An Investigation to Study the Relationship of Multiple Intelligence and Students' Learning Styles

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ARTICLE INFO	ABSTRACT
	This research was planned to assess and identify the impact of multiple intelligences on students' learning styles at university level in public sector universities Rawalpindi. The research used two approaches about theoretical frameworks for conducting this study. One was based on multiple intelligences given by Gardner (2011) which was consist of 9 sub dimensions named as linguistic, logical, musical, bodily, kinesthetic, intrapersonal, interpersonal, naturalistic and existentialist. The second theoretical framework was based on students' learning styles given by Baneshi, Tezerjani, and Mokhtarpour (2014) which was consist of six sub dimensions named as, Independent, avoidant, collaborative, dependent, competitive and participatory. The researcher used quantitative approach to conduct the study. The researcher adopted two questionnaires based on theoretical frameworks. One was based on multiple intelligences given by Gardner (2011) which was consist of 9 sub dimensions named as linguistic, logical, musical, bodily, kinesthetic, intrapersonal, interpersonal, naturalistic and existentialist. There were total 45 items, each dimensions were consisting of 5 items. The second theoretical framework was based on students' learning styles given by Baneshi et al. (2014) which was consist of six sub dimensions named as, Independent, avoidant, collaborative, dependent, competitive and participatory. Each dimensions were consisting of 10 items and there were 60 items in total. Convenient sampling technique was used to collect the data. After collecting data, the researcher used SPSS to enter the data and run test according to the objectives. The researcher used individual scores and regression analysis in SPSS to achieve the targeted objectives. It is recommended that teachers should encourage students to explore and develop their multiple intelligence in ways that align with their personal interests and strengths. This can help students to become more self-aware and confident learners.

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1. Introduction

Allah has created each human being the noblest due to which he looks unique from the rest of the living beings. Every human has been blessed by Allah with countless abilities. For some reason they look unique from each other. The role of student is very important in any educational institutions because no educational institutions can run without students. Students in educational institutions come from different family backgrounds and each student is different from each other in terms of individual differences like intelligence, physical, mental and emotional. The word intelligence was first introduced by Alfred Binet in 1905. Intelligence means how capable the person is to learn something, means how much time he takes to learn something. The learning styles was first introduced by David Colb in 1984, learning styles means which learning styles a person use to learn something, in which way or style he is

capable to learn something. Gardner (2011) proposed the theory multiple intelligence and he divided this theory into nine parts. This theory claims that each individual has unique intelligence style which he uses to learn something in a better way. Given the wide range of intelligences, it is reasonable to assume that students may achieve remarkable success in various subject areas and that their preferred learning styles may vary depending on their dominant intelligence type. That's why multiple intelligences are interlinked with learning styles because multiple intelligence focus on capability of individual whereas learning styles depends on individual's way of learning something.

1.1. Rationale of the Study

A research on multiple intelligence and its impact on university students' academic performance was undertaken by few researchers. Those studies discovered a strong link between academic success and multidimensional intelligence. When compared to students with other intelligence types, those with strong logical-mathematical intelligence performed better in the classroom. In a 2019 study, Hussain et al. investigated the effects of multiple intelligence on maths students' academic progress. In comparison to pupils with other forms of intelligence, the study indicated that students with logical-mathematical intelligence outperformed them in mathematics. Nyhammer (2022) studied multiple intelligence and how it affected university students' learning preferences. The study discovered a high correlation between students' chosen learning preferences and them predominate intellect type. Students who are highly linguistically intelligent, for instance, like text-based materials, whereas those who are highly bodily-kinesthetically intelligent, favor hands-on activities.

In 2020, Nawab and Nisa did research on multiple intelligence and how it affects university students' academic performance. According to the study, pupils with strong interpersonal intelligence performed better academically in the humanities and social sciences. The literature on the effects of multiple intelligences on students' preferred learning methods at Rawalpindi's universities was reviewed for the current study. According to the analysis of the research, students' academic success and multiple intelligences are both highly connected with their learning preferences and dominant intelligence types. This suggests that instructors should create instructional techniques that accommodate students' varied learning preferences. This may be accomplished by including activities and learning resources that complement various intellect types. As a result, the current study suggests that future research concentrate on developing useful techniques to integrate multiple intelligence theory into university curricula.

1.2. Problem Statement

The researcher conducted a research on impact of multiple intelligence on learning styles of students at university level. It is an area of research that requires attention. It remains unclear that how these intelligences impact the learning styles of students. In Pakistan teachers and parents may unaware about the multiple intelligence level and learning styles of children. It is because lack of training awareness programs for teacher and parents regarding different learning styles and also because of the traditional teaching methods. In Pakistan teachers may not pay attention to the individual differences in learning of their students. It is important to spread awareness among teachers and parents about the concept of multiple intelligence and learning styles and how they can impact students learning. That's why the researcher conducted this research to identify the impact of multiple intelligence on students learning styles.

1.3. Significance of the Study

The current finding and results of the study on impact of multiple intelligence on learning styles among university students would be useful for teachers. Teachers may able to know about the concept of multiple intelligence and how it impacts the learning styles of students. Teachers may develop lesson plan that may help to cater different multiple intelligences and learning styles of students, by which students may feel motivated to learn and retain information. Policy makers may also get benefits from this research by conducting training and developmental programs for teacher to equip well to identify students' intelligence level and their learning styles. Curriculum wing may also get benefits from this study by understanding the importance of multiple intelligence and its impact on learning styles of students. Curriculum wing may promote student centered, learning strategies across the country. Parents may also get benefits from research by assisting parents in promoting their

children's learning by providing them with resources and opportunities that are compatible to with their multiple intelligence.

1.4. Objectives of the Study
The objectives of the study were as follow:

1.   To identify the level of multiple intelligences among university students.
2.   To assess the impact of multiple intelligences on students' learning styles among university students.

1.5. Hypotheses
1)   There is no significant impact of multiple intelligence on students' learning styles at university level.

2.   Conceptual Framework
The researcher used theories to make a conceptual framework. There were two variables of the study one multiple intelligence and the other learning styles. For multiple intelligence the researcher used the theory of Howard Gardner consist of 9 sub variables, named as Naturalistic, musical, mathematical, existentialistic, linguistic, interpersonal, intrapersonal, spatial, kinesthetic and musical. Whereas the other variable is learning styles for this variable the type of learning styles they are as follow: Independent, avoidant, collaborative, dependent, competitive and participatory.

Figure 1: Conceptual framework on Impact of multiple Intelligence on Students' Learning Styles
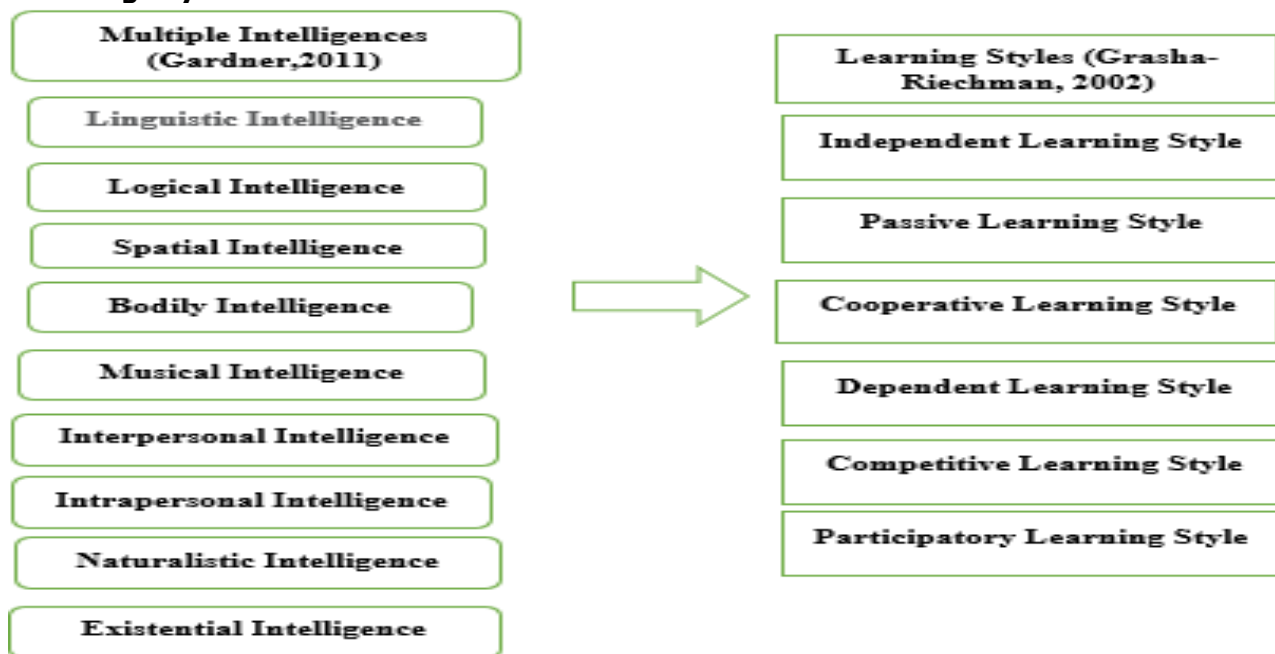
3.   Literature Review
Multiple Intelligences and learning styles are seen as important in influencing students' image, interests and values, and choices. In keeping with Gardner's numerous theories of intelligence, educators identify various learning preferences in their pupils. Each student utilizes the knowledge they have learned in the classroom in accordance with their dominant intelligence and preferred learning style. According to Gardner's multiple intelligences hypothesis (MI), combining learning styles with dominant intelligences improves students' learning processes (Jaleel, 2016). According to Finkenthal (2019), a number of variables, including gender, age, marital status, parental education, parental participation, academic success, etc., have a significant impact on how well kids develop multiple intelligences. Additionally, the fundamental premise is that intelligence does not evolve as a singular, unchanging, and monolithic entity. It's true to say the contrary. Additionally, another scholar notes that the cultural and social milieu has an impact on how multiple intelligences emerge.

According to Jaleel (2016), those with visual and kinesthetic intelligences scored highest. Batdı (2017) discovered that the verbal, intrapersonal, interpersonal, and mathematical-logic intelligences are more predominate, while the naturalist and visual intelligences are among the lowest.

Kim (2020) found that learners with multiple major learning styles and tactile or kinesthetic learning styles had higher levels of expectation, and Pour-Mohammadi, Abidin, and Ahmad (2012) discovered that students perceived their strengths in interpersonal, intrapersonal, and verbal-linguistic intelligence and their weaknesses in bodily-kinesthetic and naturalist intelligence. Gardner (2011) discovered that co-creating and multiple intelligence practices have transformed the classroom experience, an demonstrated the effectiveness of differentiated instruction by integrating multiple intelligences and learning styles on problem solving, achievement in, and attitudes towards maths in target students. Gardner (2011) proposed the hypothesis of multiple intelligence (MI). He had assigned nine separate intelligences. This notion states that each person has a unique intelligence style that they employ to study more effectively. Multiple intelligence hypothesis.

3.1. Linguistic Intelligences

Gardner (2011) defines linguistic intelligence as one of nine intelligences. Everyone in the world believes that language is the most valuable factor because it allows them to engage with people in Indonesian, English, or any other language that they know (Muhammad, 2022).

3.2. Logical Intelligences

It is the ability to use figures effectively for a desirable cause (Taheri, Sadighi, Bagheri, & Bavali, 2019). Individuals with these intelligences can categories, deduce, and generalize (Punia, Malik, Bala, Phor, & Chander, 2022). It is the ability to reason with numbers, draw assumptions, build reasonable relationships, construct theories, solve problems, think critically, and grasp abstract symbols such as numbers and geometric forms, as well as create links between information.

3.3. Musical Intelligences

Music is an important aspect of human existence and culture. It is one of the oldest and most important social cognitive areas in humans. Music plays several functions in our lives.
This offers entertainment, simulation, inspiration, and a learning resource. It improves immune system activity. Blood pressure, heart rate, and body temperature are all affected by the speed and type of musical range. It also improves hearing and it is a musical intelligence that demands attention to rhythm, pitch, melody, and sound (Armstrong, 2009).

3.4. Spatial Intelligence

The ability to assess anything with mind is called as spatial intelligence. These people prefer to use the illustrations rather than defining the terms in sentences or any other form.

3.5. Bodily Kinesthetic Intelligence

With the aid of the body's ability of expressions, kinesthetic intelligence brings the capacity of expressions, powerful interaction occurs among the body parts, and tough difficulties are resolved with the help of physical activities (Nulhakim & Berlian, 2020).

3.6. Intrapersonal Intelligence

According to Shaikh, Khan, and Wakpainjan (2016), intrapersonal intelligence is described in this way that ability to cope with those emotions existing in external environment as well as within a personality. Intrapersonal intelligence refers to a person's self-awareness and ability to successfully use such knowledge.

3.7. Naturalistic Intelligence

A person with the finest naturalistic intelligence perception is adept at perceiving season, vegetation, occupancy, and temperature. Naturalistic people are associated with nature and living things (Rivers et al., 2012).

3.8. Existentialistic Intelligence

This intelligence refers to the ability to ask and answer serious existential questions. Individuals with existential intelligence.

3.9. Interpersonal intelligence

Interpersonal intelligence refers to the ability to observe and listen, analyse information, and build social relationships with others (Nguyen, 2022). A research by Oskooei and Salahshoor (2014), it was shown that students' academic performance and attitude towards learning improved when teachers included different intelligence-based techniques into their lesson plans. A better knowledge of the material and more engagement in learning activities were also seen in students who recognized and utilized their primary intellectual strengths. Similar research was done by Shaikh et al. (2016) to determine how many intelligences-based teaching strategies affected the learning results of medical students. Using a quasi-experimental methodology, the researchers discovered that students who were exposed to a variety of intelligence-based teaching techniques performed better on final tests and understood medical concepts than counterparts who received instruction from more traditional means. Al-Abdallat and Al-Omari (2023) also looked at the impact of multiple intelligences activities on students' anxiety and language proficiency in a different research. Researchers discovered that students who engaged in several intelligence-based activities had decreased levels of anxiety and improved language proficiency when compared to those who received instruction using conventional approaches.

The teaching methods of teachers have a considerable influence on the learning styles and academic achievement of pupils. When instructors include multiple intelligences-based teaching techniques into their lesson plans, they may personalize learning to meet the needs and preferences of their students. The teacher-student connection is reinforced as a consequence, and pupils are more actively involved in learning activities. According to Gul and Rafique (2017), when teachers include multiple intelligences into their lesson plans, it gives students who may struggle with conventional teaching techniques the chance to show their talents through alternate means. Students may feel more empowered as a result, and their confidence in their ability to study may increase. Sharma and Chand (2022) did a research to learn more about the use of MI theory in education. The study looked at whether providing instructors with MI theory training may have a good influence on the learning outcomes of their students. It concluded that MI theory-trained teachers were better at instructing students with different learning preferences, which improved student performance. Overall, multiple intelligence is a useful concept that improves student learning outcomes and instructional methodologies. MI-based teaching practices may be tailored to each student's unique talents and preferences, resulting in increased engagement, confidence, and academic achievement. Furthermore, implementing MI theory into teacher education programs might result in more effective teaching techniques that adapt to varied students' learning styles. It is critical that educators, teachers, and academic institutions continue to apply this paradigm to better understand and adapt to students' various learning styles as we move forward.

There are certain gaps in the existing literature despite the multiple intelligence theory's considerable contributions to the field of education. First off, little attention has been made to university-level education in the majority of the study on multiple intelligences, which has mostly concentrated on primary and secondary schools. Second, there is a lack of focus on understanding the influence of multiple intelligences on students' learning styles in Pakistani research that examine the effects of teaching approaches on academic achievement. Thirdly, insufficient emphasis is given to the influence of multiple intelligence on other crucial abilities like critical thinking, leadership, decision-making, communication, and collaboration skills in the present research on multiple intelligence, which primarily concentrate on the impact of multiple intelligence on academic achievement.

4.   Research Methodology
4.1.   Research Approach

The study used a quantitative research methodology. The foundation of quantitative research is numerical measurement and statistical data analysis. To find and examine numerical data or information that may be given as statistical value for better comprehension, a quantitative method is used. Based on the nature of the research's aims and hypothesis, the researcher chose this strategy.

4.2. Research Design

According to earlier researches design is an arrangement of parameters for data collection and analysis that balances relationship with the research's objective with procedural efficiency. Researcher used a descriptive strategy to evaluate how independent variables affected dependent variables.

4.3. Research Method

The study's methodology was descriptive research. A population, circumstance, or phenomena that is being examined may be described in descriptive research. It concentrates on addressing the how, what, when, and where of the occurrences under examination.

According to the objective no 2 of the research study was to assess the impact of multiple intelligences on students learning styles, the co-relational research method was used and for collecting the data researcher used survey method.

4.4. Sampling Technique

For the present study, the convenient sampling technique is used. The technique was adopted due to time constraint. As this research project is executed during the PhD studies. So mutually researchers were agreed to collect the data where they are enrolled to complete the project well at time. Henceforth, this technique adopted to cater the time constraint.

4.5. Data Collection

Data collected through an adopted questionnaire. This tool had been developed by with 8 types of intelligences. This tool aimed to collect the data about multiple intelligences. However, few earlier researchers added 9th form of intelligence and updated the same tool. This tool consisted of 45 items. The second questionnaire developed by Grasha-Riechmann, was adopted, on student's learning styles. This tool consist of 60 items. Both tools were updated as per the need of area.

4.6. Delimitation of the Research Study

Due to time and financial constraints following delimitation were made:

- Arid university
- Rawalpindi
- Public sector Universities

Due to time shortage the researcher was trying her best to collect the required date and also shortage of resources the researcher was unable to collect the data and collected data through online sources.

5. Results and Discussion

Objective No.1: Identify the level of multiple intelligences of leaners at university level.

Table 1: Level of Multiple Intelligences (N=40)

Sr. N	Score	Level of Interpersonal Skills	N	Percent%
1	45-105	Below Average	10	25%
2	106-166	Average	13	32.5%
3	167-225	Above Average	17	42.5%

The level of multiple intelligence of students is shown in table 4.1. There were three groups of the students as shown in above mentioned table. These groups indicated the category of the respondents according to their multiple intelligences. To place respondents in a specific category, scores of respondents were divided into three groups. These groups were named as below average, average, and above average. Ranges from 60-105 named as below average, 106-166 named as average and 167-225 named as above average. Table depicted that majority (42.5%) of the students at above level of multiple intelligence. However 32.5% were at average level and only 25%% were at below average.

Ho1:   There is no statistically impact of multiple intelligence on learning styles
of students at university level

Table 2: Impact of multiple intelligence on students' leaning styles (N= 40)

Independent Variable	Dependent Variable	B(Coefficient)	T	Sig	R Square
Multiple Intelligence	Learning Styles	4.14	0.95	0.337	.024

**P< 0.01, *P<0.05

The Independent Variable (MIQ) R square value .024 which explaining that multiple intelligence had 24% percent variation in learning styles. However, there are more factors playing their role in rest of variation. While the coefficient (β=4.14) shows that this effect is positive and t- value (t= 0.95) was observed statistically significant at 0.337 indicates that this relationship is not statistically significant at the 95% confidence level. Thus the hypothesis No.1 there is no statistically impact of multiple intelligence on students learning style at university level is accepted.

6.   Summary, Findings, Discussion, Conclusion and Recommendations
6.1.   Summary

This research was based on impact of multiple intelligences on students' learning styles at university level. This research was conducted to achieve two main objectives; they are

i) Identify the level of multiple intelligences on university level.
ii) Assessing the impact of multiple intelligences on students' learning styles at university level.

The researcher used two theoretical frameworks one was based on multiple intelligences given by Gardner (2011) which was consist of nine sub dimensions, whereas the second theoretical framework was based on students' learning styles given by earlier scholars which was consist of six sub dimensions. Targeted population of the study was Arid University Rawalpindi. The researcher selected 40 respondents on the basis of convenient sampling technique. The researcher adopted two questionnaires for multiple intelligences the researcher used (Gardner, 2011) questionnaire which was consist of 45 items, second learning styles questionnaire which was consist of 60 items developed by scholars. After collecting data, the researcher used SPSS to enter data and run test according to the objectives. The researcher used two test one individual test and other regression test. The reliability of the variable multiple intelligences was .990 and learning styles was .980.

7.   Findings

Research findings based on the results and data interpretation. This section describes the findings of the research. Researcher applied Cronbach's Alpha to check the reliability of the tool used in this research. The value of this test was recorded as 0.990 for the questionnaire. Based on data analysis the results were drawn. Details of these findings are given below. Additionally, overall reliability of the Student's learning 0.980.

Objective No.1 "Identify the level of multiple intelligence of students at university level". It was found that majority of the respondents had (42.5%) above average level of multiple intelligences. Though, result depicted that most of the students lies at above average level of MI, however there were 25% who lies below the average MI. This number is significant and more as per standards. It leads to a conclusion that there are a reasonable number of students, who have less MI, sitting in the classrooms of higher educational level. Ultimately, such students may create pressure to the teachers either to create a learning environment or to stick with their problems. This statistics also revealed that these students may not supporting the teachers to proceed in a standardized lecture pattern. The other side of this statistics, is that, teachers in higher education should have enough pedagogical skills to overcome this reasonable number and deal these students strategically. This is an important challenge to engage such students in learning activities.

Objective No.2 "To assess the impact of multiple intelligence on students' learning students at university level.

It is being concluded that multiple intelligence represents 2.4% variation on students' learning styles and it further revealed that it was a statistically significant at 0.337 level of significance. This variation is important for decision makers at higher education level. It depicted that managers and academic heads of institutions should focus on pedagogical skill of

teachers to handle this significant variation of students who are sitting in the classrooms. A wide range of teacher's methodologies is important which can be adopted in the classrooms to overcome this variation and meet the needs of students.

8.   Discussions

The research study was designed to assess the impact of multiple intelligence on students' learning styles at university level. The first objective was to assess the level of multiple intelligence of students at university level. It was concluded that mostly respondents were at were at above level of multiple intelligence. A study conducted by Stefanie D Wilson and Mujtaba (2010) on multiple intelligence theory and student learning styles at university level: a no correlation study. It discovered no association between students' dominant intelligence type and preferred learning approaches. Stefanie Denise Wilson (2007) did a study on multiple intelligence theory and student learning styles at the university level: limited evidence. This notion has no major influence on university-level student learning patterns. Kamińska et al. (2023) research on multiple intelligence theory and learning styles at the university level: a puzzle to be solved. There was no statistically significant relationship between multiple intelligence hypothesis and pupils' chosen learning styles. The second major objective of the study was to assess the impact of multiple intelligence on student learning styles. Findings of the study revealed that there is no significant effect of multiple intelligence on students' learning styles. A similar study conducted by Moafian and Ebrahimi (2015) the purpose was to look at the presence of multiple intelligence in university students. The findings revealed that the majority of pupils performed above-average. Another similar study conducted by Sciarra, Austin, and Bienia (2022) on an exploratory investigation of multiple intelligences in university students. The study's findings showed that most students had above-average levels of intelligence. Another similar study conducted by many scholars according to the study, students demonstrated above-average levels of several types of intelligence, including musical, logical-mathematical, and bodily-kinesthetic intelligence.

9.   Conclusion

Conclusion is based on the findings of the research which are highlighted in previous section. Now in the following lines there is a snapshot of the conclusion:

Objective No.1: It was drafted as "identify the level of multiple intelligence of students learning at university level". As a whole, conclusion is that majority of students exhibited an above level of multiple intelligence at (42.5%). However, there is a countable number of students who lies in the group of lower multiple intelligence (25%). The second objective was to assess the impact of multiple intelligence on students' learning styles. It was concluded that there was significant impact of multiple intelligence on students' learning styles and hypothesis was accepted. This is important to report that the study was conducted at a small level, which may be generalized at the same university. However, there should be some more studies to know about the phenomenon at the province level or at country level.

9.1.   Recommendations

1.   Educators should focus on implementing a variety of teaching strategies that cater to different learning styles, regardless of students' dominant intelligence type. This can help ensure that all students receive equal opportunities for learning.
2.   Further research should be conducted to explore the relationship between multiple intelligence and other factors that may impact student learning, such as motivation, interest, and prior knowledge.
3.   Educators should continue to incorporate multiple intelligence theory into their teaching practices as a means of promoting a more holistic and diverse approach to learning, despite the lack of significant impact on learning styles.
4.   Teachers should encourage students to explore and develop their multiple intelligence in ways that align with their personal interests and strengths. This can help students to become more self-aware and confident learners.
5.   It is recommended to conduct such studies in a bulk of universities, college, school, and early learning centers to know about the learning styles and status of multiple intelligences in these institutions. In this way, policy makers can engage the training institutions to overcome the challenges in the classrooms.

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