Assessed performance of E-learning methods and benefit from (AI) for Undergraduate Engineering stage

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Abstract

A teaching technique in educational institutions is considered an important state that reflect the performance of study. It is classified in to two methods, self-study and distance study that each method has advantages and disadvantages. In this paper, an innovative education method based on mixed method to associate their advantages and eliminate their disadvantages. It is employed using artificial intelligence (AI) and e-learning techniques for undergraduate engineering stages. The study is conducted on the main problems of a teaching geology subject such as of qualitative assessment, acquired knowledge and competencies in the department of petroleum engineering, college of engineering, University of Misan in Iraq. It is applied on 204 student that are study in the first stage the department of petroleum engineering during one years. The outcomes of this study prove that the proposed method achieves a higher successful rate of (80%), focused on evaluating the effectiveness of teaching and learning methods and aids used in general geology courses.

Keywords: General Geology, Teaching methods, Artificial Intelligence, learning style, Teaching Aids, E-learning.

1- Introduction:

In general, there are two major methods of a teaching study, self-study and distance-study. Each method has advantages and disadvantages regarding to the field study.

Advantages and disadvantages of methods point out that e-learning is more student-cantered, compared to face-to-face learning, which is more teacher-cantered, as it does not focus exclusively on instructions and guidelines coming from teachers, but it is individually adjustable to the student. The difference between e-learning and face-to-face learning has also been pointed out in relation to the main sources of information .

Recently, the e-learning teaching method in educational institutions has been utilised dramatically due to the development of a life-style. This concept by any means, even without any ideological support. This leads to the fact that the university is "Reinventing the wheel", although it does not represent why they need it and for what reasons. This leads to time costs and the product does not always correspond to qualitative characteristics. Therefore, the need for understanding the concept of e-learning, and this problem should be solved within the responsibility of the in the state(1)

By reviewing previous studies, it became clear The results also specify the advantages and disadvantages of the two forms of education from a double perspective, namely that of first-year students (beneficiaries of both face-to-face and e-learning).

The points out key information about e-learning from the students' perspectives, which should be considered to understand the ongoing changes of the educational process and to solve its specific problems, thus ensuring its sustainability[2]. During the first year of engineering studies in Iraq and globally, General Geology is a fundamental subject. The General Geology course consisted of teaching Structural geology, Petroleum geology, Petroleum geology such as basic principles and applications of Petroleum geology in the oil fields, Petroleum geology is the study of origin, occurrence, movement, accumulation, and exploration of hydrocarbon fuels, using specific reagents to distinguish between organic compounds, the skill of inferring 3-dimensional characteristics from them is one of the most fundamental in petroleum geology (3). While, in basic Geology, it is the science of the three-dimensional study of the distribution of rocks taking into account the history of their formation. The primary goal of structural geology is to use present-day rock measurements to reveal information about the history of rock formation. Typically, the phrase learning styles refers to the learning strategies of obtaining, organizing, processing, and interpreting thinking about information, or to a combination of elements, including attitude and behaviour, that make learning simpler for individuals (3). Identifying and understanding students' learning styles is crucial for enhancing the learning process and supporting their strengths and weaknesses. By recognizing these differences, educators can design and develop learning tools that cater to various styles, ultimately strengthening the learning experience for all students (4). Fleming (5) has demonstrated Students who prefer visual learning can soak up information most effectively when it is presented visually, using materials such as charts, graphs, pictures, and diagrams. However, visual learning is not the only important factor. Students who prefer learning through images and other visual media best learn information through watching videos, demonstrations, and interpreting text and graphics. Visual learning helps to: absorb and memorise information faster, utilise space when formatting notes, and enable quicker absorption and use of information in one's environment. As it happens, approximately 65% of the population are visual learners, so how knowledge is transmitted in society is also very visual. According to batch (4), two types of students who prefer to learn through reading and writing are referred to

as "r" learners and those who learn better through hands-on experience and practical applications are known as "kinaesthetic" or "k" learners. It emphasizes the importance for faculty members to understand the learning attitudes and preferences of their students, as learning styles refer to the most efficient and effective ways in which learners perceive, store, process, and recall information. The study of learning styles is a complicated topic with over 70 models and components. The most effective approaches take into account the preferences and characteristics of the learner to improve performance and grades in the classroom. In addition, a broad range of factors, including experience, ethnicity, age, culture, and degree of preparation, as well as learning preferences and styles, are currently represented among engineering students (7).

This variation is even more appreciated because it pushes the teacher to fulfil each student's educational needs and allows each student to develop according to their preferred learning style and method when following the approved directions as a group (8). As a result, it is the instructor's responsibility to understand the variety of learning styles and create effective teaching strategies (9)(10).

2- The use of artificial intelligence in education

The development of computing, information processing technologies and artificial intelligence (AI), have been widely applied in educational practices (artificial intelligence in education; AIEd), such as intelligent teaching systems, educational robots, learning analytics dashboards, adaptive learning systems, and human learning. General form: It is expected that classrooms and lecture halls in universities will soon move from the traditional framework of learning to using a combination of robots and artificial intelligence designed as needed. A large and growing percentage of students will benefit from the use of robots that are characterized by continuity and flexibility, and teachers will also benefit from artificial intelligence techniques to the same extent. The advantages of using artificial intelligence in education are as follows:

AI technologies can provide the required support to the student outside the classroom. Students who learn the basic principles of reading, science, mathematics, and other sciences rely mainly on explanations from their teachers and parents to understand these foundations and rules. Since the time of teachers and parents is limited, this puts a lot of pressure on different parties and the result may not be satisfactory. However, when an intelligent, dedicated assistant that is available, who can know the student’s abilities, strengths and weaknesses, and the topics in which he suffers from a lack of understanding or a lack of information, then he can adapt the scientific material and even the entire educational process to suit the individual’s capabilities and provide the required assistance and support in At the specified time and in a manner appropriate for each individual student. On this basis, the results are supposed to be more positive when every student, regardless of financial capabilities, geographical location, or mental abilities, has something like a private teacher available at all times and in every place.

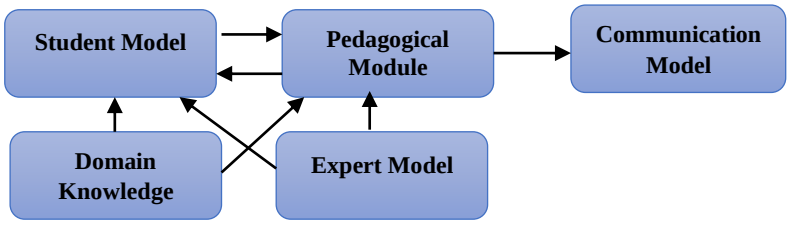


Fig1: Interactions of components in an intelligent tutoring system.

AI system can always be prepared to offer aid from tutoring model's built-in teaching theories. User interface explains learners' performance through multiple input media (voice, typing and click) and provides output (texts, figures, cartoons and agencies). The advanced human-machine interface provides AI-related functions including natural language interaction, speech recognition and learners' emotion detection.

current uses of AI in education that include:(Classroom Audio-Visual, Assessment, Classroom/Behavior Management, Parent-Teacher Communication, Maintenance, Finance, Lesson Planning, Transportation, Language Learning, Safety and Security, Test Prep, Cybersecurity, Learning Management Systems, Professional Development, Staff Scheduling and Substitute Management, Gamification for Enhanced Student Engagement)

3- **Materials and Methods:**

The research is conducted on the first-year engineering students at the undergraduate level. The students are given a voluntary questionnaire comprising 25 statements, divided into two parts(11). The first part consisted of questions about the current teach-to-learn processes of the General Geology module, aiming to gather information based on the students' responses to target future improvements and modifications (12). The second part of the survey focused on teaching-learning methods and aids, with 10 questions divided into two sections. The first section addressed various learning styles, such as the best methods for exams or exam preparations. The second section inquired about teaching aids and students' preferences for methods of delivering lectures, including the use of whiteboards, E-learning methods, PowerPoint presentations, scientific videos, pictures, and models. Additionally, the General Geology module was scheduled to be taught twice a week for three hours and once a week for practical classes, based on a pre-formatted timetable (13).

The study's objective was communicated to the students without revealing the potential outcomes. At the beginning of the questionnaire, students were asked about their names and gender. Their responses were evaluated using a Likert-type scale ranging from 1 to 5, with only one question being based on a yes, no, or neutral basis, which inquired about their preference for General Geology. The collected data was analysed using Microsoft Excel (14).

4- **The results of the reactions:**

The survey was completed by a total of 204 first-year engineering students, of which 197 responses were included in the analysis. The participants comprised 74 male and 123 female students (15). See Figure 1.

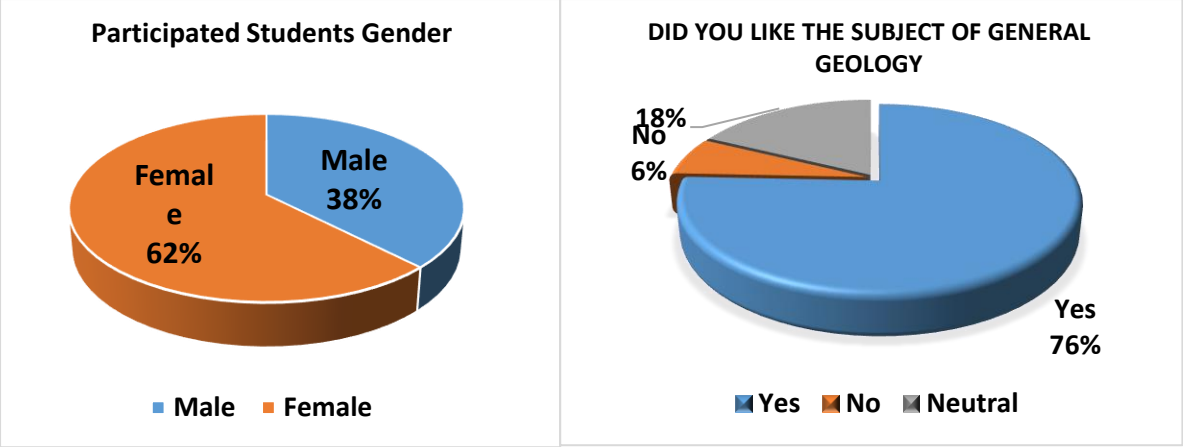


Figure 1: Pie charts of male and female participants' percentages (left), student participants' percentages for how much they like the subject of General Geology (Right).

Out of all the students, the first question about liking General Geology was the only one that received responses from every student. The results indicated that 76% of the students liked the subject, 6% did not, and 18% were neutral.

5- Teaching learning methods & helps in General Geology

The students' preferences favoured various teaching and learning methods that were perceived as popular, interactive, and highly useful. These included monthly exams with fewer topics, pre-main exam assessments, extensive problem-solving tasks for exam preparation, and the use of electronic examinations. Additionally, the use of prepared quizzes was well-accepted, as they helped students identify their knowledge gaps and served as a motivation for further study. As illustrated in Figure (2).

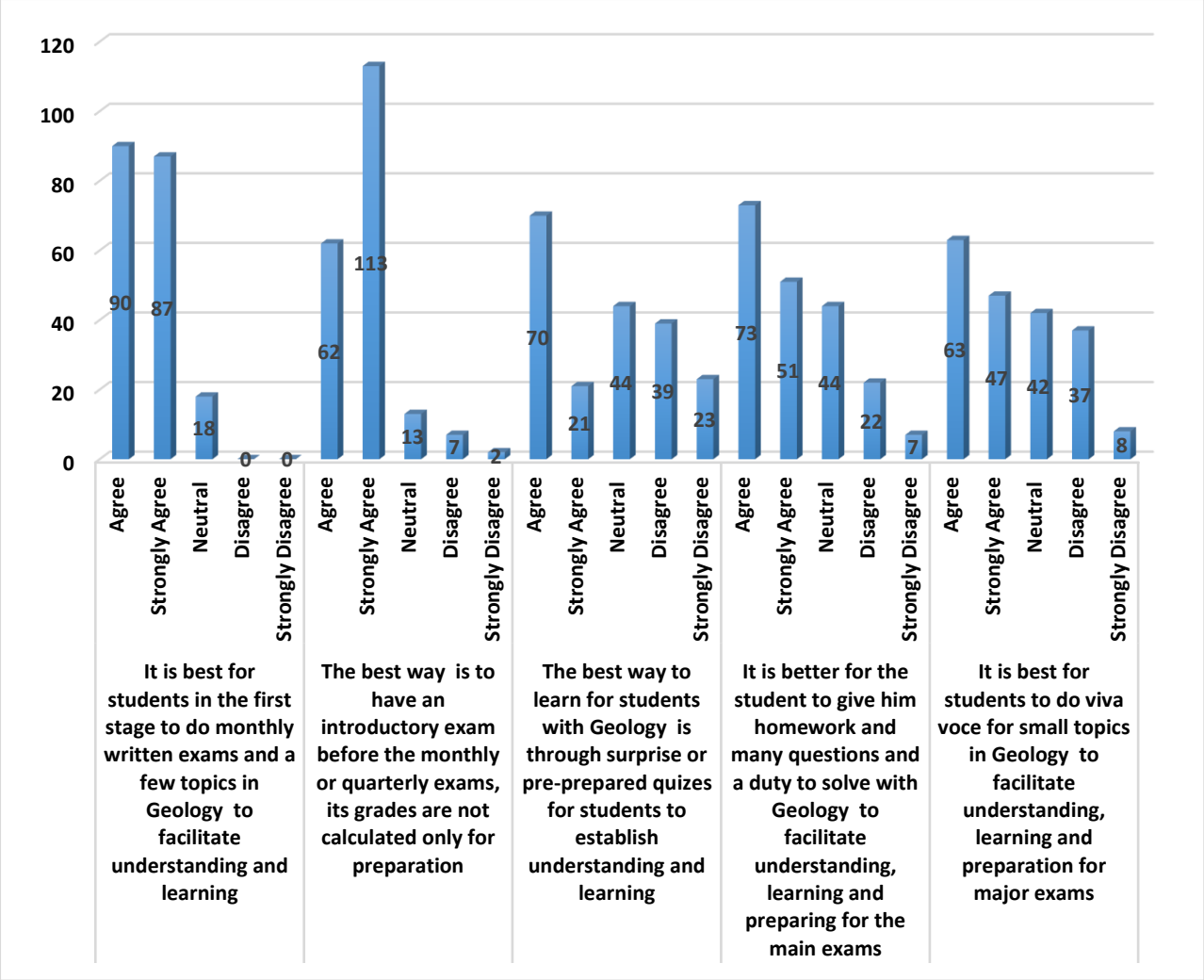


Figure 2: Graph showing Effective way of teaching General Geology from exams preparations point of view.

The next section of the survey asked students to provide feedback on the most and least appreciated teaching methods or aids. Students suggested that incorporating educational materials into the General Geology lecture would make the session more interactive. Notably, the engineering students at Misan Engineering College expressed a preference for the whiteboard as the educational method and quiz tests via their mobile phones (MCQ tests)(The professor feeds the Moodle platform with questions and then tests them) (17). See Figure 3.

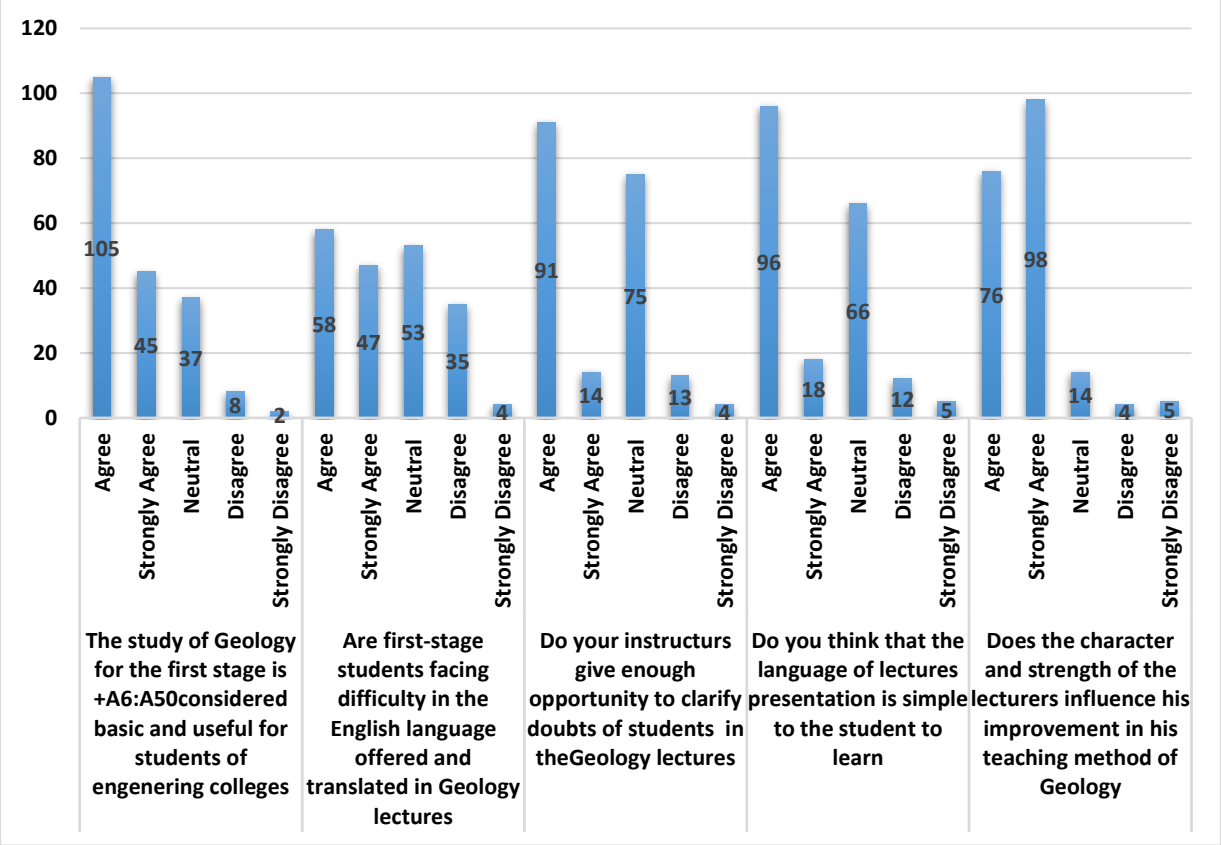


Figure 3: Graph showing the opinion of 1st engineering students towards the various teaching aids used for Conducting General Geology theory classes.

The whiteboard + PowerPoint presentation method was highly favoured among first-year engineering students and was greatly appreciated. Additionally, the survey results indicated a strong preference for the use of diagrams, pictures, and videos during lectures. The primary reason for favouring the whiteboard method was its potential to enhance student-teacher interaction, minimize attention diversion, maintain good eye contact, and present easily understandable content. . On the other hand, the PowerPoint method was favoured by students due to its ability to display text, diagrams, and images on the same slide with high quality, making it legible and engaging (18), Sending lectures and tests on the Moodle platform had a significant impact on enhancing students' understanding of the subject well and the professor's communication with them. (19).

6-Perceptions and opinions towards improving teaching-learning of General Geology:

According to the results, a significant number of students agreed and supported the advantages of learning general geology during Students, felt that the English language utilized in the learning process was challenging, and they needed enough time to get the answers to their inquiries. It was thought that the scientific jargon employed in engineering geology lectures was simple to pick up and comprehend. the e-learning and AI character had a big influence on their teaching strategies (20). See Figure 4.

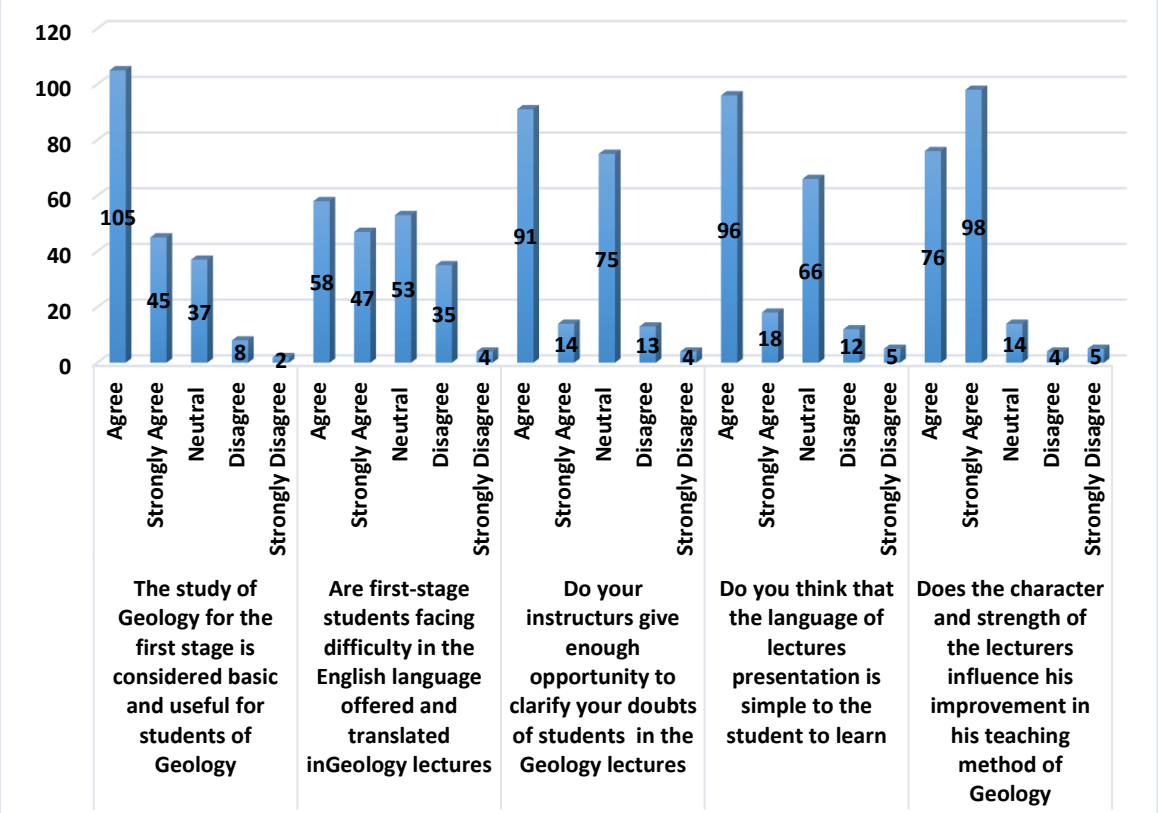


Figure 4: Improve teaching learning of General Geology via perceptions and opinions

he results showed a high level of agreement and support from students regarding the benefits of studying General Geology. However, students found the English language used during the learning process to be difficult, and they required sufficient time to obtain answers to their questions. The scientific language used in engineering Geology lectures was considered easy to learn and understand. Additionally, the students believed that the Integrating e-learning and AI had a significant impact on their teaching methods (21). See Figure 5.

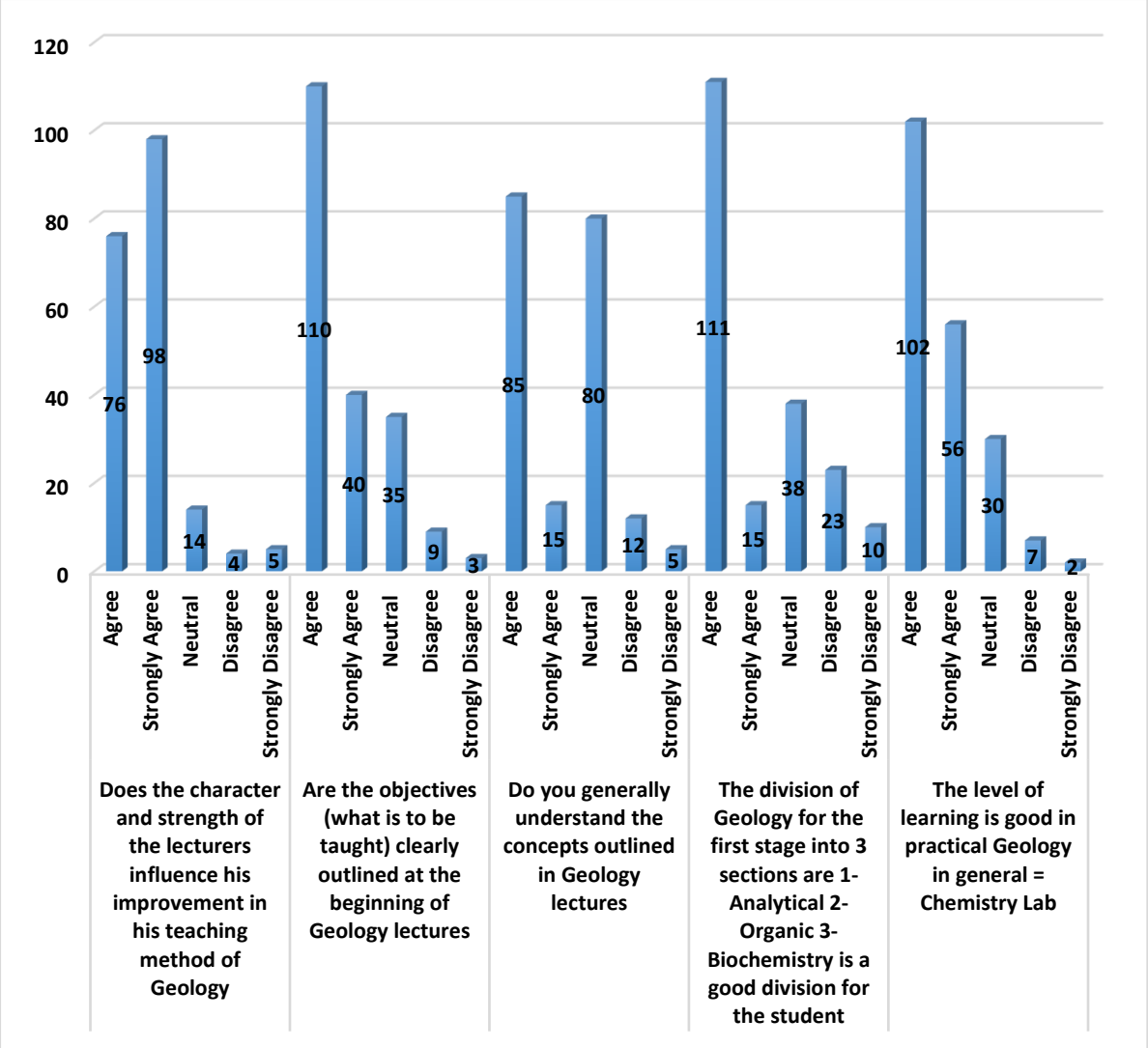


Figure 5: Improve teaching learning of General Geology via perceptions and opinions

7-Results:

Materials and Methods: In the second semester of the 2021-2022 academic year, a thorough survey was conducted among undergraduate engineering students at the Department of Petroleum Engineering, College of Engineering, University of Misan.

The feedback was analysed using the Likert scale to classify their preferences and attitudes toward the survey statements.

The study revealed that certain combinations of teaching, learning, and aid methods were highly satisfactory to students, while others were least preferred. Geology was the most popular subject among the majority (76%) of students. The majority of students found exam preparation techniques, practical exercise lectures, and various teaching aids to be excellent and very good methods. To improve the teaching of General Geology, students' opinions and preferences suggested the need for more preparation techniques for main exams and the use of multiple teaching aids, such as Simulation in laboratories, whiteboards, PowerPoint presentations and technology-based approaches by AI, during lectures. By taking into account students' perceptions, the teaching and learning processes in Geology can be enhanced (1).

8- Discussion:

Students' experiences with teaching and learning methods during their first year at the College of Engineering, University of Misan, are documented in this study. There is limited literature on students' preferences and opinions regarding the General Geology module. Although it is a two-semester course in Iraqi engineering colleges, the issues discussed in this research and students' perceptions are likely to be similar in other countries, in terms of understanding the material, learning methods, and the integration of e-learning with face-to-face learning, even with different curricula or longer course lengths.

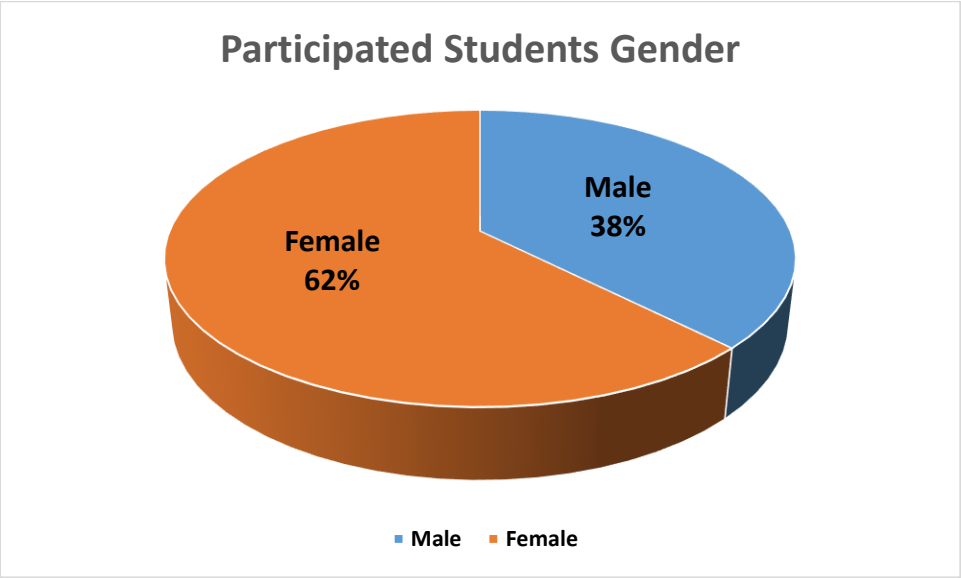
9- Conclusion:

In this work, mixed teaching method based on self-study and distance study has been utilized using e-learning and AI technique. This research confirmed the preferred learning methods and tools of some students, and confirmed that comprehensive understanding of the lecture does not depend on the lecturer's style alone. On the basis of the foregoing, it can be concluded that a high-quality training is possible, but it requires: the use of technology, e-learning, tests and electronic tests is an important factor in improving students' performance and their continuous interaction with the professor and the study material. Interest and understanding of the issues of learning structures. Develop AI approaches and tools of certain students and affirmed that a comprimarios to improve machine behavior in such - that major simultaneously in which these technologies are evolving with the use of artificial intelligence and e-learning

In the first semester of academic year, Students were taught to use e-learning using artificial intelligence and achieved good results through that.

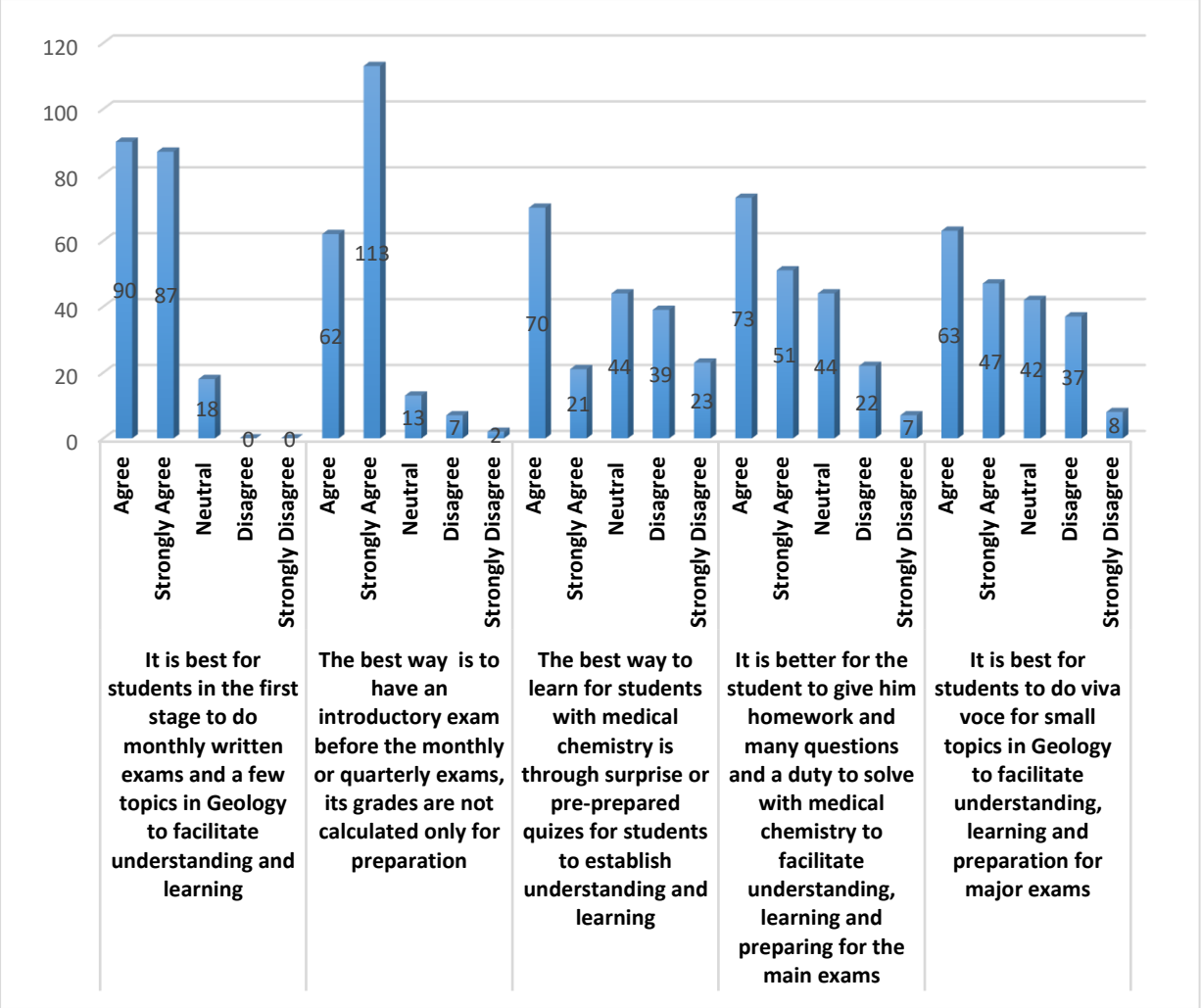
Descriptive statistics

Male	Female
74	123

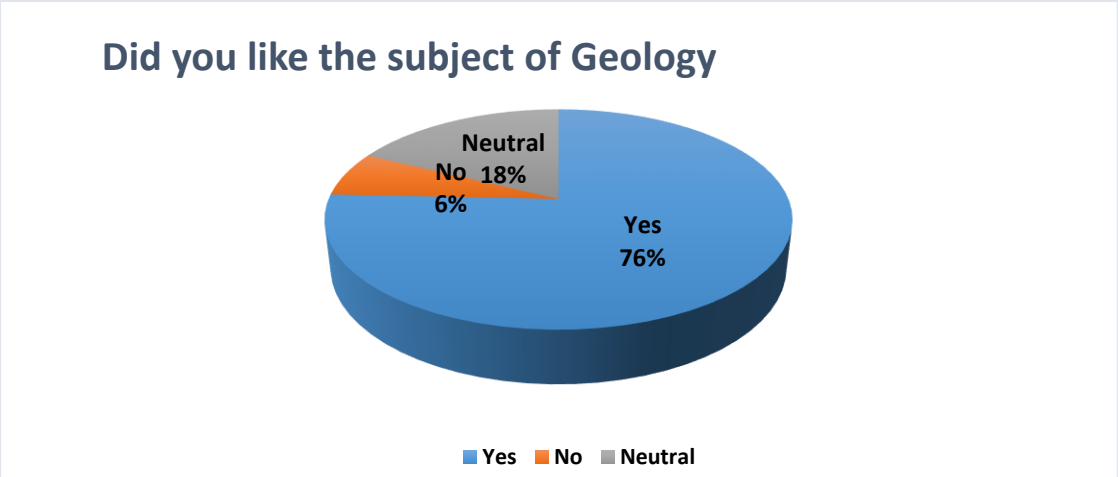


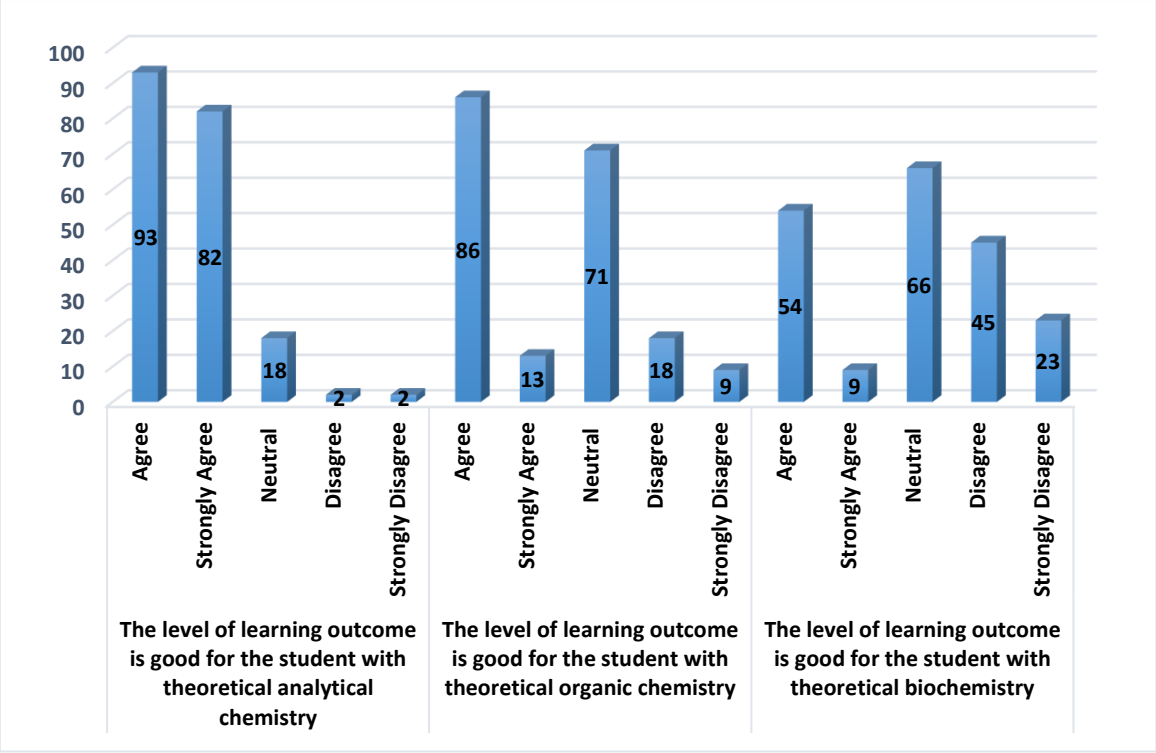
It is best for students in the first stage to do monthly written exams and a few topics in General Geology to facilitate understanding and learning	Agree	90
	Strongly Agree	87

	Neutral	18
	Disagree	0
	Strongly Disagree	0
The best way is to have an introductory exam before the monthly or quarterly exams, its grades are not calculated only for preparation	Agree	62
	Strongly Agree	113
	Neutral	13
	Disagree	7
	Strongly Disagree	2
The best way to learn for students with General Geology is through surprise or pre-prepared quizes for students to establish understanding and learning	Agree	70
	Strongly Agree	21
	Neutral	44
	Disagree	39
	Strongly Disagree	23
It is better for the student to give him homework and many questions and a duty to solve with General Geology to facilitate understanding, learning and preparing for the main exams	Agree	73
	Strongly Agree	51
	Neutral	44
	Disagree	22
	Strongly Disagree	7
It is best for students to do viva voce for small topics in General Geology to facilitate understanding, learning and preparation for major exams	Agree	63
	Strongly Agree	47
	Neutral	42
	Disagree	37
	Strongly Disagree	8



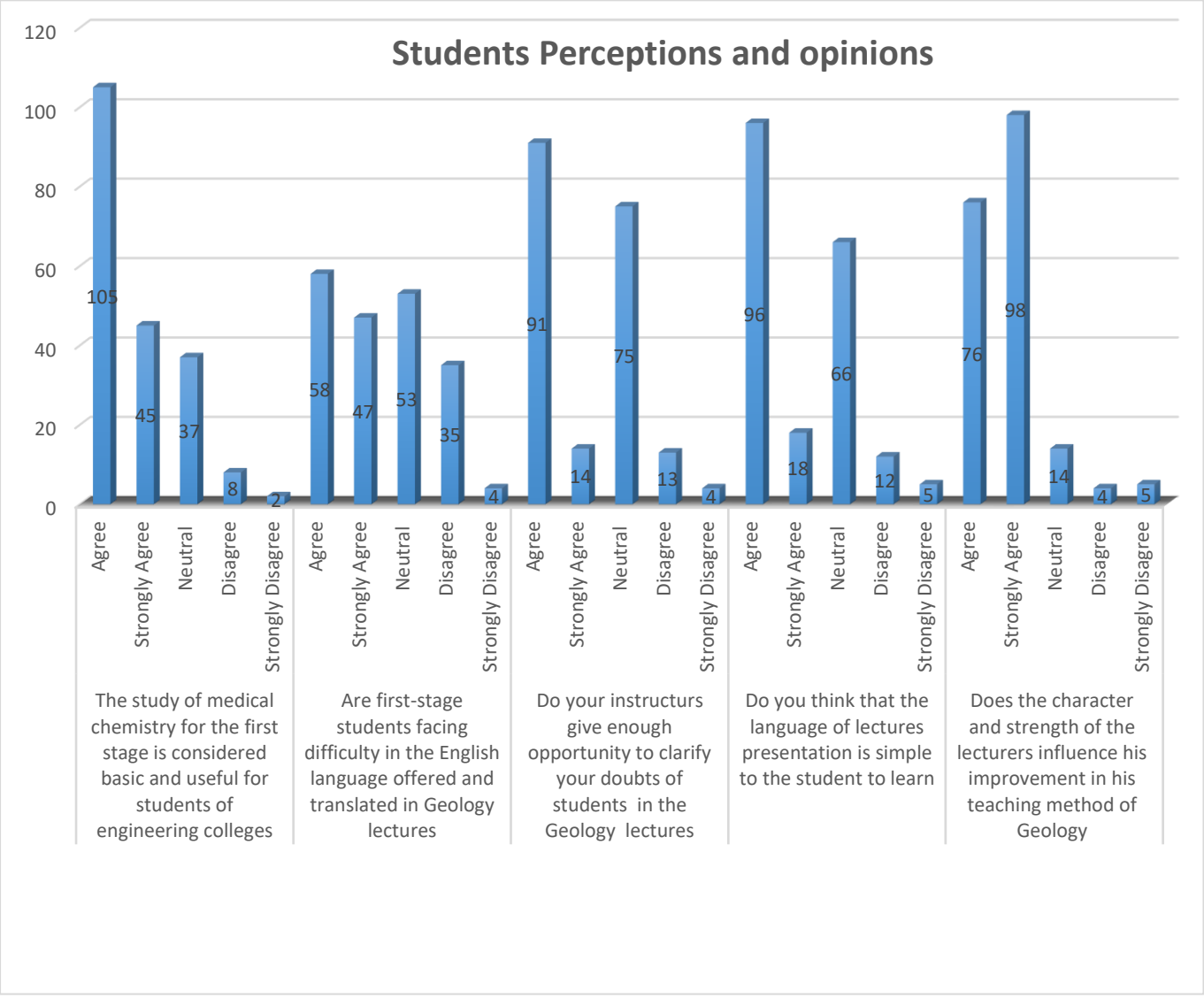
Did you like the subject of General Geology	Yes	149
	No	13
	Neutral	35



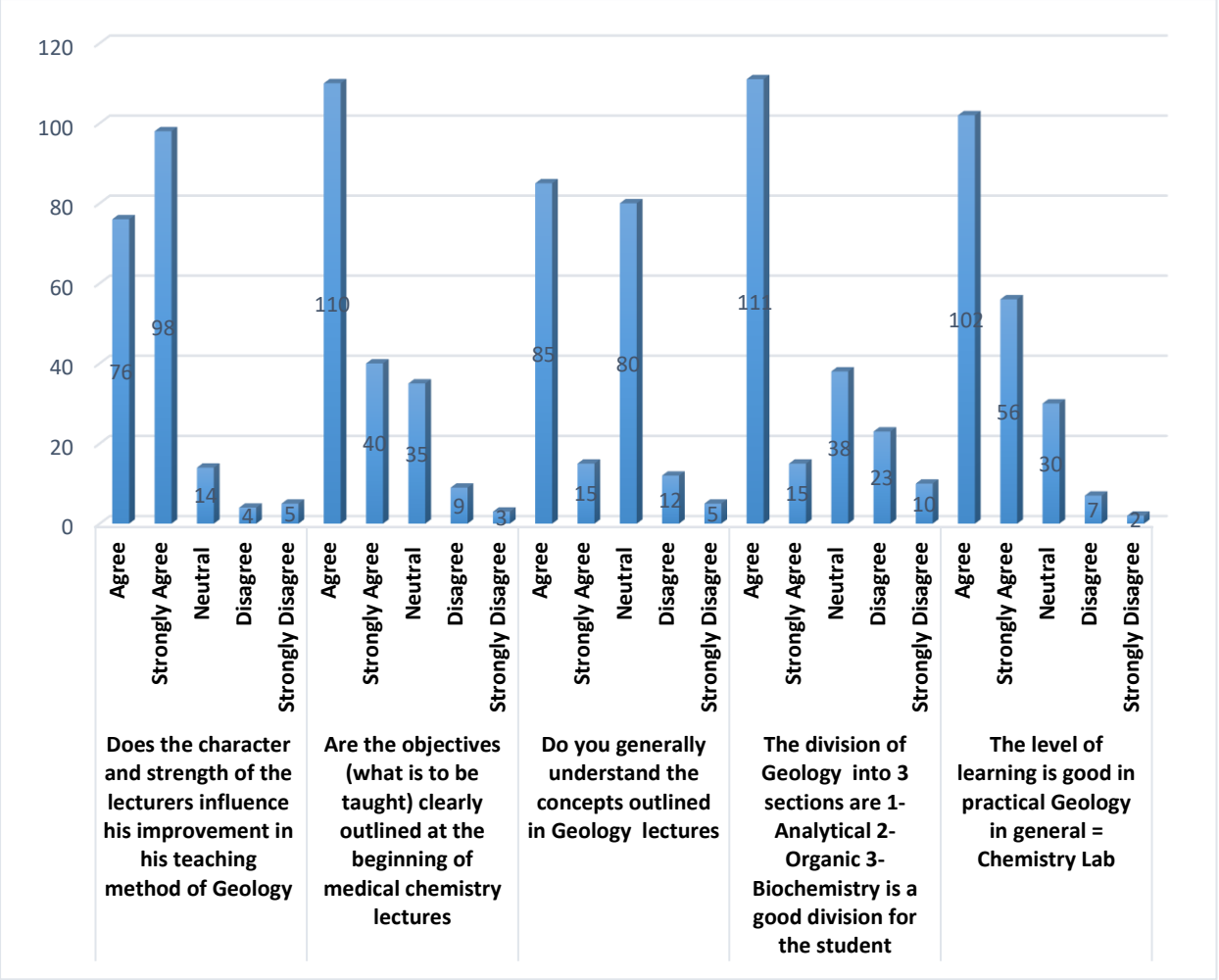


The study of General Geology for the first stage is considered basic and useful for students of engineering colleges	Agree	**105**
	Strongly Agree	**45**
	Neutral	**37**
	Disagree	**8**
	Strongly Disagree	**2**
Are first-stage students facing difficulty in the English language offered and translated in General Geology lectures	Agree	**58**
	Strongly Agree	**47**
	Neutral	**53**
	Disagree	**35**
	Strongly Disagree	**4**
Do your instructurs give enough opportunity to clarify your doubts of students in the General Geology lectures	Agree	**91**
	Strongly Agree	**14**
	Neutral	**75**
	Disagree	**13**
	Strongly Disagree	**4**
Do you think that the language of lectures presentation is simple to the student to learn	Agree	**96**
	Strongly Agree	**18**
	Neutral	**66**

	Disagree	**12**
	Strongly Disagree	**5**
Does the character and strength of the lecturers influence his improvement in his teaching method of General Geology	Agree	**76**
	Strongly Agree	**98**
	Neutral	**14**
	Disagree	**4**
	Strongly Disagree	**5**

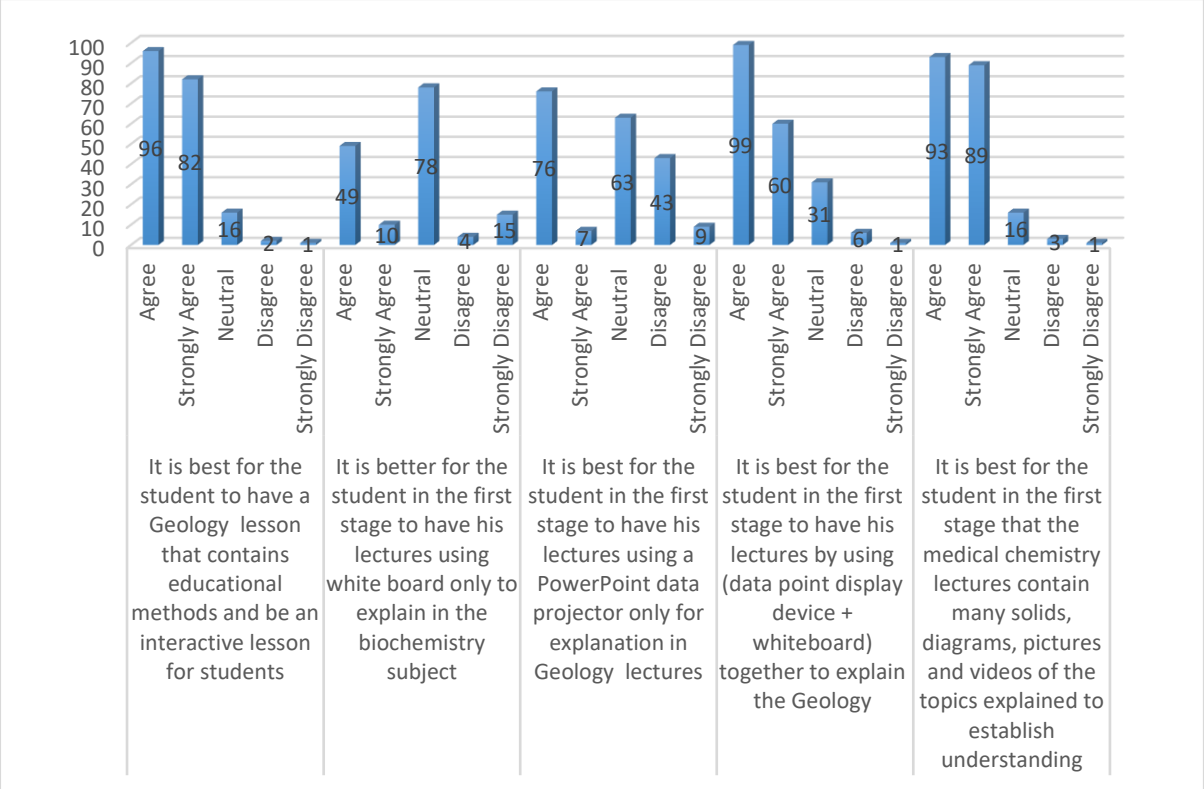


Are the objectives (what is to be taught) clearly outlined at the beginning of General Geology lectures	Agree	110
	Strongly Agree	40
	Neutral	35
	Disagree	9
	Strongly Disagree	3
Do you generally understand the concepts outlined in General Geology lectures	Agree	85
	Strongly Agree	15
	Neutral	80
	Disagree	12
	Strongly Disagree	5
The division of General Geology into 3 sections are 1-Analytical 2-Organic 3-Geologyis a good division for the student	Agree	111
	Strongly Agree	15
	Neutral	38
	Disagree	23
	Strongly Disagree	10
The level of learning is good in practical General Geology in general = Chemistry Lab	Agree	102
	Strongly Agree	56
	Neutral	30
	Disagree	7
	Strongly Disagree	2



It is best for the student to have a General Geology lesson that contains educational methods and be an interactive lesson for students	Agree	96
	Strongly Agree	82
	Neutral	16
	Disagree	2
	Strongly Disagree	1
It is better for the student in the first stage to have his lectures using white board only to explain in the Geologysubject	Agree	49
	Strongly Agree	10
	Neutral	78
	Disagree	4
	Strongly Disagree	15
It is best for the student in the first stage to have his lectures using a PowerPoint data projector only for explanation in General Geology lectures	Agree	76
	Strongly Agree	7
	Neutral	63
	Disagree	43

	Strongly Disagree	9
It is best for the student in the first stage to have his lectures by using (data point display device + whiteboard) together to explain the General Geology	Agree	99
	Strongly Agree	60
	Neutral	31
	Disagree	6
	Strongly Disagree	1
It is best for the student in the first stage that the General Geology lectures contain many solids, diagrams, pictures and videos of the topics explained to establish understanding	Agree	93
	Strongly Agree	89
	Neutral	16
	Disagree	3
	Strongly Disagree	1



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