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Gender-Based Analysis of Teachers' Content Knowledge at Higher Education Level

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Abstract: The purpose of this study was to analyzed the gender-based teacher content knowledge at higher education level. Objectives were to find out dimension of teachers' content knowledge and to compare male and female teachers content knowledge at higher education level. Population of the study was 103 including 61 male and 42 female teachers from university of Kotli Azad Jumma & Kashmir. Data was collected through personal visit by using stratified random sampling technique. Nature of study was descriptive by using quantitative research approach. Self-developed questionnaire was used based on three dimensions knowledge of subject matter, conceptualization of content knowledge and transition of knowledge. Data was analyzed through simple t test and finding shows that there was significant difference among male and female teachers at higher university level regarding teacher content knowledge. It was concluded that there was significant gap and seek of professional development among male and female teachers regarding knowledge at higher educational level. It was recommended that teachers might be provided 360o professional development and training regarding content knowledge and transition of knowledge

Keywords: Gender, Analysis, Teachers' Content Knowledge, Higher Education Level

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Introduction

A teacher is a person who conveys information to their students. Words such as tutor, mentor, or educator can be used interchangeably with teacher. A teacher assists students in gaining knowledge, skills or principles (Storonge,2018). A teacher is a key architect in shaping future generations. Societies expect that the most capable and intelligent individuals will pursue this esteemed profession. However, in Pakistan, it is often observed that individuals with weaker academic backgrounds and lesser qualifications enter this field. Many who cannot secure employment in other professions end up joining teaching, which can impact the future of the nation. This trend is partly due to the low salaries and diminished social status associated with teaching. Despite these challenges, the role of a teacher is crucial and significant. Educators have a profound and lasting impact on those who spend considerable time with them. A teacher's affection, expertise, character, and ethical dedication greatly influence students. Teachers serve as role models, with students emulating their behavior, communication style, manners, and appearance. The positive conduct of teachers consistently captures the attention of students (Gupta, 2007).

Teacher Content Knowledge is a measure of how well teachers know their subjects. As Ball et al. (2008) cites Shulman as saying, "Teachers need not only to understand that something is so, but the teacher must also further understand why it is so." As a result, the emphasis is placed on having a comprehensive comprehension of the subjects that are covered in school. As a result, teachers' CK differs from academic research knowledge acquired at higher education institutions and everyday knowledge retained by adults after graduation. According to Shulman (1986), PCK

is the knowledge required to make subject matter accessible to students. Knowledge of students' subject-specific conceptions and misconceptions, as well as knowledge of subject-specific teaching strategies and representations, are two fundamental components of PCK that have been identified in the literature.

Numerous studies on PCK are available within the contexts of primary and secondary education, including several review articles (Berry et al., 2016; Chan & Elliott, 2004; Depaepe et al., 2013), yet there is a lack of systematic knowledge regarding PCK in higher education HE differs significantly from school education, making it potentially inadequate to apply research findings from the former to the latter. For instance, university instructors often lack formal pedagogical training and receive minimal mentoring in teaching (Brownell & Tanner, 2012). At the same time, these educators generally possess substantial content knowledge due to their extensive education and research in their specific fields (Gehrtz et al., 2022). Additionally, initiatives to enhance teaching quality in HE has typically been irregular and uncoordinated. Therefore, conducting this scoping review is crucial for assessing the extent and breadth of empirical research on PCK in HE, which can help develop evidence-based strategies to enhance teaching effectiveness and quality within this context.

Teachers impart knowledge, skills, and attitudes to their students. The expertise of teachers in their subject matter encompasses various aspects. Educators must effectively convey key concepts of the subject to students and clarify any misconceptions about the content (Mustafa, 2014). The quality of education at the higher level has been a major concern for policy makers and educational stakeholders. One of the crucial and critical factors that contribute to the quality of education is the effectiveness of teachers in delivering content and evaluating student's learning. Despite the recognition of the crucial role that teachers play in the educational process. This study emphasized on the gender-based analysis of teacher content knowledge at higher education level, it is a dire need because there is limited research that provides a comprehensive understanding of the teachers' content knowledge. So, the present study focused on the gender-based analysis of teachers' content knowledge at higher education level in AJ&K.

Objectives

1. To find out the dimensions of teachers' content knowledge at higher education.
2. To compare teachers' content knowledge regarding gender at higher education level.

Hypothesis

H_o: There is no significance difference of teacher content knowledge regarding gender-based at higher education level.

Literature Review

The educator is regarded as a key figure in shaping the nation's development within society. Hence, it is crucial for teachers to be both skilled and proficient. The significance of a teacher is acknowledged at every educational stage. Teachers aim to build a strong foundation for their students academically and professionally. This is why teachers are seen as the cornerstone of the entire education system. Consequently, students' future prospects largely hinge on the teacher's performance, skills, and effectiveness at each grade level.

Teaching is a complicated process that involves many steps that must be taken in addition to simply passing on information to students. Locally administration action that will be done with the title Further developing PCK for center and secondary teachers, it expects to give data to educators about the utilization of PCK capabilities in figuring out how to work on's how educators might interpret these skills further. In addition, this activity supports in-depth discussions with colleagues, fosters camaraderie, establishes a reflective and long-lasting learning culture, and provides teachers with opportunities to learn curriculum, management, content, and pedagogy. The strategy utilized in this help movement is to give data, materials, and models about the skill of PCK and Innovation Educational Substance Information (TPACK). To build the information and abilities of the pertinent taking part educators (PCK), TPACK and further investigate the novel blend of content and instructional method from the instructor, which will at last shape an expert comprehension of the educator himself (Tamalene, 2022).

Teachers' Content Knowledge

Teachers need to be able to help students create useful cognitive maps, relate to see how ideas connect across disciplines, and relate to everyday life in order to teach students according to today's standards. This sort of understanding gives an establishment to PCK that will empower educators to make thoughts open to other people. Introduce the term PCK, or Subject Matter Content Knowledge (SMCK), as well as the significance of this knowledge for effective teaching. You also mentioned that research on teachers' knowledge and the processes by which this knowledge is acquired is a significant area of investigation into the nature of teaching. The ability of a teacher to transform the content knowledge he or she possesses into forms that are pedagogically powerful and yet adaptable to the variations in ability and background presented by the students is also mentioned as an important question that necessitates an investigation of the cognitive and affective aspects of teachers' profession lives.

Educators in advanced education (HE) can upgrade their substance information by understanding the organic and social nature of understudies, encouraging intelligent practices for ceaseless improvement and informed direction. Considering HE a framework permits instructors to integrate this information to their calling, so they consider the intricacy of the school system and its members. Reflexive practices permit the ceaseless improvement of educators and fitting dynamic with regards to training (Barbosa-Chacón, 2015).

Knowledge of Subject Matter

Teachers' daily work is a major source of their content knowledge. However, theoretical knowledge does not contradict it. It incorporates hypotheses gained during instructors' readiness and the experience acquired from progressing schooling exercises. The advancement of information on showing content is affected by factors connected with the educator's very own experience and workplace. PCK is well established in the experience and resources of understudies, their families and networks. It is considered as a combination of content and instructional method. It is a one-of-a-kind creation by educators, making it a "special" manifestation of their knowledge and expertise. PCK is additionally called 'process information'. It contains thorough information on the insight that educators have amassed in educating practice. Teachers take into consideration PCK in light of the four components—students, subjects, and courses. It must be addressed within the context of a varied instructional strategy (Rafique, 2019).

Teachers gain their insight for instructing from different sources; the equivalent can be anticipated to apply to instructor information on topic. Friedrichsen et al. (2009) recognized three expected causes of topic information: (a) educators' own Insight and opportunities for growth, (b) instructor training and expert improvement projects, and (c) educating encounters. The point that proficient information starts to foster even before up-and-comers enter educator training.

Researchers (Akhtar, Shaheen, & Bibi, 2016) identify three key components of subject content knowledge:

1. Subject matter substance data
2. Pedagogical substance information
3. Curricular substance information

Additionally, researchers describe three dimensions of subjects:

1. The content of the subject
2. The organization of the content
3. The methods of inquiry employed in the subject

A teacher's grasp of subject matter significantly enhances students' learning opportunities. The teacher's knowledge of the subject plays a crucial role in the teaching and learning process. The researchers investigated whether gender influences the subject matter competency of teachers selected through three methods (Conventional, National Testing Service, and online) in relation to competency-based teacher education (CBTE) .

Conceptualization of Content Knowledge

The intricate concept of PCK's conceptualization and measurement remain contentious issues. Following Shulman's underlying system during the 1980s, different PCK models arose over the ensuing thirty years (van Driel and Berry, 2019), prompting assorted translations of PCK definitions and degree. According to Shulman's definition, PCK includes both the specific content knowledge and the organization of that content to improve student learning. Grossman developed Shulman's PCK model by integrating curricular information, which, close by grasping understudies' information and powerful showing techniques, is impacted by the instructor's motivation for showing explicit substance. Expanding on the establishments laid by Shulman and Grossman, Magnusson et al presented two extra parts: educators' directions towards instructing and appraisal information. Later reconceptualization's have based upon these prior models to refine and merge PCK systems (Carlson et al., 2019; Gess-Newsome, 2015).

Reviews of PCK in school settings (Chan & Hume, 2019) have found that some researchers may oversimplify the concept by focusing only on specific aspects, despite progress in PCK conceptualization. For example, certain investigations preclude academic thinking while analyzing sanctioned PCK, as brought up by Alonzo et al. (2012), while others center only around information concerning understudy hardships (Zhou et al., 2016).

Transmition of Knowledge

In universities, the mastery of educators in their branches of knowledge is in many cases profoundly respected, regardless of whether their capability in instructing and working with understudy learning of that topic (Depaepe et al., 2013) contends that only knowing about satisfied and general showing techniques is lacking for powerful guidance. All things being equal, successful instructing requires "the reconciliation of content and instructional method into a comprehension of how explicit subjects, issues, or issues are organized, portrayed, and adjusted to the shifting interests and capacities of understudies, and conveyed for the end goal of instructing" Shulman presented this "extraordinary blend of content and instructional method," known as academic substance information (PCK), which he affirms that teachers ought to have and apply. Since its presentation over many years prior, the idea of PCK has gathered huge examination interest, expecting to clarify the complex, nuanced, and refined nature of educating.

As a theoretical framework, PCK can be utilized to fathom how instructors configuration learning exercises and convert their topic skill into structures and portrayals (like similarities and representations) that are both significant and reasonable to understudies, lining up with their formative stages. Subsequently, PCK coordinates information about instructing and picking up, shaping a powerful starting point for developing great educating capability. A methodology informed by PCK assists instructors with articulating the reasoning and philosophy behind their academic techniques for showing explicit substance, Explaining the normally verifiable parts of showing rehearses (Bertram and Loughran, 2012) can be gainful for propelling educators' particular information and supporting this improvement all through the showing calling (Carlson et al., 2019).

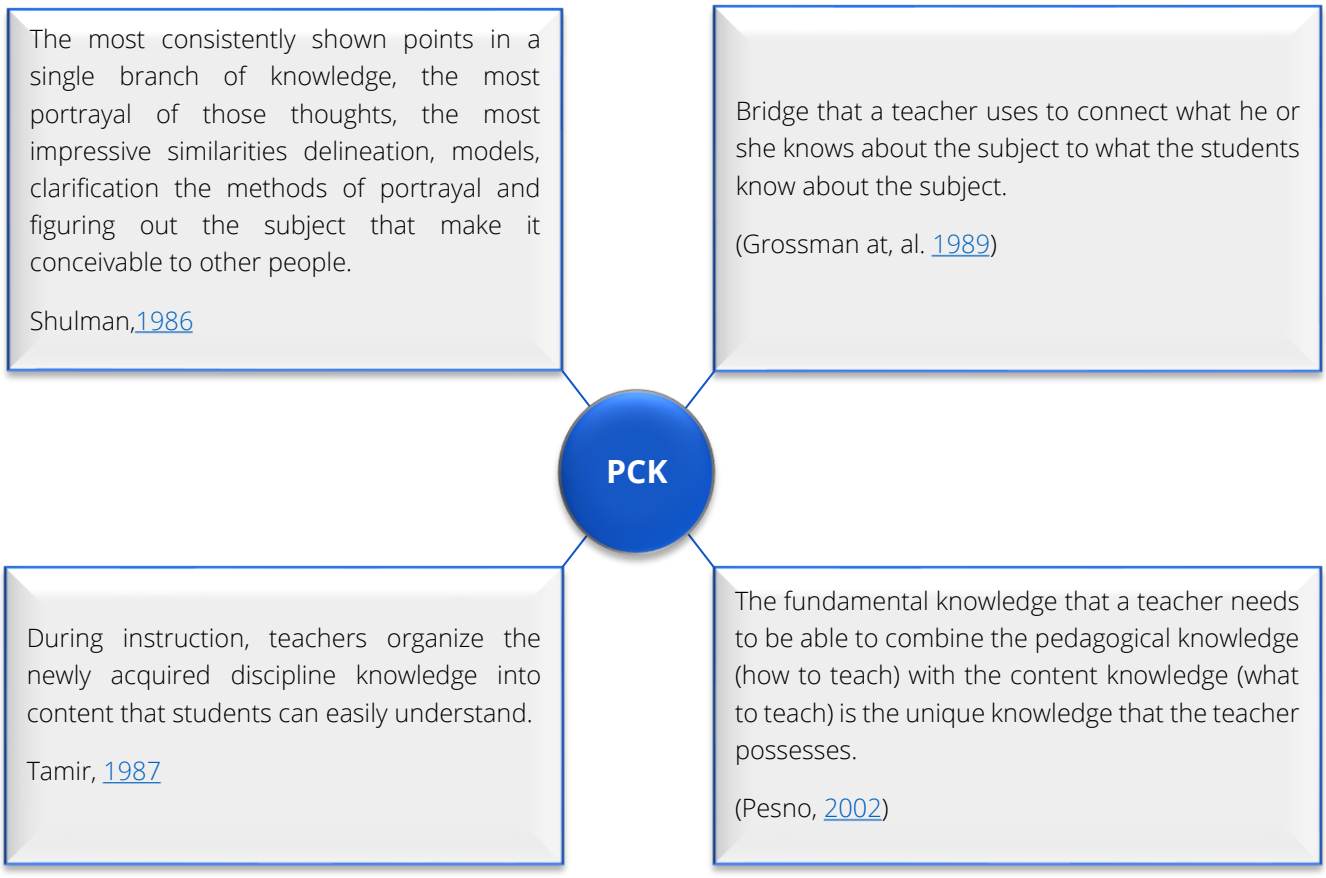
Theories related to Pedagogical Content Knowledge (PCK)

PCK is comprehensively perceived as a mix of no less than two kinds of information: general showing information and subject-explicit information. Especially noteworthy is Tamir's persuasive take on PCK, which suggests that it includes both subject knowledge and teaching knowledge. As per Tamir, the information that instructors hold is separated into two classes: proficient showing information and general educating information. PCK explains how to effectively engage students by adapting a topic's content. It includes understanding the difficulties related with a specific subject, the prior ideas that understudies bring to their learning, and the informative techniques fit to the instructing setting. In order to help students develop their own ideas, connect concepts, and reorient their thoughts in order to foster meaningful learning, educators need to be familiar with the breadth and adaptability of their subject matter in order to meet current educational standards. Teachers also need to know how to stimulate thought both within the subject area and in everyday situations.

In conclusion, numerous definitions, viewpoints, and models of PCK exist in the literature. Regardless of broad examination into the idea of PCK, definitions and parts stay hazy or equivocal (Abell, 2007; Gess-Newsome, 1999). To all the more likely comprehend the showing system and the effect of educator information on guidance, working on showing ideas and settings: "Researchers should limit the extension, center around thinking, and figure out issues in a direct, not perplexing way" (Shulman, 1986)." Different researchers use different models and components to define and interpret PCK, which leads to different interpretations of the relationships between these components. However, all models share elements of subject knowledge and teaching knowledge. Thus, this study incorporates these two PCK components and considers them crucial for research because:

- The teacher's conduct while teaching is significantly influenced by their deep understanding of the lesson content, making it a key aspect of their ongoing professional development.
- Research into teachers' content knowledge links pedagogical knowledge with subject matter expertise, indicating that PCK is a robust foundation for developing skilled educators.
- The subsequent section will explore the research status of PCK and its influence on the advancement of teacher education programs.

Pedagogical Content Knowledge



Both substance information (CK) and educational substance information (PCK) are significant parts of instructor ability that impact understudy progress. In late many years, instructive examination has given persuading proof that understudies' inspiration and learning are impacted by the nature of the learning open doors given by educators. (Kleickmann et al. 2013).

Particularly since Shulman's distributions, research on instructors' information on topic (CK and PCK) has been driven by the presumption that this information is at the core of their expert ability. Without a doubt, late examinations have areas of strength for given, proof that instructors' topic information influences their educational practice and their understudies' accomplishment gains (Baumert et al. 2017)

Instructive substance information is a kind of information held by instructors that not just makes sense of how for successfully show content (information on instructional method), yet in addition disentangles The's comprehension educators might interpret the substance (Ramos 2021).

Related Study

As per Plain Herolda and Michael Waring (2016) the job that content information, a significant part of pragmatic topic information, plays for pre-administration educators (PSTs) in actual training instructor schooling (PETE) stays challenged and hazy. While some researchers emphasize that this kind of knowledge is helpful, others argue that putting too much emphasis on content knowledge hinders the development of student-centered and critical pedagogies. Notwithstanding of its appearing significance, explicit examination into this part of the information base remaining parts scant. Reason: This exploration set off on a mission to look at the impacts that changing degrees of content information had on the improvement of PSTs in PETE. In doing as such, it expected to make an upgraded comprehension of what this information base means for the learning and advancement of PSTs in PETE. This study utilized semi organized interviews, illustration perceptions and post-example reflections as fundamental instruments of information assortment during three phases of a one-year PETE program me at a College in the UK. Data from 12 PSTs (six male and six female) were analyzed using constant comparative analysis in a Charmaz-outlined two-stage analysis method. Building Grounded Hypothesis: A Reasonable Aide Through Subjective Investigation. London: Sage. Principal results and results: Content information constraints were found to variously affect PSTs. PSTs need at least "adequacy" of content knowledge in order to use more advanced pedagogical strategies confidently, as the lack of confidence in teaching and negative effects on enacted teaching knowledge (pedagogical content knowledge) demonstrated. Content information supposedly was setting explicit and contextualized inside the educational plan conveyed in the separate schools, where PSTs were set. Inside and out satisfied information was seen to be a resource that could be utilized to plan and instruct illustrations that were receptive to student need.

Research Methodology

It was descriptive and quantitative in nature. Ortiz & Calderón (2006) defined descriptive research as a purposeful process of gathering, analyzing, classifying, and tabulating data about current conditions, practices, processes, trends, and cause-effect relationships, followed by adequate and accurate interpretation of such data, with or without the use of statistical methods. According to Njite et al. (2011) Quantitative research is defined as a systematic investigation of phenomena by the collecting of numerical data and the use of statistical, mathematical, or computer approaches. So Kurgat (2020) apply this type of methodology in their study. The objective of this research was to Gender-based analysis of teacher content knowledge at higher level in AJ&K. Survey method was used to collect the data. One variable was used in this study. A survey was used to collect the data. Mean and t test was used to find out the Gender-based analysis of teacher content knowledge at higher level in AJ&K.

Population of the Study

The population of this study comprised of 61 male and 42 female university of Kotli Azad Jammu &Kashmir teachers of district Kotli. There were 103 male and female teachers.

Sample of the Study

Stratified random sampling techniques were used in this study. According to Mugenda & Mugenda (2013) sample of 15-50 % is an accurate for research study. So the researcher use 50% of sample for both male and female.

Table 1

Description of the sample

Gender	No. of Teachers	Sample Size
Male	61	31
Female	42	21
Total	103	52

Results

Table 2

Mean of Teacher Content Knowledge

Statements	Mean
Knowledge of subject matter	4.01389
Conceptualization of content knowledge	3.944
Transition of knowledge	3.9638

Table 2 show total result of analysis of Teacher Content Knowledge at university level in AJ&K. Table show that obtain result of teachers were 4.01389 in Knowledge of subject matter and in Conceptualization of content knowledge result of teachers were 3.944. Mean of Transition of knowledge results of teachers were 3.9638. So, mean of Knowledge of subject matter result is slightly better than or values of teacher content knowledge.

Table 3

t-test for Knowledge of subject matter of Teacher Content Knowledge

Gender	N	Mean	Df	T	Sig
Male	31	30.0000			
			50	-1.114	.067
Female	21	67.5238			

Table 3 revels result of independent simple t test. It makes clear that they were statistical difference in the mean scores of male teachers working in university level (N= 31, mean= 30.0000) and Female teachers (N= 21, mean= 67.5238) df =50, t = -1.114, sig=.067. It indicates that no significance difference between mean value of both groups.

Table 4

t-test for Conceptualization of content knowledge of Teacher Content Knowledge

Gender	N	Mean	Df	T	Sig
Male	31	117.3571			
			50	2.647	.003
Female	21	19.5238			

Table 4 revels result of independent simple t test. It makes clear that they were statistical difference in the mean scores of male teachers working in university level (N= 31, mean= 117.3571) and Female teachers (N= 21, mean= 19.5238) df =47, t = 1.647, sig=.003. It indicates that significance difference between mean value of both groups.

Table 5

t-test for Transmition of knowledge of Teacher Content Knowledge

Gender	N	Mean	Df	T	Sig
Male	31	162.8095			
			50	2.453	.002
Female	21	35.3571			

Table 5 revels result of independent simple t test. It makes clear that they were statistical difference in the mean scores of male teachers working in university level (N= 31, mean= 162.8095) and Female teachers (N= 21, mean= 35.3571) df =50, t = 2.453, sig=.002. It indicates that significance difference between mean value of both groups.

Table 6

t-test result of Teacher content Knowledge

Gender	N	Mean	Df	T	Sig
Male	31	92.6786			
			50	-2.853	.002
Female	21	105.4286			

Table 6 reveals result of independent simple t test. It makes clear that they were statistical difference in the mean scores of male teachers working in university level (N= 31, mean= 92.6786) and Female teachers (N= 21, mean= 249.4286) df =50, t = -2.853, sig=.002. It indicates that significance difference between mean value of both groups.

Discussion

The 1st objective of the research is "to find the level of teachers 'content knowledge at higher education level." After applying this, it was concluded that teacher content knowledge has been positive link with university teacher's male and females. Jordan (2013) suggests that, while both genders rate their knowledge highly, especially Content Knowledge there are significant differences in how male and female beginning teachers rated their knowledge, with males rating their knowledge higher in both years of this study.

2nd objective "To compare teachers' content knowledge regarding gender at higher education level." After applying this, it was concluded that there is significance difference between Teacher content Knowledge regarding male and female at university level, may reason that the teachers are very sincere with their subject and the feel comfortable with their job. According to Kavanoz et al. (2015) Pedagogical Knowledge subscales while lower scores were measured in Web Communicative and Web Pedagogical Content Knowledge sub-scales. The participants' level of general self-efficacy regarding W-PCK was positively correlated with their attitudes towards Web-based instruction. No significant gender or year level differences were observed in their study.

Conclusion

After analyzing the result researcher has drawn the conclusion from the analyzed data below of the study "gender-based analysis of teachers' content knowledge at higher education level".

- It shows that obtain result of teachers in knowledge of subject matter, Conceptualization of content knowledge and transmission of knowledge.
- The result of the analysis show that the strongest factor of teacher content knowledge at university level is knowledge of subject matter of teacher content knowledge while the lowest factor of teacher content knowledge at university level is conceptualization of content knowledge. It was concluded that knowledge of subject matter is slightly better than other values of teacher content knowledge at university level in AJ&K.
- It was concluded that significant difference of teacher content knowledge regarding gender at university level. Both male and female teachers are very sincere with subject and they feel comfortable with their job.

Recommendations

The findings from this study suggest that there are major differences in how male and female beginning teachers assess their knowledge of the TPACK framework. Previous research has not really focused on the influence of gender, and the few studies which have reported inconsistent findings.

It is recommended that :

1. Teachers may aware own knowledge gaps and seek professional development with help of training and workshops.
2. Teachers may update with research and best practices through collaboration.
3. Teachers may use concise, clear and accurate language when explaining concepts.

4. Teachers may be familiar with the curriculum standard and requirements.
5. It is also recommended to use updated technology and resources to enhance teaching and learning.

Limitations

Further studies are therefore warranted, so that we can gain a much clearer understanding of its possible role. Further studies could focus on pre-service and in-service teachers, and consider possible similarities and differences in how both rate their knowledge. Further studies might also examine public and private schools.

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