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Pedagogical Content Knowledge of Mathematics Teacher and its Influence on Students Achievement: An Analytical Study

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Abstract:

The teaching of mathematics may be influenced by a variety of factors, but instructors are crucial to the process. Every student is engaged in class by the teacher, who believes that everyone can learn mathematics. The term "pedagogical content knowledge" was first used by Shulman (1986), which generated a whole new wave of research studies on teachers' subject-matter expertise and the significance of this information for effective instruction. Understanding about the student, the learning environment, the content of mathematics, the mathematics curriculum, and knowledge of pedagogy make up pedagogical content knowledge.

Objective: *To understand how a teacher's pedagogical content knowledge (PCK) influences student accomplishment.*

Research Question: *Does a teacher's pedagogical content knowledge (PCK) affect the academic success of their students? Mathematics instruction: a teacher who teaches students in class 7 grade and has at least a B.Sc. with a B.Ed. or another professional teaching degree. Student Success: Student success in mathematics for the seventh grade, based on researcher-made assessments of the subject matter. According to the data analysis, instructors with a high level of pedagogical subject knowledge have students who accomplish at higher levels, while teachers with a low level of pedagogical content knowledge have students who achieve at lower levels.*

Key Word: Pedagogical Content Knowledge (PCK), Students Achievement. Mathematics Teacher.

Introduction:

"I like teaching as much as a painter enjoys painting, a musician enjoys playing, a singer enjoys singing, and a strong guy enjoys running a marathon. William Phelps once stated that "teaching is an art—a great, great, terrible, and so difficult to perfect art that a man or woman might spend a whole life at it, without comprehending much more than his limits, faults, and distances from the ideal. In the era of scientific and technological advancement, it is crucial

to give teachers the tools they need to be agents of social change, national thinking growth, and scientific temper transmission through professional programmes. In the framework of the NCF - 2005 and the RTE - 2009, teachers' professional development (TPD) takes into account not only pre-service and in-service training but also ongoing support for the teacher and their facilitation. Teachers need dedicated time to think deeply and advance their skills. To be able to see the impact of their pedagogical knowledge (PCK) on student achievement, teachers need to be informed in a variety of subject areas.

No part of mathematics can be seen, felt, or smelled. But it's simple to see that there is a mathematical law governing our cosmos, our daily lives, and everything else behind every form we take, every moving object like a car or a river, every reflection in a mirror, and every coin flung into the air! Such is mathematics' enchanted power! The capacity to think critically, reason, and solve issues is what math teaches students. It is one of the subjects that begins with the child's safe "Home learning" foundation that they built before they entered school. It has existed since the dawn of the human species and continues to play a crucial role in society today. Math is defined differently by many authors. According to Joe Shipman, "conjecturing and proving theorems in first order logic" is what math is. According to Berthelot, mathematics is a necessary tool for every physical investigation. "It is challenging to convey a genuine sense of the profound beauty of nature to individuals who do not grasp mathematics. If you want to learn about nature, to appreciate nature, it is vital to grasp mathematics.

The teaching of mathematics may be influenced by a variety of factors, but instructors are crucial to the process. Every student is engaged in class by the teacher, who believes that everyone can learn mathematics. The student's learning results are greatly impacted by excellent mathematics teachers. The instructor faces a very challenging challenge when deciding how to teach mathematics. A teacher should possess the necessary expertise to teach mathematics. The math instructor needs to be successful. A good math instructor demonstrates a variety of traits. A dedicated instructor is essential for success. A stimulating environment that promotes learning must be fostered by the instructor. whether it be in mathematics or another subject. The ability to promote other people's learning must be

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possessed by the instructor. A good math teacher tries to remove the worry and fear that math instills in so many kids. As is often said, teaching is an art, and techniques are how one learns and practices the skill. The teacher's strategy to teach mathematics is carried out in its entirety using methods.

Rationale:

The term "pedagogical content knowledge" was first used by Shulman (1986), which generated a whole new wave of research studies on teachers' subject-matter expertise and the significance of this information for effective instruction. The instructor should take into account the pedagogical topic knowledge for a successful teaching of mathematics. According to Thilokleickmann (2013), participant content knowledge and pedagogical content knowledge were quite accurately reflective of variations in the organization of teachers' education. According to A. Massoumeh et al. (2012), there is a correlation between a teacher's pedagogical subject understanding and the achievement of their students. In contrast to more seasoned instructors, secondary mathematics teachers failed to properly and clearly explain the associated concepts of functions in class, according to Mohd Yusminah and Effandi's (2010) research. According to Sara (2010), there is a connection between teachers' mastery of pedagogical material and students' results on the geometry and measuring criteria of learning. According to C.N. Madeira M's (2010) research, including instructors in peer exchange and scaffolded reflection can be a beneficial in-service professional development activity. According to N. Lianhua's 2009 research, there was a disconnect between the instructors' grasp of pedagogical material and their instructional strategies. According to M.K. Jussi-Pekka Heikkinen et al. (2009), successful teaching is influenced favorably by student-teachers' PCK and their level of topic understanding. According to Jaipal and Kamini (2009), secondary instructors lack the content expertise necessary to instruct students at the secondary level. Instead, they have a broad understanding of the subjects they are teaching. In circumstances when instructors demonstrated low level of SCK and PCK, S. Joyce (2009) observed that teachers with insufficient subject content knowledge (SCK) will likely have restricted PCK, however the two are not fully dependent on one another.

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As math educators, we must comprehend the fundamentals of mathematics and how to apply them so that our students may build their own understanding. Without their pedagogical content understanding, math teachers may not be able to solve the mathematical problem, not just the mathematical problem, but also the mathematical problem. With this paper's researcher attempting to study and find knowledge of mathematics teachers and their impact on students, mathematics teachers should have to provide them with the knowledge of pedagogy, content, and environmental issues. You will be able to comprehend the impact of a mathematics teacher's pedagogical content understanding on student accomplishment through this essay.

Statement of the Problem:

The present problem is being stated as "*Pedagogical Content Knowledge of Mathematics Teacher and its Influence on Students Achievement: An Analytical Study".*

Operational Definition:

Pedagogical Content Knowledge: Union of Knowledge of Student, Knowledge of learning Environment, Knowledge of Mathematics Content, Knowledge of Mathematics Curriculam And knowledge of Pedagogy.

Mathematics teacher: A teacher having at leat B.Sc. with B.Ed. or any other Teaching professional degree and teaching class 7 grade learners.

Students Achievement: Students achievement in mathematics of class 7 grade, mathematics content which was based on researcher made assessment.

Objective:

1. To be aware of the mathematics teacher's Pedagogical Content Knowledge (PCK) and how it influences student success.

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Research Question:

1. Does a math teacher's pedagogical content knowledge (PCK) affect students' achievement?

Methodology:

For the aim of this study, the researcher randomly chose 30 schools in the Bihar district of Begusarai, selected a mathematics teacher, and then tested the instructor's pedagogical topic understanding. A simultaneous achievement exam in mathematics was also administered to grade 7 students at the concerned school.

Tools: The accomplishment test was created by researchers using the PCK test, which had already been trialled.

Data Analysis:

Table -1

Percentage (%) of PCK level and Students Achievement in Percentage (%)

School Number	% of PCK level of Teachers	% of Students Achievements
1	51.42	30.73
2	45.71	22
3	48.57	20.46
4	80	61.6
5	48.57	28.8
6	51.42	22.86
7	80	63.8
8	48.57	25.53
9	54.28	26.33

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10	48.57	24.73
11	65.71	29.33
12	74.28	60.2
13	57.14	26.53
14	60	27.86
15	77.14	61.06
16	37.14	21.06
17	54.28	24.33
18*	60	29.73
19	71.42	61.66
20	48.57	24.26
21	48.57	23
22	34.28	17.6
23	34.28	18.73
24	45.71	23
25	65.71	56.93
26	57.14	45.2
27	54.28	37.93
28	62.85	55.73
29	54.28	37.46
30	71.42	60.26

(Corelation=0.890603)

According to the research, in 80% of the situations, teachers with high PCK levels had pupils with high accomplishment levels (see table 4.37 above). Additionally, it is discovered that there is a substantial association between student accomplishment and PCK level of teacher

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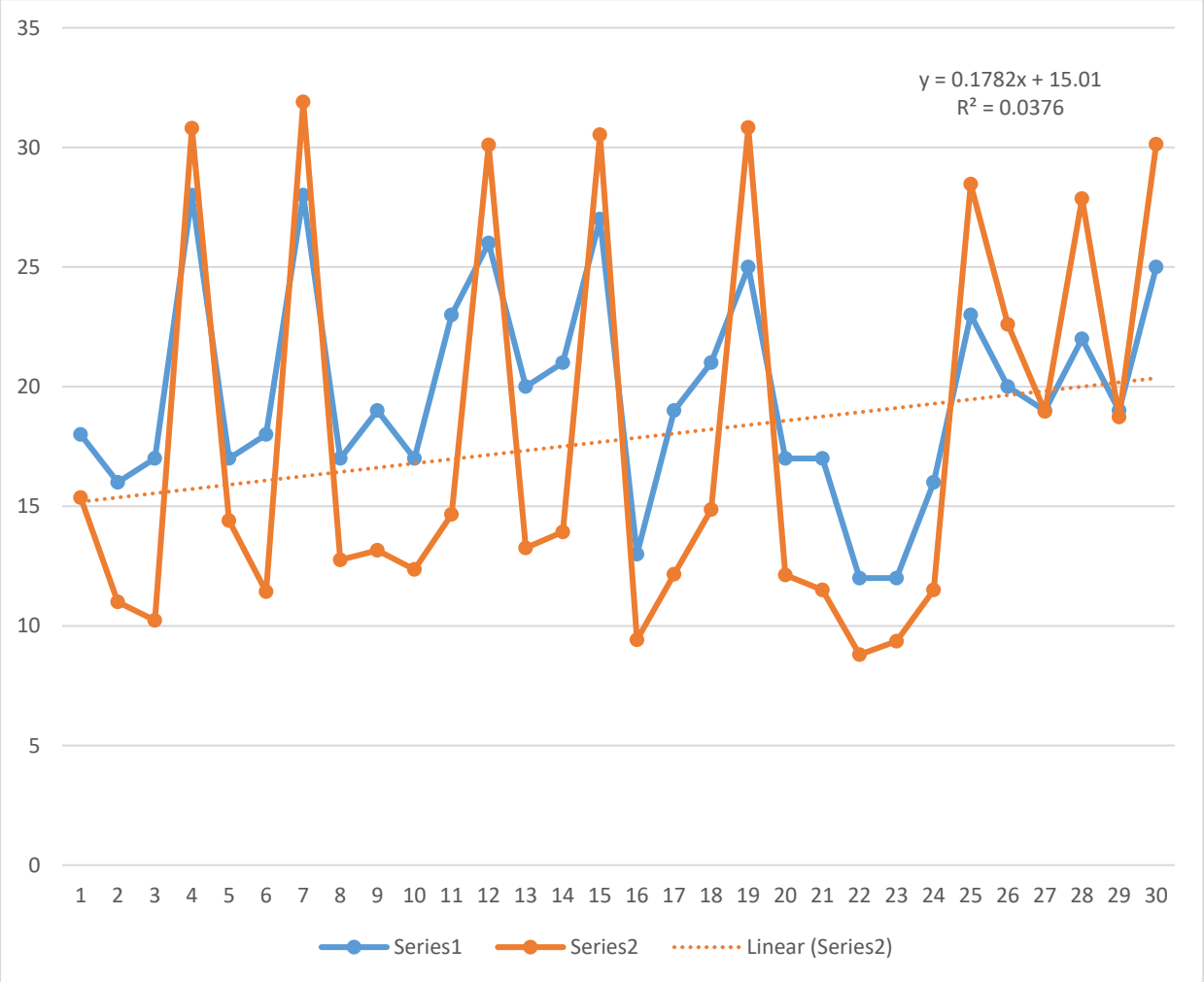
(0.890603), which is between 0.85 and 1. Hence is evident that the association between PCK leve of instructor and pupils' success is quite stong.

Figure-1 Correlation between Teachers PCK and Students achievement.



(Series1= PCK Level of teachers, Series2= Students achievement)

The first line graph shows the relationship between students' achievement levels and math instructors' PCK levels. And it demonstrates that there is a significant link between kids' achievement and teachers' PCK proficiency.

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Conclusion:

The researcher concludes from the data shown above and their table 1 that a high degree of pedagogical subject understanding indicates a high level of student learning and accomplishment. This study report came to the conclusion that a teacher's pedagogical subject knowledge has an impact on a student's accomplishment because instructors with low levels of pedagogical content knowledge see a correspondingly low level of achievement in their pupils.

Therefore, the goal of this study work is to understand how teachers' pedagogical subject knowledge influences students' academic accomplishment. The purpose of this study is to determine whether or not a teacher's pedagogical subject understanding affects students' accomplishment. then research of this article found that yes PCL level of mathematics teachers impact kids' accomplishment.

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