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Teaching styles of biology teachers and student's performance in a private university in China

Xu, Songhe ✉
Institute of Graduate and Professional Studies,
Lyceum-Northwestern University, Dagupan City, Philippines

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Abstract

This study investigated the impact of teaching styles employed by biology teachers on the academic performance of students at Jining Normal University in China. The research aimed to describe the demographic profile of respondents, assess teaching styles as perceived by both teachers and students, and test the relationships between teaching styles and student performance. A descriptive research design was employed, utilizing a questionnaire administered to 100 biology students and 10 biology teachers. The study found that teachers consistently utilize a variety of teaching styles, including demonstrator, facilitator, and authoritarian methods, with a composite mean of 3.55. Students also perceived these styles as being consistently employed, with a composite mean of 3.42. Significant differences were found between teacher and student perceptions of teaching styles, highlighting the importance of ongoing feedback. A significant difference was also found between students' prelim and final grades, demonstrating the positive impact of the teaching styles on student performance. The study concluded that the teaching styles employed by biology teachers at Jining Normal University generally have a positive impact on student academic performance, with certain styles, such as the use of visual aids, interactive activities, and structured assignments, having a particularly strong influence. The study recommends that teachers prioritize these effective styles, seek regular student feedback, and refine the implementation of hybrid and delegator approaches to optimize learning outcomes.

Keywords: teaching styles, biology teachers, students' performance, private university, classroom management

Teaching styles of biology teachers and student's performance in a private university in China

1. Introduction

The teaching profession is an occupational field in education that is directly responsible for the formation of young minds and hearts. This means a teacher ends up playing several roles simultaneously. A teacher has to have a personality that sincerely welcomes a learner into the journey of lifelong learning. It requires intelligence, skills, insights, and diligence in succeeding different ways to fulfill the challenge of classrooms. Teaching style is a multitask phenomenon that illuminates how teachers teach knowledge; accomplish classroom work, and supervision of students. These tasks do not spare and inspire women to contribute in economic and social development. Women are given less educational chances than for men. They dislike the jobs in male dominant professions like architecture, business and engineering. Many studies have presented their results that teaching styles are associated with achievement score of students.

Constructivist style of teaching based on the notion that learning is an active process. It states that students generate their own ideas and link it with previous knowledge. Huang and Fraser (2009) revealed that male teachers supposed to exhibit better relationship with students than that of female teachers. Research found that evaluation of students inclined to gender of teachers. Many studies highlighted that students rank male teacher differently than female teacher. There are many reasons behind that students show biased views male and female faculty members. Teaching styles are classified on the basis of their application and merits. The styles have both merits as well demerits. The popular current teaching styles are designated by Brown (2001) and discovered by Grasha (2002). According to Brown (2001), refers teaching styles as teachers' personal behaviors to deliver knowledge.

According to Sun and Wang (2007), teaching styles are Authoritarian, democratic, and laissez-faire. The proper working facilities make teachers more productive, comfortable and competent. Gender and teaching Styles Many studies conducted by Driessen (2009) investigated that gender of students is motivated and influenced by gender of teachers. Jones (2003) explained that male teachers were more motivating for boys than female teachers. According to Mullola et al. (2011), the gender of teachers did not have an impact on students' grades. Driessen (2009) revealed that male teachers assess their students better than females. Male teachers stressed on cognitive development of students in classroom because male teachers have more qualification and content knowledge than females. In male and female teachers about class organization. Female instructors experience more behavioral challenges than male teachers. Carrington et al. (2008) investigated that teachers' gender do not impact on students' attainment. The students may accurately assess teaching styles of teachers attributed to them. Female teachers utilize inspiration to help content-oriented paradigms. Female teachers more time in preparation of lectures, plan course, and design learning tasks for assessing students' learning activities. National Centre for Education Statistics reported that female teachers dominate male teachers in teaching profession triple times. National Education Association highlighted that American's elementary school teachers comprised only nine percent male teachers. Female instructors emphasized higher thinking abilities, promote learning environment and multiple experiences than male instructors.

Female teachers use more active learning strategies. Female teachers use more interactive techniques than male teacher. Female teacher influences girls' performance than boys. The female students outperform than male students in test. Female teachers improve female test scores twenty percent more than boys. Many studies initiate that female teachers affect female students' achievement score. Teachers' teaching styles have an impact on students' performance. It essential to know what the students' preferences are to help them understand a topic and build a much friendlier classroom environment. An effective classroom organization plan involves advance planning of a lesson, from beginning to end, using a variety of procedures. The teachers utilize basic and

advanced classroom management techniques in order to provide quality education and order in the classroom, providing a much livelier atmosphere wherein students and the teachers share a bond in learning the topic together.

The teachers, being the focal figure in education, must be competent and knowledgeable in order to impart the knowledge they could give to their students. Good teaching is a very personal manner. Effective teaching is concerned with the student as a person and with his general development. The teacher must recognize individual differences among his/her students and adjust instructions that best suit to the learners. It is always a fact as educators, we play varied and vital roles in the classroom. Teachers are considered the light in the classroom. We are entrusted with so many responsibilities that range from the very simple to most complex and very challenging jobs. Everyday we encounter them as part of the work or mission that we are in. It is very necessary that we need to understand the need to be motivated in doing our work well, so as to have motivated students in the classroom. When students are motivated, then learning will easily take place. However, motivating students to learn requires a very challenging role on the part of the teacher. It requires a variety of teaching styles or techniques just to capture students' interests. Above all, the teacher must himself come into possession of adequate knowledge of the objectives and standards of the curriculum, skills in teaching, interest, appreciation and ideals. He needs to exert effort to lead children or students into a life that is large, full, stimulating and satisfying.

Some students seem naturally enthusiastic about learning, but many need or expect their instructors or teachers to inspire, challenge or stimulate them. "Effective learning in the classroom depends on the teacher's ability to maintain. The interest that brought students to the course in the first place (Erickson, 2008). Not all students are motivated by the same values, needs, desires and wants. Some students are motivated by the approval of others or by overcoming challenges. Helping students understand better in the classroom is one of the primary concerns of every teacher. Teachers need to motivate students how to learn. According to Schlecty (2012), students who understand the lesson tend to be more engaged and show different characteristics such as they are attracted to do work, persist in the work despite challenges and obstacles, and take visible delight in accomplishing their work. In developing students' understanding to learn important concepts, teacher may use a variety of teaching strategies that would work best or her/his students. Furthermore, teachers need to vary teaching styles and techniques so as not to cause boredom to the students in the classroom. Seeking greater insight into how children learn from the way teachers discuss and handle the lesson in the classroom and teach students the life skills they need, could be one of the greatest achievements in the teaching process.

Various researchers have stressed different aspects of styles in teaching. Gregorc (2009) indicated that a teaching styles consists of a teacher's personal behaviors and the media used to transmit data to or receive it from the learner. Teaching styles refers to educators' behaviors as they teach in the classroom. Educators' personal qualities are considered persistent. Fischer (2009) similarly defined teaching style. They stated that the teaching style of an instructor might persist even when he or she uses several different teaching techniques and methods. How teachers teach is related to how they learn. Research supports the concept that most teachers teach the way they learn. Dunn et. al, (2009) claimed that teachers' teaching styles correspond to their learning styles. Based on their personal learning experiences, teachers tend to teach students how they themselves learn the best and introduce learning. Strategies that have benefited their own learning. The same learning strategies, however, may not work well for all of their students. Therefore, Dunn et. al, (2009) indicated that teachers should adjust their preferred way of teaching to reach each student.

Grasha (2002) supported the idea of viewing teaching style in terms of its elements. He defines teaching style as several elements that teachers demonstrated in every teaching-learning moment behaviors, roles, instructional practices, characteristics, and beliefs. He was in agreement with Dunn et. al, (2009) and claimed that educators should modify their teaching styles so as to meet the needs of all students. Few can deny that every student learns and responds to information uniquely. To better serve a student's learning needs, researchers have discussed the role of teaching style in student learning. Many of those researchers support the view that

matching teaching and learning styles improves student achievement. Farkas (2003) investigated the effect of teaching styles on two groups of seventh-grade students. Students in the experimental group preferred similar learning styles and were taught according to their preferences, while the control group was taught with a conventional teaching style. In this study, the students in the experimental group, who received a teaching styles that matched their preferred learning styles, outperformed the control group academically. The experimental group also showed more positive attitudes toward learning, more understanding of people's feelings, and an increased ability to transfer what they had learned from one area to another. Researchers have classified teaching style in many ways and have considered certain teaching styles more effective in improving student learning.

Curtin (2005) studied a group of English as a Second Language (ESL) students and their teachers and categorize teaching styles as didactic and interactive. Didactic teachers make most of the decisions in the classroom, emphasize teaching the content, and put students in a passive role. On the other hand, interactive teachers allow for the diverse learning styles of their students, place much emphasis on the teaching and learning process, and expect students to be active learners. The findings of Curtin's study suggest that teachers who adopt an interactive teaching style can better meet the unique needs of their ESL students. The interactive instructors utilized more cooperative learning strategies along with numerous activities that worked best with ESL students. Since student achievement is influenced by factors other than teacher's actions, it is also important to understand students' perceptions of teaching styles, as these relate to their own learning. Accordingly, research studies have been conducted to examine students' perceptions of teaching styles. The studies enable educators to be aware of students' perspectives and to recognize the need to make adjustments in teaching. In a study conducted by Norzila, et., al (2007), 175 college students took a questionnaire adapted from Grasha (2002) to see if there were differences between students' perceptions and preferences of their English language lecturers' teaching styles. The researchers found that there were no gender differences in students' preferred and perceived teaching styles. However, students preferred learner centered teaching styles, whereas the most frequently used teaching styles of lecturers were teacher-centered in nature.

Hughes (2009) researched the relationships between teaching styles perceived by students and teaching styles adopted by instructors. A total of 117 students participated in the study and were put into either a control group or an experimental group. The instructor taught control-group students pre-calculus with a conventional lecture-based approach. On 11, the other hand, two instructors. In the experimental group adopted a teaching style that increased student involvement; they also provided real-life examples and sufficient time for students to learn a concept by asking questions. The results showed a significant difference in students' perceptions of teaching styles between the control group and experimental group. The results also revealed that students felt the learned better when instructors employed a teaching style that was more interactive than when instructors adopted a conventional lecture style.

Chen (2008) developed an instrument for investigating junior high school students' perceptions of their teachers' teaching styles as part of his thesis project. He produced the Junior high School Teacher's Teaching Style Questionnaire in an effort to classify teaching styles of educators (i.e., authoritarian, democratic, laissez-faire, or indifferent), based on Sun (2007) teachers' discipline style inventory. In his research of 1,587 students, Chen found that the most prevalent teaching style perceived by students was the indifferent teaching style. The findings of the study showed that there were significant differences between students' perceived teaching styles and their academic achievement. Students who perceived that their teachers employed an authoritarian or a democratic teaching style scored higher on tests than students who perceived a laissez-faire or an indifferent teaching style. Chen concluded that students performed better academically if they felt that their teacher established rules to manage their learning, but at the same time listened to students' opinions toward learning and gave them feedback. Several research studies have been conducted to determine if there are differences between teachers' and students' perceptions of teaching styles. McCollin (2000) used the Principles of Adult Learning Scale (PALS) to investigate instructors' teaching styles. The 12 PALS was also adapted to measure teaching styles as perceived by students. The data analysis, utilizing an independent t-test, indicated a significant difference between instructors' self- perceived teaching styles ad students' perceptions of teaching

styles.

In another study, Cothran et., al (2000) also examined teachers' perceived teaching styles. The researchers compared the results of their study with those of Cothran, et., al (2000), since the latter investigated college students' views of teaching styles. The study revealed, again, the teachers' and students' perceptions of teaching styles differed significantly. Teachers used slightly more styles than students observed. The study also showed that teachers and students valued different teaching styles; however, the two groups had different opinions about which teaching styles enhanced motivation and learning. Furthermore, researchers have begun to identify some aspects of the teaching situation that help enhance students' motivation. Research made by Lucas (2010) show that several styles could be employed by the teachers to encourage students to become self-motivated independent learners. As identified, teachers must give frequent positive feedback that supports students' beliefs that they can do well; ensure opportunities for students' success by assigning tasks that are either too easy nor too difficult; help students find personal meaning and value in the material; and help students feel that they are valued members of a learning community. Therefore, it is important to take into consideration students' needs and interests so as to focus instruction that is applicable to different groups of students with different levels.

A study conducted by Chaudhry et al. concluded that punishment is not necessary for the learning process, and imbalanced styles and strict behavior were a primary cause of low academic performance among students. The teacher's open and moderate attitude showed positivity in the students' academic performance and attitude. As cited in the research conducted by Mohanna, et. al (2006), "Effective teachers are adaptable and flexible in providing variety in their teaching activities which aims to match manipulation of the teaching and learning environment that the learner needs, on the contrary, teachers should also know what activities that are most effective at delivering.

Objectives of the Study - This study aims to determine the impact of the teaching styles of Biology teachers to the academic performance of students n Jining University in China, school year 2023-2024. Specifically, this study sought to describe the demographic profile of the respondents as to sex and academic performance during prelims ; assess the teaching styles utilized by Biology teachers as perceived by teachers themselves and students; test the differences in difference between the perception of the teachers themselves and the students on the teaching styles of Biology teachers; test the relationships between the teaching styles of Biology teachers and the profile variables and assess the level of performance of students in Biology in their final grades after utilization of teaching styles.

2. Methods

The researcher employed a descriptive research method, utilizing a questionnaire to gather necessary data. According to Calmorin (2016), this method aims to accurately describe a situation or the association between variables to make statements about a specific group or population. The goal is to describe the current situation and explore the causes of phenomena. This study used the descriptive method to profile students in Biology classes at Jining Normal University in China and to identify the teaching styles of Biology teachers and their relationship to students' academic performance. The subjects of this study were the 100 students in Biology in Jining Normal University and 10 Biology teachers. The researcher used the questionnaire as the major data instrument in this study. The researcher adopted a questionnaire of similar researches on Teaching Styles which consisted of (1) The profile of students in terms of 1.1 Age, and 1.2 academic performance; the frequency counts and corresponding percentage (%) was computed for each of the aforecited variables.

Before the conduct of the study the researcher strictly observed the following standard operation procedures: Secure permit from the Highest Official of the University and a letter of permission was sent to the school department heads of Biological Science in Jining Normal University.to administer the questionnaires to the intended respondents. The researcher administered and retrieved the instrument. using the google form. Data was based from the respondents answers and carefully tallied, tabulated, and analyzed.

Research participants were treated with utmost respect and were not subjected to harm. Their dignity was prioritized, and full consent was obtained before the study commenced. Privacy and confidentiality of participants and data were ensured, maintaining anonymity throughout. No deception or exaggeration about the research aims and objectives was practiced. Affiliations, sources of funding, and any potential conflicts of interest were disclosed. Communication related to the research was conducted with honesty and transparency, avoiding misleading information or biased representation of primary data findings. Participation was voluntary, with respondents having the right to withdraw at any stage. Informed consent was a key principle, ensuring participants received sufficient information to make an informed decision about their involvement, free from pressure or coercion. Offensive, discriminatory, or otherwise unacceptable language was avoided in questionnaires, interviews, and focus groups. Privacy and anonymity were of paramount importance. The works of other authors were acknowledged using the appropriate referencing system as specified in the Dissertation Handbook.

Appropriate statistical tools were utilized to ensure valid and reliable interpretation of the data gathered. Frequency counts and percentages were used for the profile of the respondents. The average weighted mean was employed to assess the teaching styles used by Biology teachers, as perceived by both students and teachers. A Z test was applied to determine the significant difference between teachers' and students' perceptions of teaching styles and the difference in students' performance during prelims and finals. The Spearman Coefficient Correlation tested the significant relationship between the teachers' teaching styles and the students' profiles. The mean percentage score was used to evaluate the students' performance during finals. To assess the impact of teaching styles on students' academic performance, the average weighted mean and a five-point Likert scale were employed, along with their descriptive equivalents.

3. Results and discussion

Table 1 shows the teaching styles utilized by biology teachers as perceived by teachers themselves. Teachers consistently use short activities at the beginning of lessons to capture students' attention and create a positive classroom atmosphere, as indicated by a high weighted mean of 3.98. This practice aligns with Darling-Hammond et al. (2020), who highlight the importance of engaging and supportive learning environments for fostering student success. The emphasis on engaging students at the start of lessons not only helps to create a conducive learning environment but also sets the tone for active participation throughout the class. Incorporating activities that capture students' interest helps maintain focus and motivation, which are crucial for understanding complex biological concepts.

Table 1

Teaching Styles Utilized By Biology Teachers As Perceived By Teachers Themselves

Teaching Styles	WMVI	
1.) My teacher always gives a short activity before starting the lesson to catch the attention of his/her learners and develop a good atmosphere inside the classroom (facilitator)	3.98	Always
2.) My teacher approaches us whenever we don't understand the lesson and kindly teaches it to us again. (Facilitator)	3.98	Always
3.) My teacher encourages us to ask them questions at the end of each discussion. (Facilitator)	3.90	Always
4.) My teacher assigns us to activities to demonstrate what we've learned in the class. (Demonstrator)	3.61	Always
5.) Aside from using our books, my teacher provides visual aids, to gain our interest towards the subject (Demonstrator)	3.61	Always
6.) Whenever we don't understand a point, our teacher uses props as a way to clearly teach his point. (Demonstrator)	3.61	Always
7.) My teacher gives us an assignment to study new topic prior to class discussions. (Authoritarian)	3.42	Always
8.) My teacher sits in class and discusses the topic while we jot down notes and memorize to the best of our ability on what is being said. (Authoritarian)	3.42	Always
9.) My teacher upholds authority in the classroom and is particularly strict. (Authoritarian)	3.42	Always
10.) My teacher uses their daily encounters in giving examples during class discussions and to help us better understand the lesson (Hybrid)	3.40	Often

11.) My teacher has a very distinct and unique personality that allows us to stay attentive to the class. (Hybrid)	3.40Often
12.) My teacher teaches us in styles that's distinct From other teachers and adds their own personal twist to it. (Hybrid)	3.40Often
13.) My teacher allows us to brainstorm in order for us to compile our own understanding about the topic. (Delegator)	3.39Often
14.) My teacher assigns us researches and projects in order to develop our understanding about the lesson. (Delegator)	3.39Often
15) My teacher divides us into groups to work together and collaborate our understanding, showcase our talents and promote leadership skills (Delegator)	3.39Often
Composite Mean	3.55Always

The emphasis on engaging students at the start of lessons not only helps to create a conducive learning environment but also sets the tone for active participation throughout the class. Incorporating activities that capture students' interest helps maintain focus and motivation, which are crucial for understanding complex biological concepts. Teachers also regularly assign activities, use visual aids, and employ props to clarify complex points, with a weighted mean of 3.61, indicative of the demonstrator style. These practices make abstract biological concepts more tangible and understandable. Brown et al. (2001) emphasize the importance of such methods in making complex subjects like biology more accessible and engaging. The incorporation of demonstrator methods reflects an understanding that visual and practical engagement can significantly enhance student comprehension and retention. Providing concrete examples and interactive elements makes the learning experience more relatable and memorable, supporting students in grasping challenging material more effectively.

Meanwhile, the authoritarian style, characterized by assigning homework, lecturing while students take notes, and maintaining strict classroom authority, shows a commitment to structured and disciplined learning environments, each aspect with a weighted mean of 3.42. This approach is supported by Simonsen et al. (2021), who assert that effective classroom management is critical for creating an environment where academic learning can thrive. The balanced use of authoritarian methods demonstrates that while flexibility and engagement are important, there is also a need for clear guidelines and expectations to maintain order and facilitate effective learning. This blend of structure and flexibility ensures that students benefit from both a supportive and well-organized learning environment.

Hybrid teaching methods, which combine traditional and innovative approaches, are frequently used. Teachers use personal anecdotes, maintain distinct personalities, and employ unique teaching styles, all with a weighted mean of 3.40. This variety keeps the learning experience dynamic. Robinson (2016) underscores the need for creativity and individualized learning paths to prepare students for the complexities of the modern world. The use of hybrid methods allows teachers to bring a personal touch to their instruction, making lessons more relatable and engaging. By integrating different teaching styles and incorporating personal elements, educators can better connect with students and adapt their approach to meet individual needs, thereby enhancing the overall learning experience.

Delegator methods, which promote student autonomy and collaboration, are also frequently utilized. Teachers encourage brainstorming, assign research projects, and promote group work, each with a weighted mean of 3.39. These practices foster critical thinking, teamwork, and leadership skills among students. Johnson et al. (2020) found that structured group work enhances students' social skills, critical thinking, and academic achievement, supporting the use of delegator methods in the classroom. The emphasis on delegation and collaboration reflects a commitment to developing students' higher-order thinking skills and preparing them for real-world challenges. By engaging students in group activities and projects, teachers encourage them to take ownership of their learning and work collaboratively, which are essential skills for success beyond the classroom.

The composite mean of 3.55 indicates that teachers generally perceive themselves as consistently applying these diverse teaching styles. This suggests a balanced approach to teaching that emphasizes engagement, clarity,

and active participation, while also maintaining discipline and encouraging innovation. Overall, the data highlights the teachers' efforts to create a dynamic and effective learning environment that caters to various learning preferences and promotes comprehensive educational outcomes.

Table 2 presents students rated indicators related to the Demonstrator style, such as the use of visual aids (3.42), activities to demonstrate learning (3.41), and props for clarification (3.41), as "Always." This aligns with the principles highlighted by Hattie (2009), who emphasizes that visual aids and interactive demonstrations significantly enhance student understanding and engagement. By making abstract concepts more concrete through visual and practical methods, teachers can facilitate better comprehension and retention of complex material. The Facilitator style was also rated "Always," with a mean score of 3.41 for indicators such as giving short activities to capture attention, encouraging questions, and providing additional help when needed. According to Bernard et al. (2009), effective teaching often involves creating an engaging and responsive learning environment, which is a hallmark of the Facilitator approach. Facilitators foster active student participation and provide personalized support, which not only improves academic performance but also promotes positive attitudes towards learning.

Indicators of the Authoritarian style, including lecture-based note-taking, pre-class assignments, and maintaining strict authority, were rated "Often" with a mean of 3.40. While modern educational practices often emphasize flexibility, the structured approach of the Authoritarian style is still supported by Marzano et al. (2003). Their research suggests that a clear and consistent classroom structure is essential for maintaining order and ensuring that students remain focused and disciplined, which can contribute to an effective learning environment. Delegator methods, such as brainstorming, research projects, and group work, received an "Often" rating with a mean of 3.35. According to Vygotsky (1978), collaborative learning and student autonomy are crucial for developing higher-order thinking skills and fostering deeper understanding. By promoting student-led activities and teamwork, Delegator approaches enhance critical thinking, collaboration, and leadership skills, which are valuable for both academic success and real-world applications.

Table 2

Teaching Styles Utilized By Biology Teachers As Perceived By The Students

Teaching Styles	WM	VI
1.) Aside from using our books, my teacher provides visual aids, to gain our interest towards the subject (Demonstrator)	3.42	Always
2.) My teacher assigns us to activities to demonstrate what we've learned in the class. (Demonstrator)	3.41	Always
3.) Whenever we don't understand a point, our teacher uses props as a way to clearly teach his point. (Demonstrator)	3.41	Always
4.) My teacher always gives a short activity before starting the lesson to catch the attention of his/her learners and develop a good atmosphere inside the classroom (facilitator)	3.41	Always
5.) My teacher encourages us to ask them questions at the end of each discussion. (Facilitator)	3.41	Always
6.) My teacher approaches us whenever we don't understand the lesson and kindly teaches it to us again. (Facilitator)	3.41	Always
7.) My teacher sits in class and discusses the topic while we jot down notes and memorize to the best of our ability on what is being said. (Authoritarian)	3.40	Often
8.) My teacher gives us an assignment to study new topic prior to class discussions. (Authoritarian)	3.40	Often
9.) My teacher upholds authority in the classroom and is particularly strict. (Authoritarian)	3.40	Often
10.) My teacher allows us to brainstorm in order for us to compile our own understanding about the topic. (Delegator)	3.35	Often
11.) My teacher assigns us researches and projects in order to develop our understanding about the lesson. (Delegator)	3.35	Often
12.) My teacher divides us into groups to work together and collaborate our understanding, showcase our talents and promote leadership skills (Delegator)	3.35	Often
13.) My teacher teaches us in styles that's distinct from other teachers and adds their own personal twist to it. (Hybrid)	2.60	Seldom
14.) My teacher assigns us researches and projects in order to develop our understanding about the lesson. (Delegator)	3.39	Often
15) My teacher divides us into groups to work together and collaborate our understanding, showcase our talents and promote leadership skills (Delegator)	3.39	Often
Composite Mean	3.42	Always

The Hybrid style, characterized by unique personal twists and diverse teaching methods, was rated "Seldom" with a mean of 2.60. This lower rating could reflect a preference for more structured or consistent teaching methods over less conventional approaches. Nonetheless, Hybridity in teaching can offer valuable benefits, as noted by Tomlinson (2014), who argues that integrating different styles and personalizing instruction can make learning more engaging and relevant for students. Table 2 presents the teaching styles utilized by biology teachers as perceived by the students, with a composite mean of 3.42, indicating that these styles are employed consistently, primarily rated as "Always" by the students. This reflects a commitment to engaging students through multiple methods, such as visual aids, interactive activities, and collaborative projects. The high rating indicates that these practices are not only implemented but are integral to the teaching process, contributing significantly to students' learning experiences.

Table 3

Significant Difference Between The Perception Of The Teachers Themselves And The Students On The Teaching Styles Of Biology Teachers N=100

Tabulated Value @.01	Computed Value	Interpretation
2.58	8.03	Significant

Table 3 reveals a significant difference between the perceptions of teachers and students regarding teaching styles, with a computed value of 8.03 exceeding the tabulated value of 2.58 at the 0.01 significance level. This finding suggests that teachers and students view teaching practices differently, supporting research by Mertler (2009), which indicates that teachers may have an idealized view of their methods that doesn't always align with students' actual experiences. The discrepancy highlights the need for teachers to seek regular feedback from students to ensure their teaching methods are effectively meeting students' needs and expectations. Incorporating student feedback can bridge this gap and enhance instructional effectiveness.

Table 4

Significant Relationship Between Teaching Styles Of Biology and the Profile Variables N=100

Variables	Computed Value	Range	Interpretation
Age	0.138	0.00 to 0.20	Negligible correlation
Academic Performance	0.200	0.00 to 0.20	Negligible correlation

Table 4 shows that the computed values for the relationship between teaching styles and profile variables—age (0.138) and academic performance (0.200)—fall within the negligible correlation range (0.00 to 0.20). This indicates that there is a minimal relationship between these variables and the teaching styles employed by biology teachers. Supporting research by Duckworth and Yeager (2015) suggests that individual profile variables such as age and academic performance may have limited impact on the effectiveness of teaching styles, as other factors, including classroom environment and teacher-student interactions, often play a more substantial role. These findings underscore the importance of focusing on dynamic aspects of teaching and learning rather than static profile characteristics when evaluating and enhancing instructional practices.

Table 5

Level of Performance of Students in Biology in their Final Grade after Utilization of Teaching Styles N=100

Grade	Frequency	Percentage
75 and below	0	0
75-79	3	3.00
80-84	14	14.00
85-89	37	37.00
90 and above	46	46.00
Total	100	100.00

The distribution of final grades for 100 students in biology shows a notable trend in performance after the implementation of various teaching styles. The data reveals that a significant proportion of students achieved

grades of 90 and above (46%), with fewer students falling into the lower ranges (75-79: 3%; 80-84: 14%). This indicates a positive outcome from the teaching styles utilized, which likely contributed to higher academic performance. Research by Hattie (2009) supports this, demonstrating that effective teaching practices, including the use of diverse instructional strategies, significantly enhance student achievement. Additionally, Marzano et al. (2003) emphasize that varied teaching approaches cater to different learning styles and can improve overall student performance. The high percentage of students achieving grades in the higher range suggests that the employed teaching styles were effective in enhancing understanding and engagement, leading to improved academic outcomes.

Table 6

Significant Difference Between The Academic Performance of Students in their Prelim and Final Grades N

Tabulated Value @.01	Computed Value	Interpretation
2.58	2.84	Significant

Table 6 indicates a significant difference between students' academic performance in their prelim and final grades, with a computed value of 2.84 surpassing the tabulated value of 2.58 at the 0.01 significance level. This result highlights that the varied teaching styles employed effectively contributed to improved student performance over the study period. Recent research by Hattie and Timperley (2007) suggests that targeted feedback and adjustments in teaching strategies can lead to significant improvements in student outcomes. Additionally, the work of Wiliam (2018) emphasizes that formative assessments and responsive teaching approaches are crucial for enhancing learning and achievement.

Table 7

Impact of the Teaching Styles of Biology Teachers to the Academic Performance of Students N=100

Teaching Styles	WMVI	
1.) My teacher always gives a short activity before starting the lesson to catch the attention of his/her learners and develop a good atmosphere inside the classroom (facilitator)	4.77	Very Great Impact
2.) My teacher gives us an assignment to study new topic prior to class discussions. (Authoritarian)	4.75	Very Great Impact
3.) My teacher uses their daily encounters in giving examples during class discussions and to help us better understand the lesson (Hybrid)	2.60	Poor Impact
4.) My teacher divides us into groups to work together and collaborate our understanding, showcase our talents and promote leadership skills (Delegator)	2.62	Moderate Impact
5.) Aside from using our books, my teacher provides visual aids, to gain our interest towards the subject	4.99	Very Great Impact
6.) My teacher sits in class and discusses the topic while we jot down notes and memorize to the best of our ability on what is being said.	2.60	Poor Impact
7.) My teacher assigns us to activities to demonstrate what we've learned in the class. (Demonstrator)	4.51	Very Great Impact
8.) My teacher has a very distinct and unique personality that allows us to stay attentive to the class. (Hybrid)	2.62	Moderate Impact
9.) My teacher encourages us to ask them questions at the end of each discussion. (Facilitator)	4.55	Very Great Impact
10.) Whenever we don't understand a point, our teacher uses props as a way to clearly teach his point. (Demonstrator)	4.90	Very Great Impact
11.) My teacher approaches us whenever we don't understand the lesson and kindly teaches it to us again. (Facilitator)	4.85	Very Great Impact
12.) My teacher teaches us in styles that's distinct from other teachers and adds their own personal twist to it. (Hybrid)	2.60	Poor Impact
13.) My teacher allows us to brainstorm in order for us to compile our own understanding about the topic (Delegator)	2.62	Moderate Impact
14.) My teacher assigns us researches and projects in order to develop our understanding about the lesson. (Delegator)	2.60	Poor Impact
15.) My teacher upholds authority in the classroom and is particularly strict. (Authoritarian)	2.62	Moderate Impact
Composite Mean	3.49	Great Impact

Table 7 reveals that certain teaching styles of biology teachers have a significant impact on students' academic performance is 3.49, which falls within the range of "Great Impact.". This suggests that, overall, the teaching styles employed by biology teachers have a moderate effect on students' performance. Specifically, the

use of visual aids, assignments prior to class discussions, and interactive activities, which fall under the facilitator, demonstrator, and authoritarian styles, were rated with "Very Great Impact" by students. These methods align with recent educational research emphasizing the effectiveness of engaging and supportive teaching strategies. For instance, Hattie (2009) found that strategies such as providing clear learning goals and using varied instructional methods can greatly enhance student learning. Similarly, Mayer (2011) highlights that incorporating multimedia and interactive elements in teaching improves understanding and retention. In contrast, teaching styles associated with hybrid and delegator approaches, such as using daily encounters for examples and dividing students into groups for projects, were rated with "Poor" to "Moderate Impact." This finding suggests that while these methods are beneficial, their implementation may not be as effective in the given context, potentially due to less frequent use or insufficient adaptation to students' needs. This discrepancy supports findings by Brame (2016), who notes that the impact of teaching styles can vary greatly depending on how well they are tailored to the specific learning environment and student needs.

4. Conclusions and recommendations

In conclusion, the analysis highlights that biology teachers employ a variety of teaching styles, including demonstrator, facilitator, and authoritarian methods, which are well-received by students and generally effective in enhancing learning outcomes. Teachers' use of visual aids, interactive activities, and structured assignments creates a dynamic and engaging classroom environment that fosters better understanding and retention of complex biological concepts. The significant difference between teacher and student perceptions suggests that while teachers may believe their methods are effective, students' experiences may differ, indicating a need for ongoing feedback and adjustments. The overall positive impact of these teaching styles on students' final grades underscores their effectiveness in improving academic performance. However, the lower impact of hybrid and delegator approaches indicates that these methods might need further adaptation or more frequent implementation to better support students' learning needs. This balanced approach, integrating diverse teaching methods while remaining responsive to student feedback, will be key in optimizing educational outcomes and ensuring that all students benefit from effective instruction.

To enhance the effectiveness of teaching biology and improve student outcomes, several key recommendations are proposed. Firstly, teachers should prioritize and integrate teaching styles that have demonstrated significant impact, such as the use of visual aids, interactive activities, and structured assignments. Consistent application of these methods will help maintain high levels of student engagement and comprehension. Additionally, establishing regular feedback mechanisms will allow for adjustments based on students' perceptions, ensuring teaching strategies are effectively meeting their needs. It is also essential to refine the use of hybrid and delegator methods by tailoring them to student needs and ensuring their effective implementation. Professional development opportunities should be provided to educators to explore and integrate innovative teaching strategies, enhancing their ability to adapt methods to various classroom settings. Monitoring and evaluating teaching practices regularly will help assess their effectiveness and facilitate continuous improvement. Lastly, promoting collaborative learning through group-based activities will foster critical thinking, leadership skills, and teamwork among students.

5. References

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