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Evaluating Students' Response Range to Chatbots of Artificial Intelligence Applications, Using Rogers' Innovation Adoption Model.

-A case study of a sample of students from the Faculty of Economic Sciences at the University of Mohamed El Bachir El Ibrahimi Bordj Bou Arreridj-

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Abstract :

This research paper aims to identify the students' response range to artificial intelligence (AI) applications through *chatbots*, using *Rogers* model, which consists of five stages (steps): knowledge, persuasion, decision, implementation, and finally confirmation. To achieve the research objectives, a questionnaire was designed consisting of: 18 statements was handed to a group of students at the *Faculty of Economic Sciences at the University of Mohamed El Bachir El Ibrahimi Bordj Bou Arreridj*. After analyzing the questionnaire with the (SPSS, V25) program, the most important results reached were the sample's high tendency to adopt chatbots in academic education.

Keywords: *artificial intelligence (AI), chatbots, Rogers' model*.

JEL Classification: M31, Q55, P46.

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1. Introduction:

Technology has become an imposed reality that exists in all areas of human life and in all political, economic and social sectors with which it deals. Higher education is one of these sectors that has kept pace with the use of technology. With the ongoing evolution of education on par with these technological developments, this sector has benefited from artificial intelligence (AI) which is considered as the most important finding of nowadays. The latter has reduced the gap in understanding and learning among students by providing a variety of applications that enabled them acquire personal learning skills in searching for information that helps them in studying, in a very easy way, with just a click of a button anytime and anywhere. One of these applications is *Chatbots*.

Chatbots are new innovations that have become widespread among students around the world, as a new and modern technology that they can benefit from at various stages of their educational career. Among the most famous of these applications, there is: *Chat GPT. Bard, Ada, Socratic, Bing Chat etc*. These are programs that have been added to the search engines to make them more intelligent in looking for information and translating it from a language to another. In addition to the excellent processing of photos and videos, creating presentations, etc. this study also aims to acknowledge the spread of these programs and its adoption among students in Algerian universities.

This research paper evaluates students' response range at the *Faculty of Economic Sciences at the University of Bordj Bou Arreridj* to dealing with *Chatbots* in their academic education, using *Rogers' Innovation Adoption* model. The latter is the author of the theory of *Diffusion of Innovations* in a social system. He presented a model which consists of five stages (steps): knowledge, persuasion, decision, implementation and confirmation.

Research Problem:
Based on the above, the research problem can be presented in the following main question:

To what extent do students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* respond to the use of *chatbots* according to *Rogers'* model?

From the main question the following sub-questions emerge:

1- Do the students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* know *Chatbots*?
2- Are the students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* convinced to use *Chatbots*?
3- Do the students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* make the decision to adopt *Chatbots*?
4- Do the students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* adopt (use) *Chatbots*?
5- Are the students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* ready to consistently use *Chatbots*?

Research Hypotheses:
To answer the research question these are the suggested hypotheses:

1- The students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* know *Chatbots.*

2- The students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* are convinced to use *Chatbots.*
3- The students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* make the decision to adopt *Chatbots.*
4- The students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* adopt (use) *Chatbots.*
5- The students of the *Faculty of Economic Sciences at Bordj Bou Arreridj University* ready to consistently use *Chatbots.*

Research Objectives:

- Evaluating students' response range to Artificial Intelligence applications, using Rogers' model.
- Identifying the reasons that drive students to use *chatbots* in their academic education.
- Identifying the impact of *chatbots* on their academic performance.
- Identifying the extent to which students benefit from *chatbots* in completing their research activities.

Research methodology:

This research relied on the descriptive and analytical approach, based on preparing the theoretical side relying on what was mentioned in some references such as books, articles, websites...etc. as for the practical side the questionnaire was the main tool for gathering data that was analyzed. Using the program (SPSS, V25) to reach the results and thus test the hypotheses.

2.Theoretical Background

Before addressing the applied study, we will review some theoretical concepts related to the research variables as follows:

2.1. Definition of Rogers Innovation Adoption Model:

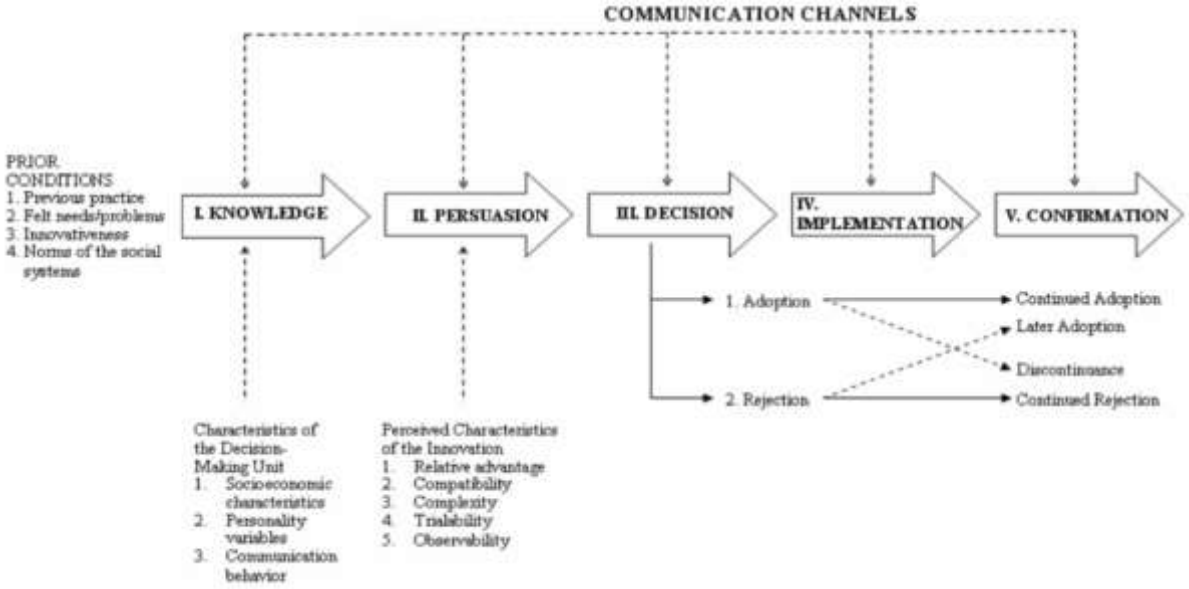
Rogers is the proponent of the theory of the diffusion of innovations, He published it in his book "Diffusion of Innovations". Rogers theorized that information diffusion is the social process through which an innovation, is communicated through certain channels over time among the participants in a social system. This theory has been applied to numerous contexts, including marketing, communications, health promotion, organizational studies, and complexity studies. (Wang, Wang, & Xu, 2020, p. 4)

On the other hand, Rogers select four key elements that influence diffusion of a new idea: (Innovation, Communication Channels, Time, Social System, Relative advantage, Compatibility, Complexity, Trial-ability, Observability) (ROGERS, 2003, pp. 36 - 37).

In 1971, Rogers and Shoemaker proposed five stages though which an innovation passes before an individual takes it into use: The awareness, The interest, The evaluation, The trial, and the adoption stage. In 1981, he proposed an improved model for studying the stages of adoption which he called Innovation-Decision Process Model(Tahir Wani & Syed Wajid , 2015, pp. 106 - 107).

Rogers defined The innovation decision process as: " the process through which an individual (or other decision-making unit) passes from firm knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision" (Rogers, 1983, p. 165).

Fegure 1 : A model of stages in the innovation decision process



Source: (Rogers, 1983, p. 165).

According to Rogers, the adoption process entails five stages that typically follow each other in a time-ordered manner, They will be explained in the following table**:**

Table (1) : Stages of Rogers model

Stage	Definition
Knowledge	-The individual exposed to the innovation's existence and gains some understanding of how it functions. Rogers divides innovation knowledge into three types : • Awareness-knowledge information, answers questions such as, What is the innovation? What does it do?. • How-to knowledge helps the individual obtain and use the innovation as it should be used. Information answers questions such as, Where can I find it? What does it cost? • Principles knowledge includes the general ideas behind the innovation.
Persuasion	- The individual has a favorable or unfavorable attitude toward the innovation. - In this stage, interpersonal channels are more crucial than they are in the previous stage. Much of persuasion will occur through peers who already have some experience with the innovation. Their behavior, then is imitated. - Rogers clarifies that the mental activity at the persuasion stage is mostly affective, while it is more cognitive at the preceding knowledge stage.
Decision	- engages in activities that lead to a choice to adopt or reject the innovation.
Implementation	- puts an innovation into use. -For the innovation to be implemented and used, an adopter must be able to locate and obtain it.

Confirmation	- The individual seeks reinforcement of an innovation-decision already made, but he or she may reverse this previous decision if exposed to conflicting messages about the innovation. -Negative post-implementation information from other sources about an innovation may cause frustration and discontinuation of the innovation. It is wise, therefore, for a communication planner to extend his communication efforts to the period after implementation, encouraging the continued use of the innovation and assuring the adopters that they were wise to implement the new practice. -the confirmation stage serves to reassure whether the adoption decision is still right under the additional knowledge gained after implementation. The continued use or the discontinuance of the innovation are the two options here. This process can be considered a success when the adopting unit demonstrates commitment them ugh the sustained use of the adopted element over a period of time.

Source: Depending on the :(Rogers, 1983, p. 164), (Sven Windahl , Benno H, & Jean T, 1992, pp. 59 - 61), (Künne, 2018, pp. 123 - 124).

2.2. Definition of Chatbots:

Chatbots are considered one of the most important developments in the field of artificial intelligence (AI), the latter defined as: "a field of science dedicated to solving problems commonly associated with human intelligence, such as learning, problem-solving, and pattern recognition. Al technologies are being developed to make machines intelligent, and the intelligence enables an entity to function appropriately and with foresight in its environment These features of AI perfectly match our needs in business " (Chan, Hogaboam, & Cao, 2022, p. 3).

Among the definitions provided for chatbots, we mention the following:

-a chat bot is : " a computer program that can take user input in natural language and return text or rich media to the user. The user communicates with the chat bot via a messaging app, such as Facebook Messenger, Skype, Slack, and others, or via a voice-activated device such as the Amazon Echo, Google Home, or Harmon Kardon's Invoke powered by Microsoft's Cortana" (Rozga, 2018, p. 4).

- a chat bot is: " a kind of virtual assistant software that simulates human conversations by communicating with users via voice or text, they could be divided into three types: chatbots with animated pictures, chatbots with interactive 3D avatars, and a theriomorphic chatbots " (Ni , Gianpaolo , & Ryding, 2023, p. 372).

From this we conclude that chatbots, are programs supported by artificial intelligence that have been developed to create intelligent conversations between humans and machines using voice, text, or both. They are used to provide immediate support by answering questions, providing clarifications, suggestions,.. etc.

There are two types of chatbots (Vanichvasin, 2022, p. 16):

- rule-based chatbot is responsible for matching pre-programmed answers with text messages or speeches inputted. It chooses the system response from pre-programmed answers, based on the input text without creating new texts. The responses from the chatbot were coded, organized and presented in the format of conversation al patterns.

- Machine-learning based chatbot is responsible for generating suitable responses drawn from user input via natural language processing and deep machine learning.

In education, chatbots can be used as a digital learning tool to ask questions, give answers to questions, retrieve information, explore online content, provide useful information, establish the knowledge that the students have to learn, and propose possible solutions to the students individually (Vanichvasin, 2021, p. 45).

Among the most popular chatbots used in education are:(Labadze, Grigolia, & Machaidze, 2023, pp. 3 - 4):

- **Bard:** introduced in 2022, is a large language model chatbot created by Google AI. Its capabilities include generating text, language translation, producing various types of creative content, and providing informative responses to questions. Bard is still under development, but it has the potential to be a valuable tool for education.

- **ChatGPT:** launched in 2022 by Open AI, can generate text, produce diverse creative content, and deliver informative answers to questions.

- **Ada:** launched in 2017, is a chatbot that is used to provide personalized tutoring to students. It can answer questions, provide feedback, and facilitate individualized learning for students.

- **Socratic:** is an AI-powered educational platform that was acquired by Google in 2018. While not chatbot perse, it has a chatbot-like interface and functionality designed to assist students in learning new concepts. Like with other chatbots.

- **Habitica**: launched in 2013, Students can use Habitica to manage their academic tasks, assignments, and study's schedules. By turning their to do list into a game like experience, students are motivated to complete their tasks and build productive habits.

- Bing Chat: is an AI-driven chatbot developed by Microsoft, designed to provide natural and conversation al responses to user queries. Built on OpenAI's ChatGPT version 4 Large Language Model, Bing Chat excels at generating responses that closely mimic human answers. Unlike traditional search engines, Bing Chat offers a more interactive and engaging experience by providing creative, balanced, and precise response formats, catering to the user's preferences (https://www.simplilearn.com/bing-chat-article).

3. Applied Study

To prepare the applied study, a random sample consisting of 200 students at the Faculty of Economic Sciences at the University of Bordj Bou Arreridj were selected, which included all educational levels and all majors. the questionnaire was used as the main tool to obtain the necessary information in order to confirm the research hypotheses. It included two axes:

- Axis 1: includes personal data for the research sample items, including gender.
- Axis 2: It consists of 18 statements distributed over the stages of the Rogers model: knowledge, persuasion, decision, implementation, and finally confirmation. A five-point Likert scale (05-point Likert scale) was also used to distribute the answer scores, as follows:

Table (2): Likert scale

Srtongly disagree	disagree	Neutral	Agree	Strongly agree
1	**2**	**3**	**4**	**5**

Source: SPSS output

the table below shows the division of the Likert scale to determine the degree of agreement among the sample individuals.

Table (3): Response levels for a five-point Likert scale

Level	Very High	High	Medium	Low	Very Low
SMA	5-4.21	4.20-3.41	3.40-2.61	2.60-1.81	1.80 -1

Source: SPSS output

In order to perform statistical analysis of the results, SPSS 25 was used, and through it the following statistical methods were adopted:

- Reliability coefficient (Cronbach's Alpha) to measure the degree of credibility of answers.
- The arithmetic average and standard deviation to identify the sample members' attitudes towards the questionnaire questions.
- One simple T test to test research hypotheses.

3.1. Determining the degree of reliability of the study tool: Among the most important coefficients used in testing the degree of stability of the study tool is "Cronbach's Alpha," which takes a value from 0 to 1, and the test results were as follows:

Table (4): Results of the reliability test

Cronbach's Alpha	Number Of Paragraphs	Stages
.850	4	**Knowledge**
.768	5	**Persuasion**
.756	3	**Decision**
.881	2	**Implementation**
.839	4	**Confirmation**
0.92	**18**	**Total**

Source: SPSS output

From the table it is clear that the scale has a high degree of reliability, the value of "Cronbach's Alpha" for all stages exceeds 70%, which is (.850, .768, .756, .881, .839) respectively. However, the overall reliability value of the questionnaire is 92%, which indicates a high degree of reliability of the questionnaire.

3.2. Analyzing personal data related to the research sample items:

Table (5): Personal data of the research sample

Data	Category	Duplicates	Percentages%
Gender	Male	68	**34**
	Female	132	**66**

Source: SPSS output

It is clear from the data of the table above that 66% of the sample members are females, and the remaining 34% are males, which indicates that females are the dominant group in the Faculty of Economic Sciences at the University of Bordj Bou Arreridj.

3.3. Analysis of the sample answers to the questionnaire statements:

3.3.1. Knowledge Stage: To describe this stage, arithmetic average and standard deviations were used to determine the importance of statements, as shown in Table (6)

Table (6): Arithmetic averages and standard deviations of the sample's answers on the Knowledge stage

Number	Statement	Arithmetic Averages	Standard Deviation	Statement	Approval Level
1	You are aware of the existence of Chatbots.	4.2700	.87804	1	**Very high**
2	You know how to use Chatbots.	3.6000	1.23598	2	**High**
3	You are well aware of the importance of Chatbots.	3.5950	1.18236	3	**High**
4	You are aware of the need of Chatbots.	3.5050	1.16911	4	**High**
Arithmetic average and general standard deviation		**3.7425**	**.93404**	**High**	

Source: SPSS output

The above table data shows that the general arithmetic average for the knowledge stage was 3.7425. In addition, the arithmetic average values for the statements of this stage ranged between (3.5050 and 4.2700). They are all close values with high approval according to the scale adopted in the research. Statement 1 contributed to the positivity of this stage with a very high degree of approval. That is, the students have knowledge of chatbots supported by artificial intelligence. This generation grew up in the era of technological revolution, they know how to use it. They have coped with artificial intelligence programs through applications found on smartphones. On the other hand, social networking sites (Facebook, Instagram, Twitter…etc.) contributed in acknowledging these chatbots. Plus, how and in what areas they are used through immediate and direct communication between individuals. Especially among young people, as they are the group that uses these sites so often.

3.3.2. Persuasion Stage: To describe this stage, arithmetic averages and standard deviations were used to determine the importance of the statements, as shown in Table (7)

Table (7): Arithmetic averages and standard deviations of the sample's answers on the Persuasion stage

Number	Statement	Arithmetic Averages	Standard Deviation	Statement	Approval Level
1	You are aware of the existance of Chatbots.	4.1000	.97197	1	**High**
2	You are looking for more information about chatbots (simplicity or complexity in use, compatibility, etc).	3.9950	.95894	3	**High**
3	You have a general perception about the pros and cons of chatbots.	4.0200	.95612	2	**High**
4	You are convinced by the opinions of other individuals who have experience with Chatbots.	3.8900	.97604	4	**High**
5	You are considering using Chatbots in your academic education	3.7450	1.05620	5	**High**
Arithmetic average and general standard deviation		**3.9500**	**.70938**	**High**	

Source: SPSS output

The data of the table above show that the general arithmetic average for the stage of persuasion reached 3.9500. Additionally, the arithmetic average values for the statements of this stage ranged between (3.7450 and 4.1000), which are all close values with high approval according to the scale adopted in the research. The statements that contributed to the favorableness of this stage are 1 and 3, which means that the students' knowledge of these robots created positive tendencies and a general perception of their pros and cons. This convinced them to research even more about the characteristics of these applications and consider using them. Moreover, some students also expressed their desire to use these robots due to recommending them by their peers who had experienced using them before.

3.3.3. Decision Stage: To describe this stage, arithmetic averages and standard deviations were used to determine the importance of the statements, as shown in Table (8)

Table (8): Arithmetic averages and standard deviations of the sample's answers on the Decision stage

Number	Statement	Arithmetic Averages	Standard Deviation	Statement	Approval Level
1	You want to benefit from chatbots in your academic education.	4.1850	.79621	2	**High**
2	You are ready to try chatbots to know their usefulness.	4.2000	.72292	1	**High**
3	Other people's experiences motivate you about whether or not to use chatbots in your academic education.	3.8850	.99333	3	**High**
Arithmetic average and general standard deviation		**4.0900**	**.69272**	**High**	

Source: SPSS output

The data from the table above show that the general arithmetic average for the decision-making stage reached 4.0900. Moreover, the arithmetic average values for the statements of this stage ranged between (3.8850 and 4.2000), and they are all close values with high approval according to

the scale adopted in the research. These results reflect the acceptance of the students under study to adopt *Chatbots*, and this is through their willingness to try them initially and benefit from them in their academic education. Even those who have a negative idea or did not know these chatbots before have the desire to try them out to make sure what is said about them is true.

3.3.4. Implementation Stage: To describe this stage, arithmetic averages and standard deviations were used to determine the importance of the statements, as shown in Table (9)

Table (9): Arithmetic averages and standard deviations of the sample's answers on the Implementation stage

Number	Statement	Arithmetic Averages	Standard Deviation	Statement	Approval Level
1	You will consistently adopt (use) chatbots in your academic education.	3.9050	.97505	1	**High**
2	You search various websites to use the chatbots you need.	3.8550	.98429	2	**High**
Arithmetic average and general standard deviation		**3.8800**	**.92595**	**High**	

Source: SPSS output

The data of the table above show that the general arithmetic average for the decision implementation stage reached 3.8800. The arithmetic average values for the statements of this stage ranged between (3.8550 and 3.9050), which are close values with high approval according to the scale adopted in the research. This result reflects the willingness of students of the Faculty of Economic Sciences at Bordj Bou Arreridj University to consistently use chatbots in their various research activities. However, although the idea is the same (the decision to adopt), the purpose of using it differs from one student to another, as there is a group of students who use these applications for the purpose of developing their research and learning skills and thus improving the quality of research work (making good research papers, training reports, plans, etc.) In addition to their desire to diversify the sources of collecting information as well as the traditional sources (reading books, searching websites...) they find in these applications a way to help them obtain new information and knowledge from other sources. Besides, we find another group that relies on these applications as a tool to help them complete the various research activities assigned to them without paying any efforts, thought or trouble. With just a click of a button they get everything they want (research, solutions for exercise series...etc.) This does not serve the student. In fact, it reduces his thinking and analytical skills and reflects negatively on him. Unfortunately, this is the predominant category.

3.3.5. Confirmation Stage: To describe this stage, arithmetic averages and standard deviations were used to determine the importance of the statements, as shown in Table (10)

Table (10): Arithmetic averages and standard deviations of the sample's answers on the Confirmation stage

Number	Statement	Arithmetic Averages	Standard Deviation	Statement	Approval Level
1	You support the use of chatbots.	4.1700	.89167	1	**High**
2	You are satisfied with chatbots.	3.8600	.95654	3	**High**
3	You are going to keep using chatbots in the future.	3.8700	.99400	2	**High**
4	You follow all the new developments in the field of artificial intelligence applications.	3.5250	1.17314	4	**High**
Arithmetic average and general standard deviation		3.8562	.82913	**High**	

Source: SPSS output

The data of the table above show that the general arithmetic average for the decision confirmation stage reached 3.8562, and the arithmetic average values for the statements of this stage ranged between (3.5250 and 4.1700), which are close values with high approval according to the scale adopted in the research. We find that statement 1 contributed greatly to the favorableness of this stage, and this reflects the previous stage. They support and are going to keep using these applications, as they get the job done well and save so much time in the search process. On the other hand, we find them very interested in following up on all new developments in the field of artificial intelligence applications. They are the youth of the new generation. They automatically integrate into technology and are exposed to it daily in all aspects of life.

3.4. Testing the Hypotheses

3.4.1. Testing the 1st Hypothesis: To test the first hypothesis, we establish two alternative hypotheses:

H0: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University do not have any knowledge of chatbots.

H1: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University have knowledge of chatbots.

To test this hypothesis, we use the One Sample T test, the results are shown in the following table:

Table (11): One Sample T test results of the Knowledge stage

Datum	Standard Deviation	Arithmetic Average	T value	Sig	Hypothesis Test Reslut	
Knowledge stage	.93404	3.7425	56.665	0.000	H0	H1
					rejected	accepted

Source: SPSS output

The results of the table above show that the arithmetic average of the answers to the statements that make up students' attitudes toward the knowledge stage reached 3.7425. With a standard deviation of .93404 which is morally significant, because the significance level is less than (0.000), which is also less than (0.05). This confirms the validity of the alternative hypothesis. So, we reject H0 and accept H1.

3.4.2. Testing the 2nd Hypothesis: To test the second hypothesis, we establish two alternative hypotheses:

H0: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University are not persuaded by chatbots.
H1: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University are persuaded by chatbots.

To test this hypothesis, we use the One Sample T test, the results are shown in the following table

Table (12): One Sample T test results of the Persuasion stage

Datum	Standard Deviation	Arithmetic Average	T value	Sig	Hypothesis Test Reslut	
Persuasion stage	.70938	3.9500	78.747	0.000	H0	H1
					rejected	accepted

Source: SPSS output

The results of the table above show that the arithmetic average of the answers to the statements that make up students' attitudes toward the knowledge stage reached 3.9500. With a standard deviation of .70938 which is morally significant, because the significance level is less than (0.000), which is also less than (0.05). This confirms the validity of the alternative hypothesis. So, we reject H0 and accept H1.

3.4.3. Testing the 3rd Hypothesis: To test the third hypothesis, we establish two alternative hypotheses:
H0: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University do not decide to adopt (use) by chatbots.
H1: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University decide to adopt (use) chatbots.

To test this hypothesis, we use the One Sample T test, the results are shown in the following table

Table (13): One Sample T test results of the Decision stage

Datum	Standard Deviation	Arithmetic Average	T value	Sig	Hypothesis Test Reslut	
Decision stage	.69272	4.0900	83.499	0.000	H0	H1
					rejected	accepted

Source: SPSS output

The results of the table above show that the arithmetic average of the answers to the statements that make up students' attitudes toward the decision stage reached 4.0900. With a standard deviation of .69272 which is morally significant, because the significance level is less than (0.000), which is also less than (0.05). This confirms the validity of the alternative hypothesis. So, we reject H0 and accept H1.

3.4.4. Testing the 4th Hypothesis: To test the fourth hypothesis, we establish two alternative hypotheses:
H0: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University do not Implement (use) by chatbots.
H1: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University Implement (use) chatbots.

To test this hypothesis, we use the One Sample T test, the results are shown in the following table

Table (14): One Sample T test results of the Implementation stage

Datum	Standard Deviation	Arithmetic Average	T value	Sig	Hypothesis Test Reslut	
Implementation stage	.92595	3.8800	59.260	0.000	H0	H1
					rejected	accepted

Source: SPSS output

The results of the table above show that the arithmetic average of the answers to the statements that make up students' attitudes toward the Implementation stage reached 3.8800. With a standard deviation of .92595 which is morally significant, because the significance level is less than (0.000), which is also less than (0.05). This confirms the validity of the alternative hypothesis. So, we reject H0 and accept H1.

3.4.5. Testing the 5th Hypothesis: To test the fifth hypothesis, we establish two alternative hypotheses:

H0: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University are not willing to consistently use chatbots.

H1: The students at the Faculty of Economic Sciences at Bordj Bou Arreridj University are willing to consistently use chatbots.

To test this hypothesis, we use the One Sample T test, the results are shown in the following table

Table (15): One Sample T test results of the Implementation stage

Datum	Standard Deviation	Arithmetic Average	T value	Sig	Hypothesis Test Reslut	
Confirmation stage	.82913	3.8563	65.774	0.000	H0	H1
					rejected	accepted

Source: SPSS output

The results of the table above show that the arithmetic average of the answers to the statements that make up students' attitudes toward the Confirmation stage reached 3.8563. With a standard deviation of .82913 which is morally significant, because the significance level is less than (0.000), which is also less than (0.05). This confirms the validity of the alternative hypothesis. So, we reject H0 and accept H1.

4. Conclusion:

Chatbots are one of the most developed technological tools that have widely spread among students at universities. The main objective of these *chatbots* is to improve understanding and overcome the difficulties that students may face in the learning process. As they are a powerful source of information that helps them do better researches very fast and at a time that suits them. By providing articles, videos, plans, suggestions...etc. Therefore, this study focused on evaluating the range of students' response to these applications. Which fall within the latest new technological innovations at the present time, where Rogers' Innovations Diffusion model was chosen. After applying the stages of this model to a sample of students at the Faculty of Economic Sciences at the University of Bordj Bou Arreridj and analyzing it. The research reached the following results:

- The students answered the first and second stages statements with a high degree of approval regarding knowledge and persuasion about chatbots in education. This indicates that awareness and

knowledge towards these applications inevitably generates persuasion and thinking about using them.
- The students answered the statements of the third stage (that is related to making the decision to adopt chatbots) with a high degree of approval. This also reflects the extent of their complete persuasion to the importance of these robots.
- The students answered the statements of the fourth stage (that is related to implementing the decision to adopt educational chatbots) with a high degree of approval. This is a natural reflection of the results of the previous stages.
- The students answered the statements of the fifth stage (that is related to confirming the decision to adopt educational chatbots) with a high degree of approval. Because, in their opinion, these bots can get the job done perfectly.

Based on these results, the following suggestions are given:
- It is necessary for the Algerian universities to introduce students and make them aware of these applications and their benefits in scientific research as a tool for developing their learning and research skills.
- The necessity of programming study days and preparing training courses for students. To show them how to correctly use these applications (robots) in carrying out research activities.
- Changing the misconception among students regarding the uses of these applications. In addition to encouraging them to benefit from them to improve the quality of their academic education.
- Establishing a culture of using generative artificial intelligence applications in higher education to improve its quality, and not for other purposes that do not serve scientific research and harm it.

5. Bibliography List :

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6. Appendices

Fiabilité

Echelle : ALL VARIABLES

Statistiques de fiabilité

Alpha de Cronbach	Nombre d'éléments
.850	4

Statistiques de fiabilité

Alpha de Cronbach	Nombre d'éléments
.768	5

Statistiques de fiabilité

Alpha de Cronbach	Nombre d'éléments
.756	3

Statistiques de fiabilité

Alpha de Cronbach	Nombre d'éléments
.881	2

Statistiques de fiabilité

Alpha de Cronbach	Nombre d'éléments
.839	4

Statistiques de fiabilité

Alpha de Cronbach	Nombre d'éléments
.928	18

Statistiques descriptives

	N	Moyenne	Ecart type
Knowledge1	200	4.2700	.87804
Knowledge2	200	3.6000	1.23598
Knowledge3	200	3.5950	1.18236
Knowledge4	200	3.5050	1.16911
Knowledge	200	3.7425	.93404
N valide (liste)	200		

Statistiques descriptives

	N	Moyenne	Ecart type
Persuation5	200	4.1000	.97197
Persuation6	200	3.9950	.95894
Persuation7	200	4.0200	.95612
Persuation8	200	3.8900	.97604
Persuation9	200	3.7450	1.05620
Persuation	200	3.9500	.70938
N valide (liste)	200		

Statistiques descriptives

	N	Moyenne	Ecart type
Decision10	200	4.1850	.79621
Decision 11	200	4.2000	.72292
Decision 12	200	3.8850	.99333
Decision	200	4.0900	.69272
N valide (liste)	200		

Statistiques descriptives

	N	Moyenne	Ecart type
Implementation13	200	3.9050	.97505
Implementation 14	200	3.8550	.98429
Implementation	200	3.8800	.92595
N valide (liste)	200		

Statistiques descriptives

	N	Moyenne	Ecart type
Confirmation16	200	4.1700	.89167
Confirmation 17	200	3.8600	.95654
Confirmation 18	200	3.8700	.99400
Confirmation 19	200	3.5250	1.17314
Confirmation	200	3.8562	.82913
N valide (liste)	200		

Evaluating Students' Response Range to Chatbots of Artificial Intelligence Applications, Using Rogers' Innovation Adoption Model.
-A case study of a sample of students from the Faculty of Economic Sciences at the University of Mohamed El Bachir El Ibrahimi Bordj Bou Arreridj-

Test T

Statistiques sur échantillon uniques

	N	Moyenne	Ecart type	Moyenne erreur standard
Knowledge	200	3.7425	.93404	.06605
Persuation	200	3.9500	.70938	.05016
Decision	200	4.0900	.69272	.04898
Implementation	200	3.8800	.92595	.06547
Confirmation	200	3.8563	.82913	.05863

Test sur échantillon unique

	Valeur de test = 0					
	t	ddl	Sig. (bilatéral)	Différence moyenne	Intervalle de confiance de la différence à 95 % Inférieur	Supérieur
Knowledge	56.665	199	.000	3.74250	3.6123	3.8727
Persuation	78.747	199	.000	3.95000	3.8511	4.0489
Decision	83.499	199	.000	4.09000	3.9934	4.1866
Implementation	59.260	199	.000	3.88000	3.7509	4.0091
Confirmation	65.774	199	.000	3.85625	3.7406	3.9719