroom and the rating of these items was carried out by the researchers who made these observations. Its subscales included responsibility, teamwork, organizational skills, reflective and communication skills and were based on studies of Aldahmash, et al., (20210; Care, et al., (2019); Carver & Stickley, (2012); Choy & Oo, (2012); Dauer et al. (2017); Ettington & Camp, (2002); OECD, (2018) and Medvedeva & Rubtsova, (2021). The 9-point rating scale was adopted based on work of Terzieva et al., (2015) and validated by five experts and Internal consistency of this observation sheet was good (α = .80).

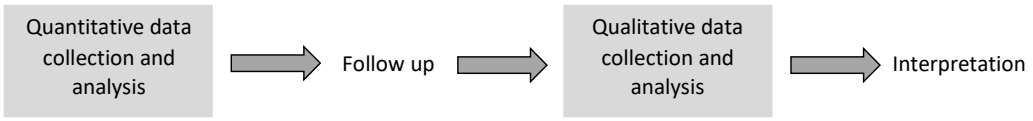
Semi-structured interview. The semi-structured interview consisted of ten open-ended questions, five questions for teachers to record their experience about adopting an interactive talk, and five questions for students about interactive talk presented by teachers in their science classrooms. Students explained their views on social interactions with their peers, classroom involvement, advantages and personal development. Additional questions were posed for extending ideas, missing information and clarity.

Design

This study used a mixed-method approach to explore nature of interactive talk by teachers and development of transversal competencies among seventh grade science students. Quantitative and qualitative paradigms working sequentially integrate and cross validate constructs in a mixed method study and help with the interpretation of the findings (Creswell, 2012; Teddlie & Tashakkori, 2010). Researchers employed explanatory sequential research design (see Figure 1) and participated in classrooms (obtrusive observation) for their observations and rating of teachers and students on TTOS and STCOS (Stage 1). Later (Stage 2) the researchers carried out semi-structured interviews (qualitative data) to identify the underlying reasons for interactive talk in teachers and transversal competencies in students.

Figure 1

Explanatory Sequential Research Design (Cresswell, 2012)



All participants were asked to provide their consent before taking part in this study. In addition, parental consent was taken for class children. Children that did not get parental consent were asked to go to the library or game room when class observations were made. All personal information and data were kept confidential and anonymous. The observers made observations and ratings of all participants. After which seven teachers and 15 students were interviewed to identify the reasons for interactive class talk and transversal competencies. Sample of qualitative phase was dependent on the saturation of responses, Teacher and student responses were transcribed and analyzed using thematic content analysis. It went through the process of coding, integrating similar codes into sub themes and finally grouping into themes and interpretation of responses in view of identified themes.

Results and Interpretations

Quantitative Analysis

Table 2
Observational Ratings of Teachers on Interactive Class Talk

Sr#	Indicator	Statement	$\bar{X}$	SD
1.	Announcement	Task explanation	3.75	.43
		Informed assessment criteria	4.93	.38
2.	Invitation	Small groups formation	3.87	.34
		Distribution of responsibilities	3.80	.40
		Informed time slot for task	4.00	.00
3.	Monitoring	Teacher monitors groups	3.93	.38
4.	Scaffolding	Teacher directs students	3.78	.41
5.	Explanation	Students discuss results	3.33	.79
		Students present final results	3.42	.76
6.	Elaboration	Students challenged results	2.27	.47
		Announcement of true solution	4.00	.00
7.	Focus	To solve the problem	3.90	.29
		Student's collective efforts	3.50	.77

Interactive class talk is sub-divided into six indicators to make it observable; announcement, invitation, monitoring, scaffolding, explanation, elaboration and focus. Highest overall mean score (4.93 with SD = .38) is secured by teacher's attempt of explaining assessment criteria of task to the students prior start of the activity. To provide students with clear and unambiguous directions before the task, may serve as motivator for the students to participate in the activity. Teachers mostly give definite/specific time slot to the students for completion of the task. Allotment of definite time slot for completion of task develops student's organizational skills. They mostly announced most acceptable solution among all presented by the groups at the end of the session. Although each group took equal time slot for presentation of results they got after activity but teachers present final and most accepted solution by their selves to whole class. This makes respective group confident and feel happy at first stance and secondly all the groups come to know about correct solution to assess their own performance gap. It enhances student's teamwork and communication skills. An overall mean score 3.90 (SD = .29) show teachers focus of engaging students in group activities to reach solution after construction and reconstruction of findings and conclusions got during group activities. It develops student's teamwork and organizational skills. Most of the teachers (3.87 SD = .34) were inclined towards dividing whole class into heterogeneous groups to provide them with an opportunity to collaborate socially for solution of assigned problem and development of their competencies. Teachers played role of monitor 3.93 while students performing their task in groups. Teachers played monitor's role without interrupting students working until they ask for any help or to reinforce and direct the group activity. Lowest mean score (2.27) is got by teachers control of rarely allowing students to challenge peer group results or findings, keeping in view the limitation of allotted time for science subjects and to keep conversation to the point and focused.

Table 3
Nature of Relationship between Class Talk and TVCs development

TVCs	Interactive Class Talk	
	Pearson Correlation	Sig.
Responsibility	.689**	.001
Reflective thinking skills	.051	.760
Communication skills	.601**	.007
Teamwork	.594*	.001
Organizational skills	.570*	.030

Table 3 portrays data regarding relationship between interactive class talk and develop talk are moderately positively correlated (.689**) and proved statistically significant (.001) at 0.01 level. The increase in group activities in class at elementary level would increase the development of responsibility among students. Development of

communication skills among students is also moderately positively correlated (.601**) with adoption of interactive talk and are significant (.007) at 0.01 level. Interactive talk and development of teamwork and organizational skills are also moderately positively correlated with Pearson correlation coefficients .594* and .570* respectively. They are also statistically significant (.001 and .030 respectively) at 0.05 level of significance. Zero relationship is shown among grouped tasking and reflective thinking skills with value of Pearson correlation for Reflective thinking and exploratory talk .051 and .760 level of non-significance. Adopting interactive class talks at elementary level by science teachers develop responsible behavior, communication skills, teamwork and organizational skills with varying levels of strength however talk at this level did not affect the development of reflective thinking skills among science students.

It is found that adopting interactive class talk by science teachers developed organizational skills, communication skills, teamwork and reasoning skills with varying levels of strength however it could not affect the development of reflective thinking skills among elementary level (grade 7th) students of science.

Table 4
Nature of Relationship between Class Talk and TVCs development

TVCs	Interactive Class Talk	
	Pearson Correlation	Sig.
Responsibility	.689**	.001
Reflective thinking skills	.051	.760
Communication skills	.601**	.007
Teamwork	.594*	.001
Organizational skills	.570*	.030

Qualitative Data

Observational data was scrutinized, and five themes were extracted from science teacher's teaching moves based on turn taking of the class participants. It was observed that during interactive class talk majority of the teaching time was dominated by teacher-Initiation it was almost equally characterized by T-I and S-I. T-I corresponds to teachers talk for elicitation of topic, open, closed or probing questions by students to help them reach correct answer, Response rate was higher from student's side. Almost 50% students were getting involved in responding at both individual and subsequent manner. Teachers were giving comprehensive feedback to students characterizing evaluative remarks, accepting or rejecting student's responses, commenting and praising. Sometimes teachers asked questions from nominated students also and they also observed providing clues to students as well.

Science Teacher's Stance at Integration of Talk and Student's Involvement

Majority of the teachers were highly motivated to get students involve in science learning. They were admiring the significance of socially collaborative and interactive teaching. They consider students involvement as healthy activity for their learning and competencies development.

Table 5
Themes of class talk observation

Code	Theme
elicitation, probing, closed, open, referential questions or display	Teacher-Initiation (T-I)
student-question, student-elicitation	Student-Initiation (S-I)
teacher-response, student-response, choral/individual, response time	Response (R)
evaluation, accept, comment, praise, accept-and-comment, reject	Feedback (F)
nominate, clue, uptake	Other
Individual, choral, explaining, providing examples, raising questions	Students Involvement
Boosts confidence, ensures accountability, shared dealing, communication opportunities	Students Development
Preplanning, extended awareness, go beyond bookish knowledge	Teachers Development
Curricular, administrative, lack of time, overcrowding, workload, lack of trainings	Constraints

Student's involvement and development: Following responses were collected against a question asked about their point of regarding student's involvement and development:

> Teacher Beta: *…when I provide an opportunity to students for explanation of their experience they get excited…..sometimes it seems they want working in groups to explore things…*
>
> Teacher Zeta: *Students like their participation whether individual or in choral, whenever they have sufficient knowledge to quote example and respond… it boosts their confidence… sense of competition and being prominent boosts them to learn and lead.*
>
> Teacher Eta: … *I think students should be provided with opportunities to argue in this way they get their communication skills developed and prevents them from reluctance and random mistakes. It minimizes the communication gap between teacher and students.*
>
> Teacher Alpha: *Students questioning and choral responses makes them confident, provokes their critical thinking and instigate them to search at their own and complete tasks using different resources. It makes the accountable and enhance their dealing with class fellows. They start owning their learning.*

Teachers Development: Teachers consider adoption of interactive class talk while teaching as rich opportunity for their own personal development. As they must respond each student, query and for this they need to go beyond the textbook. It requires extra time to prepare next day's lesson and prevent embarrassment for not being able to answer anyone's question. It demands their professional development to get students engage in social activities and develop their skills and construct their knowledge following social constructivist point of view.

Constraints: Teachers also reported constraints of time, curriculum, examination system and overcrowded classrooms. Workload evident from their demographic data as well. Some of the responses were:

> Teacher Delta: *Involving students is not as easy, it requires preplanning, extra content and pedagogical knowledge… we are bound to follow timetable and in a period of 30-40 minutes it is difficult to manage such activities…*
>
> Teacher Theta: … *significance of student's involvement is evident but we must complete syllabus before exam time and produce good results.*
>
> Teachers Iota: …*requires more time and the classes with small strength, such managements become difficult in overcrowding and lack of time …*
>
> Teacher Alpha: *We must follow predefined timetable and administrative instructions; our education system is also not providing us with leisure time professional development workshops. We solely can hardly find updated courses to successfully integrate such practice at ground level.*

Student's Stance at Integration of Talk and Corresponding Transversal Competencies

Table 6
Details of Themes Extracted from Student's Responses

Sr.#	Themes	Codes
01	Team spirit	Sharing, helping, completion of task, individual accountability, Leading,
02	Reflection	Previous experience, correctness, contextualization, situational experience, critique, evaluating
03	Communication	Utterances, confidences building, freedom of expression, listening, writing
04	Organization	Resourceful, meeting time limit, managing resources to meet targets, presentation

Students pointed out the significance of involving them socially in science classroom in a manner that it enhances their accountability and make them responsible of individual and group learning. Nominating them to explain any concept encourages them to recall previously learnt contents draw back past experiences in relation to current situation, all this develops them into reflective practitioners. They also make efforts to improve their communication skills and put their share without any mistake before class. They learn working in teams when engaged in groups to explore some phenomena. However they also get extra time for organizing their holdings and materials when most of the talk is dominated by teacher while explaining content. All such social activities exquisitely improves our communication skills. Surprisingly most of the students didn't recommend involving them into self-exploratory tasks due to lack of knowledge and unavailability of adequate contextual content that can help in true exploration. They also quoted themselves less efficient at criticizing and evaluating peers responses independently without teachers help. Some of the student's responses are being given;

> Respondent4:…*providing an opportunity to explain or probe makes me confident. I become excited to attend class and get things clear with sharing my point of view and getting evaluated by teacher….It corrects me and help my class fellows and get their help in return.*
>
> Respondent7:*Exploration provides me with the opportunity to think over past learning and mix that with new concepts and situations. Getting an opportunity to share that in front of class make me responsible learner and effective member of class.*
>
> Respondent10:*...completion of tasks in groups become easy and understandable under teachers guidance….*
>
> Respondent11: *interaction with class fellows and teachers improves my communication skills and provides me the point to praise freedom of expression.*
>
> Respondent15: *Sometimes exploration stops at a point when none of us have sufficient knowledge to move ahead. We need teacher's assistance for contextualization and critiques over point of views.*

It is found that adoption of explanatory talk improves student's responsibility and provides extra time for working on organizational skills hence shown strong positive correlation. Collaborative tasks strong positive correlation with development of teamwork/spirit in students. Social interaction in classroom shown strong positive correlation with development of student's communication skills, same is evident from students responses in interview. However self-exploratory practices are not highly recommended by students it also shown weak positive correlation in quantitative data.

Table 7
Collation of TVCs based Qualitative and Quantitative Data

		Transversal Competencies									
		Res.		TS		Refl.		Com.		Org.	
	Move/s	R %	NR %	R %	NR %	R %	NR %	R %	NR %	R %	NR %
INTERACTIVE NATURE OF CLASS TALK(QUALITATIVE)	Previous knowledge	100	--							100	--
	Explaining	95.0	5.0							100	--
	Answerable	94.0	6.0							100	--
	Accountable	90.0	10.0							100	--
	Learning	95.0	5.0							100	--
	Sharing			100	--					91.0	9.0
	Helping			100	--					96.0	4.0
	Leading			100	--					91.0	9.0
	Completion of task			100	--					92.0	8.0
	Ind. accountability			100	--					96.0	4.0
	Previous experience					5.0	95.0			13.0	87.0
	Evaluating					7.0	93.0			93.0	7.0
	Critique					--	100			30	70
	Correctness,					--	100			50	50
	Contextualization,					13.0	87.0			13.0	87.0
	Situational experience,					10.0	90.0			10.0	90.0
	Utterances							92.0	8.0		
	Confidences building							95.0	5.0		
	Freedom of expression							96.0	4.0		
	Listening							98.0	2.0		
	Speaking							96.0	4.0		
	Writing							90.0	10.0		
	Resourceful	100	--							100	--
	Presentation	100	--							95.0	5.0
	Meeting time limit,	100	--							94.0	6.0
	Managing resources	100	--							90.0	10.0
QUAN.	Pearson Correlation	.689**		.594*		.051		.601**		.570*	
	Strength & Direction	Strong Positive		Strong Positive		Weak Positive		Strong Positive		Moderate Positive	
		Res.		TS		Refl.		Com.		Org.	

Res.*: Responsibility, TS*: Team Spirit, Refl.*: Reflection, Com.*: Communication, Org.*: Organization, R*: Recommended, NR*: Not Recommended

Discussion

Study aimed at coming up to nature of talk and development of organizational skills, teamwork, responsibility, reflective thinking and communication skills among science students. It is conclude that adopting explanatory talk, questioning and exploratory talk at elementary level by science teachers develop organizational skills, communication skills, teamwork and responsible behavior with varying levels of strength however exploratory talk did not affect the development of reflective thinking skills among elementary level science students. Qualitative findings reveal students wish to be assisted by teacher while exploration of any phenomena; due to lack of their contextual knowledge and expertise at criticizing and evaluating chunks of information without teachers help. Development of high level employability skills is ensured using collaborative activities but on the other hand unavailability of student's training prior to the implementation of approach may appear worse (Vardi & Ciccarelli, 2008). Albert and Perouma (2017) mentioned that community of persons and use of dialogues in that community are more important concepts or two sides of same coin. This doesn't question their individuality (Melé &González, 2014) but it's just an approach to work for common and requires to switch from me'' to we'' (Naughton, 2015). Such practices at elementary level proved helpful for development of TVCs. Adopting explanatory talk at elementary level by science teachers develop organizational skills and teamwork with varying levels of strength. Results are consistent with the findings of Behlol, et al., (2018) and Medvedeva and Rubtsova (2021).

According to Chaturvedi, et al. (2021) dynamic and proficient multi-tasking is possible by proficient planning. Unexpected results shown social interaction is not positively correlated with development of reflective thinking skills among elementary level (grade 7^{th}) science students. This finding is contrary to the findings of Kuzle, (2015) and Pleschová and McAlpine, (2024) which states that exploratory talk is helpful for student's reflective thinking skills. It might be due to some problems in adoption of talk as highlighted by teachers; exploratory learning is contextualized (Kek & Huijser, 2011) and cannot be attained by separating application context from theoretical concepts. Revealing teachers control over exploration activities is consistent with the findings of Shamim, (1996).Results of the study are contradictory to the point of views of the researches being mentioned here like, Boso, et al. (2021) stated in their research that the element of comparison of reasons and various situations for answering any critical question or for the selection of any path for solving any problem independently is the most critical characteristic for development of reflective thinking skills among students. Choy, et al., (2017) also proved that exploratory talk enhances the student's ability to evaluate the alternatives critically and constructively. Saracoglu (2022) also stated that engagement of student's in exploratory talk provides student's with the opportunities of

intellectual and critical comparison. Development of student's ability to give valid and logical reasons for any action make them habitual of critically analyzing situations, reasons, and aspects of any happening which further helps them in informed and systematic decision making (Çelik & Dikmenli, 2021). Such habits strengthen the student's reasoned decision-making and reflective thinking skills, the most desired transferable skills of 21st-century employers. Interactive activities improved students understanding for making informed decisions considering maximum possible alternative reasons and selecting the most suitable one as the wisest strategy to be adopted for positive decision-making skills (Goodley, 2018) and enhancement of reflective thinking skills. This particular research's findings are not matched at the point that interactive class talks do not foster development of reflective thinking skills; reason behind could be the age factor of this research study, their maturity level or lack of dealing with the information technically or logically. Although exploratory talk is a students focused approach of learning but it doesn't mean teacher has minor role to play during its implementation, but he is meant to observe the progress along comprehending student's reasoning stages. He is also meant to direct students to keep them aligned to their task and active as well (Hmelo-Silver, 2004). Other reason could be students mishandling/misconception of problem while working on it. Carvalho (2015) specifically highlighted that students without training cannot effectively get engaged in collaborative practices for solution of any problem, so training is needed (Fitch, 2011). On the basis of results it is suggested to plan need based training modules for implementation of different types of talk at school level.

Teachers and students were putting their collective efforts. Most of the teachers were found with intentions to get students involved in learning. They tried to engage students in such activities to ensure lifelong learning and the development of transversal competencies (Qizi, 2020). They were using the exploratory talk, questioning, group work and explanatory talk to develop students' transversal competencies (Dukala,et al., 2023) and reflective thinking independently. Such intention was to provide students with an opportunity of strengthening their social interaction with peers. They were also engaged in making things clear to their peers and it was enhancing their communication skills and teamwork, responsibility and organizational skills. Explanatory talk following teachers played the role of guide and tried their best to engage students in productive and beneficial activities to improvement of their skills and solve the encountered problems (Haavold & Sriraman, 2022) via talk and they become successful in achieving this target.

Conclusion

It is concluded from quantitative findings that explanatory talk and peer group work proved helpful for development of sense of responsibility and organizational skills. It is also supported by students and teachers as in such talks they are supposed accountable to answer teacher's questions about student's previous knowledge and ongoing learning progress. They consider themselves accountable for their own and peer's learning.

Exploratory talk proved helpful for development of teamwork and organizational skills in students. Whereas reflective thinking practices along organizational skills of students were highly developed among students involved in Socratic questioning. Involving students in discussions develops their communication skills as per students point of views they experience enriched possibilities of listening, speaking and writing within classroom along uttering their own viewpoints which eventually add in their confidence building and development of communication skills.

Recommendations

1. Development of transversal competencies is an effort to ensure student's lifelong learning. To achieve this goal it is needed to provide students with the interactive classroom culture and interactive experiences at school level.
2. Students seems uninterested in learning science concepts due to their abstract nature. It is the responsibility of educator to create situations near to real life and welcome students to explore at their own with teachers and peers help.
3. Effectiveness of interactive talk in development of transversal competencies among students is evident, it is suggested to guide teachers for its effective implementation within classroom via training/coaching sessions or workshops.

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