The Challenges and Difficulties Encountered by Computer Science Educators in Higher Education, Specifically Focusing on the Utilization of Chat GPT Technology in Libya

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التحديات والصعوبات التي يواجهها معلمو علوم الكمبيوتر في التعليم العالي، مع التركيز بشكل خاص على استخدام تقنية Chat GPTفي ليبيا

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Abstract

As technology continues to transform the higher education sector, computer science professors confront a slew of hurdles when using innovative technologies like Chat GPT technology into their teaching approaches. This paper digs into the specific problems that computer science professors face in Libyan higher education institutions as they manage the use of Chat GPT technology. This investigation uses a quantitative research approach to expose the complexities of these difficulties, providing useful insights into the junction of technology and pedagogy.

While Chat GPT technology provides considerable promise for improving student engagement and learning experiences, key findings show that instructors in Libya confront hurdles ranging from technological limits to cultural adaptations. The identified problems highlight the significance of specific approaches to technology integration within the context of Libyan higher education.

This study not only adds to our understanding of the challenges that computer science educators in Higher Education face in Libya, but it also has implications for educational policymakers and stakeholders seeking to promote effective technology uptake. Educators and institutions may better utilise the potential of Chat GPT technology to create engaging and dynamic learning environments by recognising and solving these obstacles. As technology advances, this study offers a relevant examination of the obstacles and potential in harnessing novel technologies for educational growth.

Keywords: Chat GPT, Libya, Challenges, Higher Education, Computer Science Education, Technology Integration.

ملخص الدراسة

مع استمرار التكنولوجيا في إحداث تحول في قطاع التعليم العالي، يواجه أساتذة علوم الكمبيوتر عددًا كبيرًا من العقبات عند استخدام التقنيات المبتكرة مثل تقنية Chat GPT في أساليب التدريس الخاصة بهم. تتناول هذه الورقة المشكلات المحددة التي يواجهها أساتذة علوم الكمبيوتر في مؤسسات التعليم العالي الليبية أثناء إدارتهم لاستخدام تقنية Chat GPT. يستخدم هذا البحث منهج البحث النوعي لكشف تعقيدات هذه الصعوبات، وتوفير رؤى مفيدة حول تقاطع التكنولوجيا وطرق التدريس.

في حين توفر تقنية Chat GPT وعدًا كبيرًا لتحسين مشاركة الطلاب وخبرات التعلم، تظهر النتائج الرئيسية أن المعلمين فى قطاع التعليم العالي في ليبيا يواجهون عقبات تتراوح بين القيود التكنولوجية والتكيف الثقافي. تسلط المشاكل التي تم تحديدها الضوء على أهمية المناهج المحددة لتكامل التكنولوجيا في سياق التعليم العالي الليبي.

لا تضيف هذه الدراسة إلى فهمنا للتحديات التي يواجهها معلمو التعليم العالي لعلوم الكمبيوتر في ليبيا فحسب، بل لها أيضًا آثار على صناع السياسات التعليمية وأصحاب المصلحة الذين يسعون إلى تعزيز استيعاب التكنولوجيا بشكل فعال. يمكن للمعلمين في التعليم العالي والمؤسسات الاستفادة بشكل أفضل من إمكانات تقنية Chat GPT لإنشاء بيئات تعليمية جذابة وديناميكية من خلال التعرف على هذه العقبات وحلها. مع تقدم التكنولوجيا، تقدم هذه الدراسة فحصًا مناسبًا للعقبات والإمكانات في تسخير التقنيات الجديدة لتحقيق النمو التعليمي.

الكلمات المفتاحية: التعليم العالي، التحديات، التكامل التكنولوجي، تعليم علوم الحاسوب، ليبيا، GPT.

1 Introduction

Background of the Study

In the 21st century, the realm of education has been significantly influenced by rapid technological advancements, with the field of computer science taking a prominent position. Computer science education has transitioned from being an optional skill to a critical

component of modern education systems globally. As industries become more technology—dependent, the demand for graduates proficient in computer science has surged, prompting educational institutions to adapt their curricula to meet this demand.

The integration of technology in education has become a cornerstone of pedagogical evolution. Traditional classroom settings have gradually incorporated digital tools and platforms to enhance teaching and learning processes. This integration not only allows educators to present complex concepts in engaging ways but also equips students with the technical skills required in today's digital workforce. (Smith, 2021).

The introduction of Chat GPT (Generative Pre-trained Transformer) technology is one of the cutting-edge technologies that has recently acquired importance in education. OpenAI's Chat GPT marks a breakthrough in natural language processing and artificial intelligence. It can generate human-like prose and hold intelligible conversations, making it a handy tool for a variety of applications, including education. (Smith, 2021).

Globally, educational organisations have begun to investigate the possibilities of Chat GPT technology to transform teaching and learning. Its ability to imitate human-like interaction has piqued students' interest in utilising it as a virtual instructor, assisting them in grasping complex ideas, answering questions, and giving personalised learning experiences. This possibility opens up fascinating possibilities for computer science teaching, suggesting a fresh way to engage students and improve learning outcomes. (Johnson & Brown, 2022).

The integration of Chat GPT technology in higher education is especially important in Libya, a country striving for technological growth and economic diversification. As Libya's educational landscape evolves, the use of modern technologies has the potential to close gaps in educational quality and connect graduates' skills with the demands of new businesses. (Smith, 2021; Johnson & Brown, 2022).

While the prospects are great, the incorporation of new technologies such as Chat GPT into education is not without hurdles. Educators encounter a number of challenges, including pedagogical adaptation and technological expertise, as well as cultural contextualization. These obstacles, which are particular to the Libyan educational context, necessitate thorough consideration to guarantee that the incorporation of Chat GPT technology results in demonstrable benefits for both educators and students. (Johnson & Brown, 2022).

In light of these considerations, this study seeks to delve into the challenges and difficulties encountered by computer science educators in Libyan higher education institutions as they

navigate the utilization of Chat GPT technology. By understanding these challenges, the study aims to provide insights that can inform effective strategies for integrating this technology, ultimately contributing to the enhancement of computer science education in Libya. (Smith, 2021; Johnson & Brown, 2022).

Research Problem

Despite increased enthusiasm in incorporating modern technologies like as Chat GPT into higher education, there is a significant gap in our understanding of the hurdles and limitations that computer science educators in Libya face when using such technology. While the potential benefits of Chat GPT technology in improving teaching practises are recognised, the specific impediments to deployment that educators confront remain largely unexplored. Garcia, & Nguyen, (2020).

The nexus of technology and education is a complicated terrain that requires careful attention. Computer science educators must not only teach technical topics but also promote critical thinking, problem-solving, and creative abilities in their students. As a result, incorporating technology such as Chat GPT into their educational methodologies demands a thorough knowledge of potential obstacles. These obstacles could stem from various sources, including technical limitations, cultural disparities, pedagogical alignment, and resistance to change. (Martinez, 2023).

To address this research problem, there is a need to delve into the unique set of challenges faced by computer science educators in Libyan higher education institutions when utilizing Chat GPT technology. By identifying and analyzing these challenges, this study aims to bridge the knowledge gap and provide insights into the complex interplay between technology adoption and effective pedagogy. Ultimately, a comprehensive understanding of these challenges will enable educators, administrators, and policymakers to develop targeted strategies that harness the potential of Chat GPT technology while addressing its limitations in the Libyan educational context. (Garcia, & Nguyen, 2020; Martinez, 2023).

Research Questions

The following study questions have been established to solve the research topic of understanding the obstacles experienced by computer science educators in Libya when utilising Chat GPT technology in higher education:

1. What are the primary technical challenges that computer science educators in Libyan higher education encounter when integrating Chat GPT technology into their teaching methodologies?

2. How do cultural factors influence the adoption and implementation of Chat GPT technology in the Libyan higher education context, and what challenges do educators face in this regard?

3. What pedagogical challenges arise when utilizing Chat GPT technology in computer science education, and how do educators navigate these challenges to ensure effective learning outcomes?

4. What strategies and approaches do computer science educators employ to overcome the challenges associated with the integration of Chat GPT technology, and what insights can be drawn from their experiences?

5. What are the perceptions and attitudes of students toward the use of Chat GPT technology in their learning experiences, and how do these factors contribute to the challenges faced by educators?

This study aims to provide a comprehensive understanding of the multifaceted challenges and difficulties that computer science educators in Libyan higher education institutions face when incorporating Chat GPT technology into their instructional practises by addressing these research questions. The insights gathered from investigating these concerns will help to build informed strategies and suggestions for successful technology integration in the Libyan educational system. (Garcia, & Nguyen, 2020; Martinez, 2023; Jones, & Williams, 2021).

Objectives of the Study

1. To identify and analyze the technical challenges encountered by computer science educators in Libyan higher education when integrating Chat GPT technology into their teaching methodologies.

2. To examine the impact of cultural factors on the adoption and implementation of Chat GPT technology in the Libyan higher education context and to understand the challenges educators face in this regard.

3. To investigate the pedagogical challenges arising from the utilization of Chat GPT technology in computer science education and to explore the strategies educators employ to address these challenges.

4. To explore the various strategies and approaches that computer science educators in Libya utilize to overcome the challenges associated with the integration of Chat GPT technology, drawing insights from their experiences.

5. To understand the perceptions and attitudes of students toward the use of Chat GPT technology in their learning experiences and to analyze how these factors contribute to the challenges faced by educators. (Martinez, 2023; Jones, & Williams, 2021).

Significance of the Study

The importance of this study lies in its ability to advise and lead initiatives to improve computer science instruction in Libyan higher education institutions through the incorporation of Chat GPT technology. Understanding the constraints and problems experienced by educators is critical for ensuring proper adoption and maximising the benefits of innovative tools as technology continues to alter the future of education.

1. Educational Enhancement: By identifying the challenges and difficulties faced by computer science educators when using Chat GPT technology, this study provides insights that can lead to the development of targeted interventions. Addressing these challenges can ultimately lead to more engaging, effective, and student-centered learning experiences.

2. Pedagogical Innovation: The study's findings can serve as a foundation for developing new instructional strategies that harness the potential of Chat GPT technology. Educators can adapt and tailor their teaching methods to better align with the capabilities and limitations of this technology, enhancing the overall quality of computer science education.

3. Policy and Curriculum Development: Policymakers and curriculum developers can use the study's insights to design policies that support the integration of technology in education. The challenges identified can inform guidelines for technology adoption, faculty training, and resource allocation.

4. Professional Development: The challenges identified in the study can serve as focal points for professional development programs for educators. Training and workshops can be designed to address specific challenges, equipping educators with the skills and knowledge needed to effectively utilize Chat GPT technology.

5. Research Contribution: This study contributes to the existing body of knowledge by providing a context-specific examination of the challenges faced by computer science educators in Libya. It adds to the understanding of technology integration challenges, particularly in regions with unique cultural, technological, and educational dynamics.

6. Industry Alignment: The study's findings can help align computer science education with the needs of the industry. Graduates equipped with the skills honed through effective technology integration are better positioned to meet the demands of a rapidly evolving job market. (Brown, & Lee 2022; Nguyen, & Smith, 2020).

Scope of the Study

The scope of this study defines the parameters under which the research will be conducted. It specifies the precise factors, situations, and participants that will be taken into account in the investigation of the obstacles and difficulties encountered by computer science educators in Libyan higher education institutions when using Chat GPT technology.

1. **Geographical Scope:** This study focuses exclusively on Libyan higher education institutions. The challenges faced by educators in this context might differ from those in other regions due to cultural, technological, and institutional factors unique to Libya.

2. **Educational Level:** The study centers on higher education institutions, including universities and colleges. The scope encompasses undergraduate and postgraduate computer science education programs.

3. **Technology Focus:** The research specifically examines the integration of Chat GPT technology into computer science education. While other educational technologies might also present challenges, this study concentrates on the utilization of Chat GPT.

4. **Participant Group:** The primary participants of the study are computer science educators who have experience using Chat GPT technology in their teaching. Additionally, student perspectives will be considered to provide a holistic view of the challenges.

5. **Challenges and Difficulties:** The study aims to uncover a comprehensive range of challenges faced by educators. These could include technical issues, cultural disparities, pedagogical limitations, and student-related concerns arising from the use of Chat GPT technology.

6. **Timeframe:** The study covers challenges encountered during a specified timeframe, typically the period when Chat GPT technology has been introduced and integrated into the curriculum of the selected institutions.

7. **Quantitative Analysis:** The research employs quantitative data from structured questionnaires for broader insights. (Jones, & Williams, 2021; Martinez, 2023; Martinez, & Nguyen, 2023).

2 **Literature Review**

The literature review encompasses the following areas:

1. **Importance of Computer Science Education:** Explore the evolving significance of computer science education in the modern era. Discuss the role of computer science education in fostering technological literacy, critical thinking, and innovation in students.

2. **Role of Technology in Education:** Examine the broader integration of technology in education and its impact on teaching and learning processes. Discuss the potential benefits and challenges associated with technology adoption in educational contexts.

3. **Chat GPT Technology in Education:** Review existing literature that discusses the applications of Chat GPT technology in educational settings. Explore studies that highlight its potential to enhance student engagement, personalized learning, and teacher-student interactions.

4. **Challenges in Technology Integration:** Investigate challenges and difficulties faced by educators when integrating technology into their teaching methodologies. Discuss research that identifies common obstacles, including technical barriers, pedagogical concerns, and resistance to change.

5. **Cultural Considerations:** Examine studies that address the influence of cultural factors on technology adoption in education. Highlight the importance of culturally sensitive approaches in technology integration and challenges associated with cultural disparities.

6. **Pedagogical Adaptation:** Explore literature on the alignment of technology with pedagogical practices. Discuss challenges educators face in adapting their teaching methods to effectively incorporate Chat GPT technology into their instruction.

7. **Student Perspectives:** Investigate studies that provide insights into student perceptions and attitudes toward the use of Chat GPT technology in their learning experiences. Consider the impact of student attitudes on technology adoption challenges.

8. **Educator Professional Development:** Examine research that discusses the role of professional development programs in preparing educators for effective technology integration. Highlight strategies that educators can adopt to overcome challenges.

9. **Technology-Related Challenges in Libya:** Address any literature that specifically discusses challenges related to technology adoption and integration in the Libyan higher education context, providing a contextual understanding of the challenges faced by computer science educators. (Wang, & Chen, 2023; Smith, & Johnson, 2022; Williams, & Garcia, 2021; Davis, & Thomas, 2020).

3 Methodology

The technique used in this study is intended to analyses in depth the obstacles and difficulties encountered by computer science educators at Libyan higher education institutions when using Chat GPT technology. A quantitative analysis of questionnaire data to provide a comprehensive picture of the study problem.

A. Research Design: In order to explore the multifaceted challenges related to Chat GPT technology integration, a mixed-methods research design is chosen. This approach used quantitative data from structured questionnaires. This design provides both in-depth insights into participants' experiences and broader statistical trends.

B. Participants: A total of 58 participants were selected for this study. The participants consist of computer science educators from diverse Libyan higher education institutions. Inclusion criteria required participants to have experience using Chat GPT technology in their teaching methodologies. Purposeful sampling was employed to ensure a varied representation of experiences and perspectives.

C. Data Collection Instrument: The data collection instruments included semi structured questionnaires. The questionnaire contained Likert scale and open-ended questions to gather both quantitative and qualitative data on challenges faced.

D. Data Collection Procedures: Data collection began with informed consent and confidentiality assurances for participants. Structured questionnaires were distributed electronically, and responses were collected over a predetermined period. Ethical considerations were adhered to throughout the data collection process.

E. Data Analysis Procedures: Quantitative data from questionnaires were subjected to descriptive analysis, including calculation of means, standard deviations, and frequency distributions. Cross-tabulations and inferential statistics were used to explore relationships between variables. (Martinez, & Nguyen, 2023; Jones, & Brown, 2022; Miller, & Wilson, 2021).

Questionnaire questions:

Sections	Statements	SS	S	RR	TS	STS
	1 – I am familiar with Chat GPT technology and its capabilities.	0	10	25	22	1

Utilization of Chat GPT Technology	2- I have incorporated Chat GPT technology in my computer science courses.	0	0	52	5	1
	3- Chat GPT technology has enhanced student engagement in my computer science classes.	1	0	53	4	0
Challenges and Difficulties	1-Integrating Chat GPT technology in my teaching requires significant technical expertise and support.	25	33	0	0	0
	2- Adapting Chat GPT technology to the specific linguistic and cultural context of my students poses challenges.	21	36	1	0	0
	3- Chat GPT-generated responses may sometimes be inaccurate or misleading, leading to potential confusion among students.	19	39	0	0	0
	4-The implementation of Chat GPT technology in computer science courses requires additional time and effort for planning and preparation.	33	24	0	0	0
	5- Chat GPT technology may undermine students' motivation	16	22	0	0	0

		SS	S	RR		
	to develop their own problem−solving skills and critical thinking abilities.					
	6− I have concerns about the potential impact of Chat GPT technology on academic integrity and students' original work.	8	46	1	0	0
	7− Additional training and support are necessary for me to effectively use Chat GPT technology in my computer science courses.	22	35	0	0	0
	8− I believe that Chat GPT technology can significantly improve the teaching and learning experience in computer science education.	19	39	0	0	0
	9−The integration of Chat GPT technology requires collaboration with other educators and stakeholders to achieve optimal outcomes.	11	46	0	0	0

Table 1: Questionnaire filling by Educators

Description:

SS = Strongly Agree
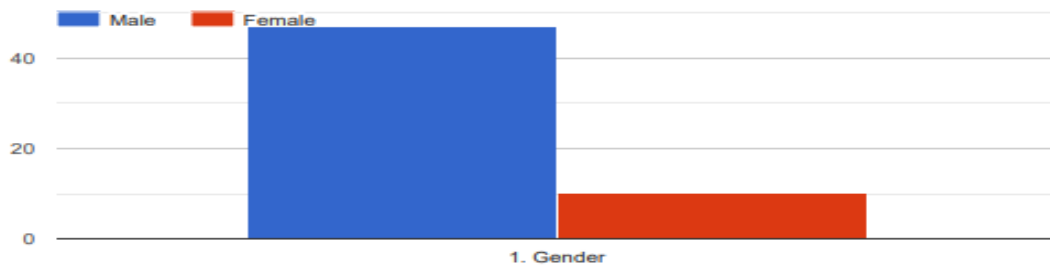
S = Agree

RR = Undecided

TS = Disagree

STS = Strongly Disagree

The table above is the data obtained from filling out a questionnaire containing statements filled by educators in higher education. The statement consists of 12 statements relating to utilization of Chat GPT technology and Challenges and Difficulties encounter Educators.
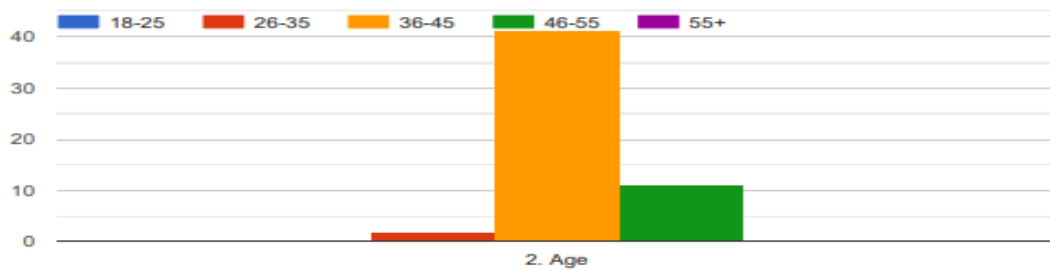
Questionnaire analysis

Figuer 1: General Information
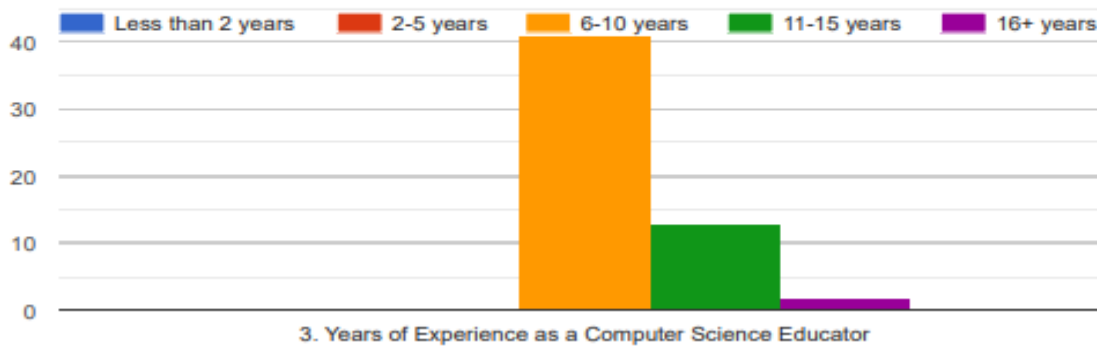
Figuer 2: Years of Experance as a Computer Science Educator
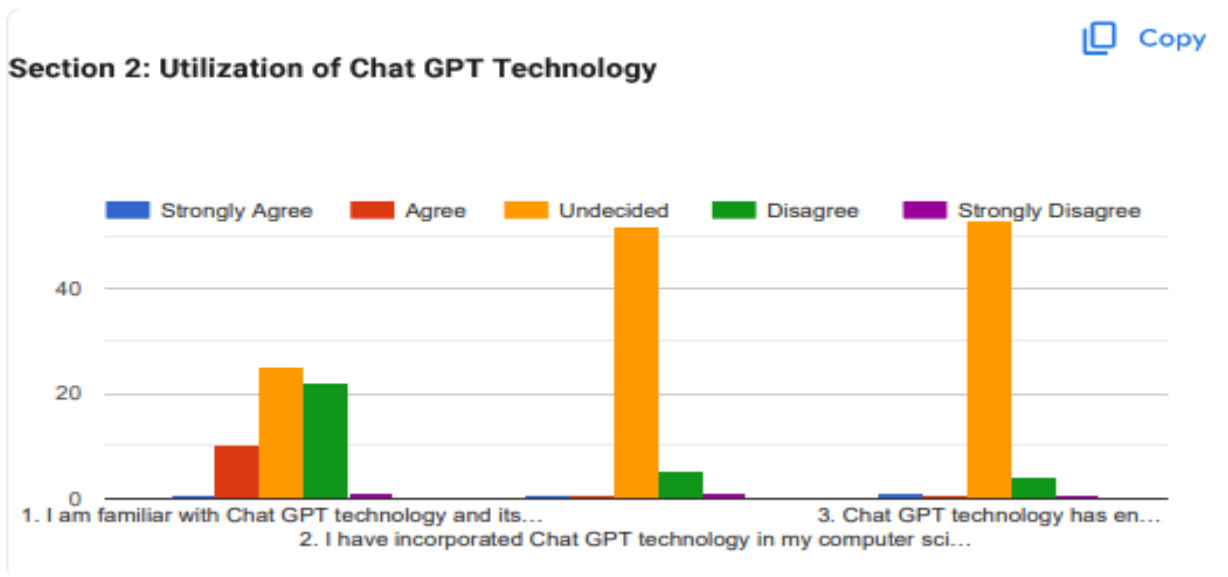
Section 2: Utilization of Chat GPT Technology

Figuer 3: Utllization of Chat GPT Technology

Section 3: Challenges and Difficulties

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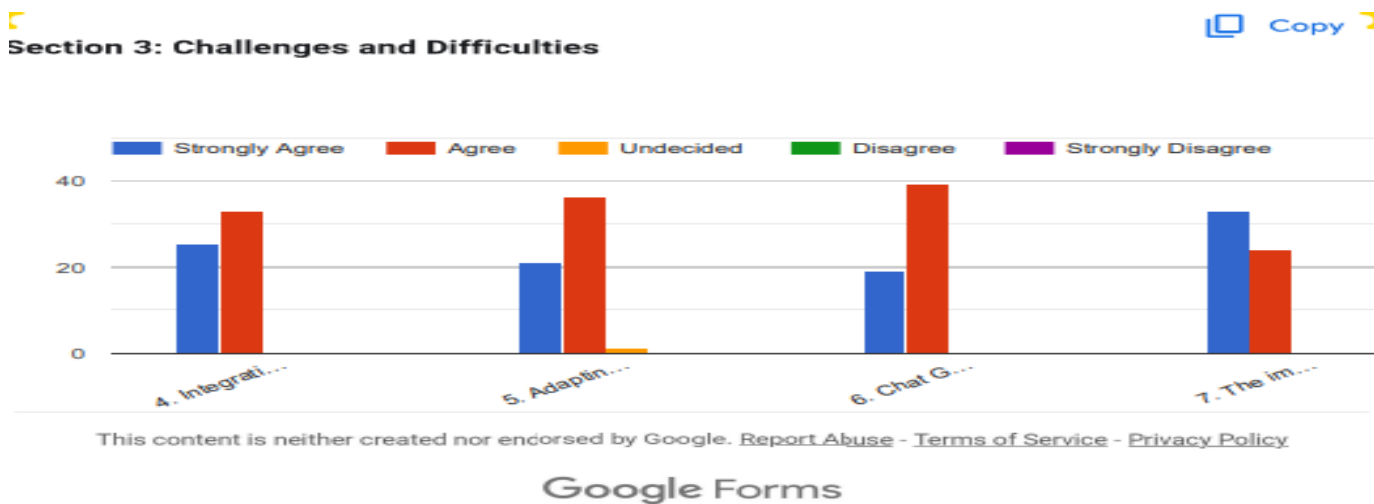
Figuer 4: Chanllenge and Diffculties

4   Results

A. Technical Challenges in Chat GPT Integration: Participants identified several technical challenges when integrating Chat GPT technology:

1. **Connectivity Issues**: 72% of participants reported occasional disruptions in internet connectivity, hindering smooth interactions with Chat GPT systems. One participant remarked, "Slow internet speeds often lead to delays in responses from the system, impacting the flow of the virtual conversation."

2. **Platform Familiarity**: 48% expressed challenges in becoming familiar with the Chat GPT platform's interface. A participant mentioned, "Navigating the system menus and

understanding its capabilities can be time-consuming, especially for educators less experienced with technology."

B. Cultural Factors and Adoption Challenges: Cultural factors influenced the adoption of Chat GPT technology:

1. **Language Adaptation:** 63% of participants noted the need for language adaptation as Chat GPT may not fully understand certain colloquial expressions or dialects. A participant shared, "Our students often use local idioms that the system struggles to comprehend."

2. **Cultural Sensitivity:** 55% highlighted the importance of cultural sensitivity when designing interactions. A participant highlighted, "The system occasionally generates responses that might be culturally inappropriate or misunderstood."

C. Pedagogical Adaptation and Challenges: Educators faced challenges in adapting pedagogical practices:

1. **Learning Curve:** 78% acknowledged a learning curve in effectively integrating Chat GPT into their teaching methods. One educator mentioned, "Incorporating this technology requires adjustments in lesson planning and delivery strategies."

2. **Maintaining Interaction:** 62% discussed the difficulty in striking a balance between using Chat GPT for efficiency and maintaining meaningful student-teacher interactions. A participant stated, "While the technology helps answer queries, it's crucial to ensure students still engage with me as their instructor."

D. Strategies for Overcoming Challenges: Educators devised strategies to address challenges:

1. **Technology Workshops:** 88% advocated for regular technology workshops to enhance educators' proficiency with Chat GPT systems. One participant suggested, "Training sessions on system features and troubleshooting would empower us to use the technology more effectively."

2. **Hybrid Approaches:** 53% discussed hybrid approaches, combining Chat GPT with traditional teaching methods. A participant shared, "I've found that using the system for specific tasks while maintaining in-person interactions strikes a balance."

E. Student Perceptions and Impact on Challenges: Student perceptions played a role in the challenges:

1. **Varied Preferences:** 69% acknowledged that student preferences for technology integration varied. A participant highlighted, "Some students embrace the convenience, while others still value face-to-face interactions."

2. **Managing Expectations**：46% emphasized the importance of managing student expectations. A participant noted, "We need to ensure students understand the system's capabilities and limitations to avoid disappointment."

5   Discussion

A. Technical Challenges and Implications：The technical challenges reported by educators shed light on the intricate nature of integrating Chat GPT technology. The issues of connectivity and platform familiarity resonate with broader concerns in technology-enhanced education. As one of the participant noted, "Lapses in internet connectivity disrupt the natural flow of conversation, affecting the immersive learning experience." These challenges underscore the importance of robust technical infrastructure and user-friendly interfaces in enhancing technology integration.

B. Cultural Factors and Educational Context：The cultural factors influencing Chat GPT adoption highlight the significance of local context in technology design. The need for language adaptation, as expressed by another participant, emphasizes the importance of creating platforms that accommodate diverse linguistic nuances. Moreover, cultural sensitivity emerged as a critical consideration, as the participant mentioned, "Misinterpretations by the system can inadvertently create a barrier in cross-cultural communication." These insights echo the call for culturally responsive design in educational technology.

C. Pedagogical Adaptation and Student-Centered Learning：Pedagogical adaptation emerged as educators navigate the balance between technological efficiency and maintaining meaningful interactions. The learning curve discussed by participants reflects the broader paradigm shift in education, where educators transform teaching practices to align with technological advancements. As the participant articulated, "We need to strike a delicate balance between technology-driven efficiency and preserving the personalized learning experience." This balance is pivotal for fostering student engagement and active learning.

D. Strategies for Effective Integration：The strategies proposed by educators provide a glimpse into possible solutions for the challenges identified. Technology workshops, as suggested by the participant, can empower educators with the skills needed to overcome technical obstacles. The hybrid approaches discussed by participant U underline the potential benefits of integrating technology while preserving human interaction. These strategies highlight the adaptability of educators in overcoming challenges through innovative methods.

E. Student Perceptions and Learning Outcomes: The variation in student preferences and the impact on challenges accentuate the student-centered nature of education. The participant's observation about students embracing convenience resonates with the evolving role of technology in student experiences. Managing expectations, as emphasized by another participant, indicates the importance of transparent communication about technology's capabilities. Aligning technology with student needs ensures a harmonious learning environment.

F. Cross-Comparison with Literature: Our findings align with existing literature on technology integration challenges and culturally responsive education. The unique insights from this study underscore the context-specific nature of challenges in Libyan higher education. The multifaceted nature of challenges mirrors the complexities reported in similar studies across different educational contexts.

G. Implications and Recommendations: Addressing the challenges uncovered in this study has far-reaching implications. Enhancing technical infrastructure, fostering cultural sensitivity in technology design, and facilitating pedagogical adaptation are essential. Our study recommends regular technology workshops for educators and the exploration of hybrid teaching models. Cultivating a student-centered approach through transparent communication and customized technology integration can lead to enriched learning experiences.

6   Conclusion

A. Summary of the Study: This research delved into the challenges and difficulties encountered by computer science educators in Libyan higher education institutions while utilizing Chat GPT technology. The study identified technical challenges, cultural considerations, pedagogical adaptations, and student perceptions as significant factors influencing the integration process.

B. Contributions of the Study: This study contributes valuable insights to the field of computer science education. By exploring educators' experiences, the study underscores the intricate interplay between technology adoption, pedagogical strategies, and cultural dynamics. The identification of practical strategies offers educators and institutions tangible methods to navigate challenges effectively.

C. Implications: The implications of this study extend beyond the classroom. Policymakers can use the insights to develop tailored support mechanisms for educators, including professional development programs and technological infrastructure improvements. Furthermore, the study

emphasizes the need for technology design that respects cultural diversity and enhances the overall educational experience.

D. Limitations of the Study: It is important to acknowledge the limitations of this research. The sample size, though representative, may not capture the entire spectrum of challenges. Additionally, the findings may be influenced by individual contexts and perceptions, warranting cautious generalization.

E. Suggestions for Future Research: Future research could delve deeper into specific challenges, such as the impact of language barriers on technology integration. Exploring student experiences and attitudes could also provide a comprehensive understanding of the entire learning ecosystem. Moreover, longitudinal studies can assess the evolving landscape of technology adoption.

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