مجلة جامعة بني وليد للعلوم الإنسانية والتطبيقية
Bani Waleed University Journal of Humanities and Applied Sciences
تصدر عن– جامعة بني وليد – ليبيا
Website:https://jhas-bwu.com/index.php/bwjhas/index
المؤتمر الدولي الرابع للعلوم و الهندسة
المجلد الحادي عشر – العدد الثاني – 2026 عدد خاص الصفحات (11- 17) ISSN 3005-3900

A Proposed UTAUT Model for Measuring Mobile Learning Acceptance in Libya

Monther M. Elaisha[1], Tarig Elshheibia[1], Omar Najah[2], Abdulwahd M. Balied[3], Lynda Ouchaouka[4], Saad Alaaraj[5]
[1]Computer Science Department, Faculty of Information Technology/University of Benghazi, Libya
[2]Computer Science Department, Faculty of arts and science/Elmergib University, Kasr Khiar, Libya
[3]Higher Institute of Science and Technology, ELmarj, Libya
[4]Laboratoire d'Ingénierie et Matériaux LIMAT, Université Hassan II de Casablanca, Morocco
[5]Aram Science University, Syria
*Crosspnding author: monther.elaish@uob.edu.ly

نموذج UTAUT مقترح لقياس قبول التعلم عبر الأجهزة المحمولة في ليبيا

منذر محمد العيش [1]، طارق الشهيبة [1]، عمر نجاح [2]، عبد الواحد محمد بلعيد [3]، ليندا اوشاوكا[4]، سعد الأعرج [5]
[1] قسم علوم الحاسوب، كلية تقنية المعلومات/جامعة بنغازي، ليبيا
[2] قسم علوم الحاسوب، كلية الآداب والعلوم/جامعة المرجب، قصر خيار، ليبيا
[3] المعهد العالي للعلوم والتكنولوجيا، المرج، ليبيا
[4] مختبر الهندسة والمواد (ليمات)، جامعة الحسن الثاني بالدار البيضاء، المغرب
[5]جامعة آرام للعلوم، سوريا

Received: 16-10-2025	Accepted: 11-12-2025	Published: 01-03-2026

الملخص:
تقترح هذه الدراسة نموذجًا يدمج نموذج **UTAUT** مع عامل خارجي لتقييم مدى تقبّل التعلّم عبر الأجهزة المحمولة بين المتعلمين الليبيين. واستنادًا إلى أبحاث سابقة، يُسلّط النموذج الضوء على العوامل الرئيسية المؤثرة في تبنّي التكنولوجيا في الدول النامية، ويقترح نموذجًا شاملًا لقياس مدى تقبّل التعلّم. وقد ساهم التحقق من صحة النموذج من قِبل الخبراء وإضافة عوامل جديدة في تحسينه. تُقدّم النتائج رؤى ثاقبة حول العوامل الأساسية اللازمة لتحسين تبنّي التعلّم عبر الأجهزة المحمولة في التعليم. وتوصي الدراسة بإجراء المزيد من البحوث لتطبيق النموذج المقترح في سياق واقعي.

الكلمات الدالة: التعلم عبر الأجهزة المحمولة، نظريةUTAUT ، الدول النامية، المعرفة التقنية.

Abstract
This study proposes a proposal model that integrates the UTAUT with an external factor to assess the acceptance of mobile learning among Libyan leaners. Building on previous research, the model highlights key factors influencing technology adoption in developing nations and proposes a comprehensive model for measuring learning acceptance. Experts' validation and the incorporation of new factors further enhanced the model. The findings pro-vide insights into the essential factors

required to improve the adoption of mobile learning in education. Further research is recommended to apply the proposed model in a real-world scenario

Keywords: : Mobile Learning, UTAUT, Developing Countries, IT Knowledge.

1. Introduction

Access to and achievement of higher levels of education is crucial for ensuring that people can secure productive jobs and sustainable livelihoods. Education is an integral component of any sustainable development agenda, as it is linked to equitable access to better living conditions, specialized and higher paying jobs, a sustainable environment, and economic and social development. Therefore, improving access to education and promoting higher levels of attainment is essential for advancing sustainable development goals [1, 2].

Multiple studies have explored the potential of technology to enhance educational opportunities and improve the overall well-being of learners. Tchamyou, Asongu and Odhiambo [3] conducted research on this topic and found several noteworthy outcomes. Firstly, mobile phones and the Internet have a positive impact on primary education by reducing income inequality. Secondly, all indicators of information and communication technology (ICT) have a negative effect on the Gini index (which measures income distribution across a population) when applied to secondary education. Thirdly, fixed broadband has a positive effect on economic growth when applied to primary education and lifelong learning.

The advancement of wireless technologies and the creation of mobile applications have has a remarkable impact on higher education. In recent years, the integration of mobile technology into technology and learning has emerged as a significant area of research for educators [4]. The implementation of new technologies such as M-Learning should be supported by societal acceptance, as highlighted by Alghazi, Wong, Kamsin, Yadegaridehkordi and Shuib [5]. However, despite the evaluation of technology acceptance models in numerous countries, research in developing nations, particularly Arab countries, remains scarce in terms of identifying the factors that influence the adoption and utilization of technology [6, 7].

A systematic review of educational research on mobile learning, conducted by Aliaño, Hueros, Franco and Aguaded [8], revealed that the number of studies examining this area is still relatively limited, despite the topic being researched since 2022. Various models have been proposed to identify and comprehend the factors that influence user acceptance of information systems [9-12]. However, in the con-text of mobile learning, Technology Acceptance Technology (TAM) and Unified Technology of Acceptance and Use Theory (UTAUT) are the commonly used models.

The majority of previous literature on technology adoption has focused on developed countries, while only a few studies have investigated this issue in developing nations, as noted by Kayali, Safie and Mukhtar [13] and Yeboah-Boateng and Essandoh [14]. Technological gaps between developed and developing countries, such as differences in information technology knowledge (ITK), present additional challenges for the latter, according to Kayali, Safie and Mukhtar [13], Mujinga and Chipangura [15], and Safie and Aljunid [16]. The level of ITK has been identified as a crucial factors in technology adoption by Kayali, Safie and Mukhtar [13] and Sabah [17].

In the 1990s and early 2000s, research on development-oriented information ICT aimed to overcome barriers to connectivity and access for the African population [18, 37]. However, due to the weak technological infrastructure in Africa, the integration of m-learning among postgraduate students may face difficulties, as noted by [19, 38]. This study aims to measure the acceptance of m-learning among learners in Libya, wish is an Arab country located in North Africa, using UTAUT factors with the addition of the IT knowledge factor.

2. Background

Venkatesh, Morris, Davis and Davis [12] developed the UTAUT to address the limitation of previous theories. UTAUT combines eight of the most prevalent previous models and theories, thus drawing upon the key constructs of each. The integration of these eight theories results in a higher explanatory power in terms of behavioral intent, with the ability to explain up to 70% of the explained variance.

The UTAUT (Unified Theory of Acceptance and Use of Technology) incorporates eight theories: Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Combined Theory of Planned

Behavior/Technology Acceptance Model (C-TPB-TAM), Model of Personal Computer Utilization (MPCU), Diffusion of Innovation Theory (DOI), and Social Cognitive Theory (SCT) [9, 10, 20-25].

Venkatesh, Morris, Davis and Davis [12] identified three crucial constructs in determining the intention to use information technology: effort expectancy, performance expectancy, and social influence. These constructs are derived from the most prevalent constructs of the eight integrated theories and model in UTAUT. Performance expectancy is influenced by constructs from TAM/TAM2, TPB, combined TAM motivational model extrinsic motivation, relative advantage of split innovation theory, and expectation/outcome of social cognitive theory. Effort expectancy relates to the ease of using a specific system, while social influence refers to individuals' perception of the importance of using the recommended system based on others' beliefs.

While UTAUT shares key assumptions with TAM and other models, there are limitations in all acceptance models [26]. UTAUT has been widely used in literature, either in its original form or with additional elements incorporated, but further investigation is required [27, 28]. Some studies suggest that UTAUT is effective and predictive in the acceptance literature, but more research is needed to understand its application in different contexts and technologies [29, 30].

Future research could examine the longitudinal effects of the UTAUT model on effective and efficient use of information system/technology (IS/IT). Additionally, meta-analyses in specific domains, such as education, could provide further insights into the model's strength in each domain. However, the UTAUT model may require adaption in different contexts, such as non-western cultures, as it may have lower explanatory power in the variance of behavioral intention [8, 31]. In certain contexts, the model explained only 39.1% of the variance in behavioral intention.

3. Method

The study comprised two phases: model building and expert validation [32]. In the first phase, we developed a draft model by integrating the core UTAUT constructs with IT knowledge as an external factor. In the second phase, we refined and validated this draft through structured feedback from domain experts.

1. Model Building

The selection of the UTAUT components: performance expectations, effort expectations, social influence, and facilitating conditions along with IT knowledge, based on their established relevance to m-learning adoption in developing contexts.

2. Expert Validation

A structured questionnaire, adapted from Elaish, Ghani, Shuib and Shennat [28] and earlier validated instrument [33-36], was emailed to three experienced technology adoption researchers. The instrument consisted of:

• Section A: Introduction to the Study and Draft Model

• Section B: Expert Demographics

• Section C: Evaluation of the Structure

1.Importance of Each Factor

2.Clarity of Factor Description

3.Consistency between Factor Name and Definition

4.Sufficiency of Data to Support Inclusion

5.Open Suggestions for Missing Principles

6.General Comments

Experts rated each item on a three-point scale (agree = 1; not sure = 0; disagree = -1). For items 1–3, higher scores reflected stronger agreement; item 4 was reverse-coded. Constructs with a mean score ≥ 0.60 were retained. Open-ended response were thematically coded to identify surface-level factors or suggested enhancements.

3. Model Refinement

Analysis of quantitative and qualitative data confirmed the importance of IT knowledge. Experts further recommend incorporating three additional constructs user experience, perceived ease of use, and self-efficacy consistent with iterative model refinements..

4. Proposed Model

1) Building

To expand the UTAUT model, an external factor, IT knowledge, was deemed relevant and essential, as shown in Fig. 1. End-users' level of IT knowledge has been found to determine their extent of technology adoption, such as e-

commerce, according to Kayali, Safie and Mukhtar [13]. Individuals with low IT knowledge may experience knowledge anxiety, as noted by previous research. Sabah [17] has suggested that students with a high level of IT knowledge are more likely to use mobile learning technology and are less likely to be influenced by others' opinion. In contrast, individuals with low IT knowledge may find it challenging to use m-learning and may be more susceptible to the opinions of others.

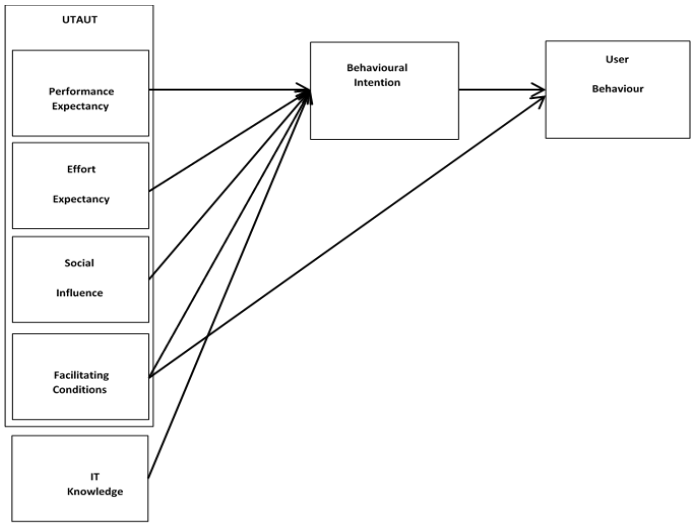

Fig. 1: The proposed model

2) Model Building

Sampling. Some of relevant experts of the adoption of technology participated in the test. The questionnaire files (was designed by Microsoft office word) via email to 3 experts. All of them have confirmed their participation in this survey study. Their recommendations were taken into account.

Instrument. The questionnaire sheet was divided into three section as follows, the first section of the questionnaire introduces the researcher, the research topic, and a proposed model that includes both UTAUT and IT knowledge factors. Additionally, the section includes a request for participation in the study. The second section consists of a set of questions aimed identifying the participants.

The third sections seeks to gather the opinions of experts on the IT knowledge factor and includes six questions. Questions 1 to 4 ask the experts to evaluate the relevance of the factor to the topic, the appropriateness of the factor's description, the correlation between the name and description of the factor, and whether more data is required. The experts are asked to provide their opinions by selecting one of the following options: agree, not sure, or disagree. Q5 asked the experts to provide their suggestions, comments, and opinions about the model. The questions is: Is there any principle that is missing? If so, please list down its name and description. Q6 is about remarks if any.

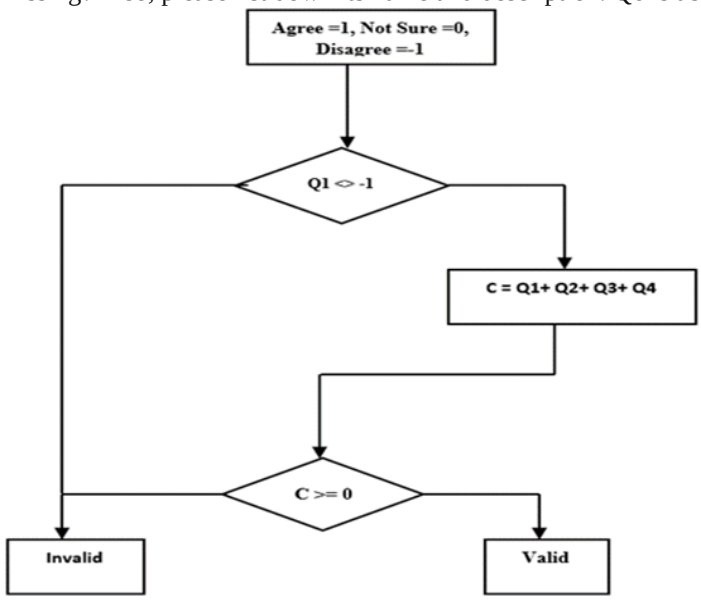

Fig. 2: Principle validation procedure

Analysis of the Expert Opinion. The provided data from the experts was analyzed for a single factor, with Agree being assigned a value of 1, Disagree a value of -1, and Note sure a value of 0. Furthermore, the results were collected based on the condition that Q1 was not equal to -1, which applied to question Q1 to Q3, except for Q4, which uses the opposite scale (Agree = -1, Disagree = 1, Note sure = 0). Experts' comments and observations on Q5 and Q6 were examined to determine. Whether they provided additional elements or simply make observations. Fig. 2. depicts the validation factor process.

Results and Discussion. The subsequent stage involved computing the responses provide by all the experts. They validated the suitability of the IT knowledge factor in measuring learners' acceptance of mobile learning. Furthermore, their comments led to the addition of new factors to the model. As depicted in Fig. 3, the experts introduced the following factors.

The model design incorporates three essential factors that crucial in measuring learners' opinions and feedback on mobile learning acceptance.

The First Factor in User Experience. It plays a significant role in understanding users' overall experience and feedback on mobile learning technology.

The Second Factor is Perceived Ease of Use. It measures users' perceptions of the ease of using mobile learning technology, including its user interface, navigation, and features. One experts added this factor to the model, highlighting its impact on user acceptance.

The Third Factor is Self-efficacy. It assesses users' confidence in their ability use mobile learning technology and how it affects their acceptance. Another experts emphasized the importance of this factor in the proposed model.

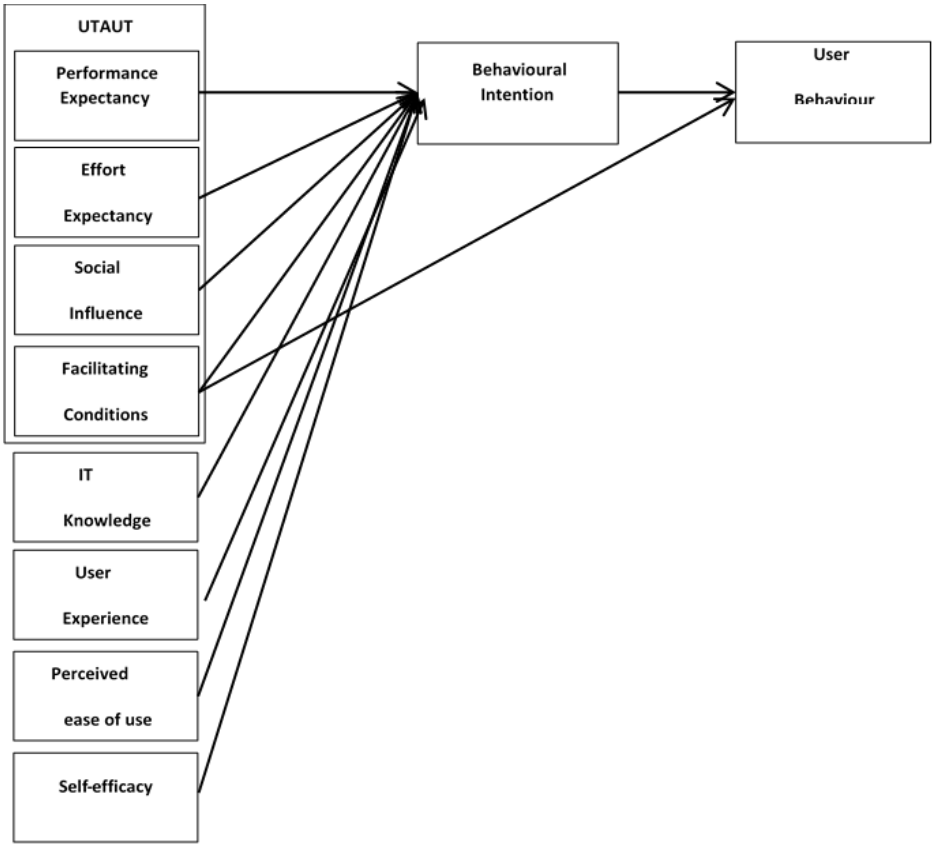

Fig. 3: The enhanced proposed model

5. Conclusion

This study provides a valuable contribution to field of mobile learning in education by proposing a model that incorporates essential factors for improving technology adoption. The study's findings can help educators and policymakers design and impellent effective mobile learning strategies. However, further research is necessary to test the proposed model in real-world scenarios and to address any limitations of gaps in the model. Through experimentation or other relevant methods, further re-search can provide valuable insights into the model's validity and identify areas for improvement. Overall, this study highlights the impotence of considering critical factors in promoting technology adoption and underscores the need for ongoing re-search in this field.

References

1. Tafese, M. B., Kopp, E., (2025), Education for Sustainable Development: Analyzing Research Trends in Higher Education for Sustainable Development Goals Through Bibliometric Analysis., Discov. Sustain., 6, 51.
2. Velempini, K., (2025), Assessing the Role of Environmental Education Practices Towards the Attainment of the 2030 Sustainable Development Goals., Sustain., 17, 2043.
3. Tchamyou, V. S., Asongu, S. A., Odhiambo, N. M., (2019), The Role of ICT in Modulating the Effect of Education and Lifelong Learning on Income Inequality and Economic Growth in Africa., Afr. Dev. Rev., 31, 261–274.
4. Ally, M., Prieto-Blázquez, J., (2014), What Is the Future of Mobile Learning in Education?, RUSC Univ. Knowl. Soc. J., 11, 142–151.
5. Alghazi, S. S., Wong, S. Y., Kamsin, A., Yadegaridehkordi, E., Shuib, L., (2020), Towards Sustainable Mobile Learning: A Brief Review of the Factors Influencing Acceptance of the Use of Mobile Phones as Learning Tools., Sustain., 12, 10527.
6. Alsswey, A., EL-Qirem, F. A., (2025), Emerging Technology Adoption in the Arab Countries: Progress, Challenges and Recommendations., In: Conf. Sustain. Cutting-Edge Bus. Technol.; Cham: Springer Nature Switzerland; pp. 149–157.
7. Al-Boinin, H., Vatanasakdakul, S., Zaghouani, W., (2025), Gender, Culture, and Social Media: Exploring Women's Adoption of Social Media Entrepreneurship in Qatari Society., Adm. Sci., 15, 89.
8. Aliaño, Á. M., Hueros, A. D., Franco, M. G., Aguaded, I., (2019), Mobile Learning in University Contexts Based on the Unified Theory of Acceptance and Use of Technology (UTAUT)., J. New Approaches Educ. Res., 8, 7–17.
9. Ajzen, I., Fishbein, M., (1975), A Bayesian Analysis of Attribution Processes., Psychol. Bull., 82, 261.
10. Davis, F. D., (1989), Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology., MIS Q., 13, 319–340.
11. Venkatesh, V., Davis, F. D., (2000), A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies., Manag. Sci., 46, 186–204.
12. Venkatesh, V., Morris, M. G., Davis, G. B., Davis, F. D., (2003), User Acceptance of Information Technology: Toward a Unified View., MIS Q., 27, 425–478.
13. Kayali, M., Safie, N., Mukhtar, M., (2019), The Effect of Individual Factors Mediated by Trust and Moderated by IT Knowledge on Students' Adoption of Cloud-Based E-Learning., Int. J. Innov. Technol. Explor. Eng., 9.
14. Yeboah-Boateng, E. O., Essandoh, K. A., (2014), Factors Influencing the Adoption of Cloud Computing by Small and Medium Enterprises in Developing Economies., Int. J. Emerg. Sci. Eng., 2, 13–20.
15. Alaiat, H. H. M. (2023). The Challenges and Difficulties Encountered by Computer Science Educators in Higher Education, Specifically Focusing on the Utilization of Chat GPT Technology in Libya. *Bani Waleed University Journal of Humanities and Applied Sciences*, *8*(4), 120-137.
16. Mujinga, M., Chipangura, B., (2011), Cloud Computing Concerns in Developing Economies. (Unpublished work)
17. Safie, N., Aljunid, S., (2013), E-Learning Initiative Capacity Building for Healthcare Workforce of Developing Countries., J. Comput. Sci., 9, 583.
18. Dreheeb, A. M., & El Tajouri, H. (2025). Role Of Artificial Intelligence In Enhancing Cyber Security. *Bani Waleed University Journal of Humanities and Applied Sciences*, *10*(3), 121-129.
19. Sabah, N. M., (2016), Exploring Students' Awareness and Perceptions: Influencing Factors and Individual Differences Driving M-Learning Adoption., Comput. Hum. Behav., 65, 522–533.
20. Ponelis, S. R., Holmner, M. A., (2015), ICT in Africa: Building a Better Life for All., Taylor & Francis, 21, 163–177.
21. Kaliisa, R., Picard, M., (2017), A Systematic Review on Mobile Learning in Higher Education: The African Perspective. (Unpublished work)
22. Ajzen, I., (1991), The Theory of Planned Behavior., Organ. Behav. Hum. Decis. Process., 50, 179–211.
23. Compeau, D. R., Higgins, C. A., (1995), Application of Social Cognitive Theory to Training for Computer Skills., Inf. Syst. Res., 6, 118–143.
24. Davis, F. D., Bagozzi, R. P., Warshaw, P. R., (1992), Extrinsic and Intrinsic Motivation to Use Computers in the Workplace., J. Appl. Soc. Psychol., 22, 1111–1132.
25. Rogers, E. M., (1995), Diffusion of Innovations: Modifications of a Model for Telecommunications., Die Diffus. Innov. Telekommun., 25–38.

26. Taylor, S., Todd, P. A., (1995), Understanding Information Technology Usage: A Test of Competing Models., Inf. Syst. Res., 6, 144–176.
27. Thompson, R. L., Higgins, C. A., Howell, J. M., (1991), Personal Computing: Toward a Conceptual Model of Utilization., MIS Q., 15, 125–143.
28. Nguyen, H. Q., Le, O. T. T., (2020), Factors Affecting the Intention to Apply Management Accounting in Enterprises in Vietnam., J. Asian Finance Econ. Bus., 7, 95–107.
29. Alshammari, S. H., Rosli, M. S., (2020), A Review of Technology Acceptance Models and Theories., Innov. Teach. Learn. J., 4, 12–22.
30. Lee, S., Jones-Jang, S. M., Chung, M., Kim, N., Choi, J., (2024), Who Is Using ChatGPT and Why? Extending the Unified Theory of Acceptance and Use of Technology (UTAUT) Model., Inf. Res., 29, 54–72.
31. Al-Shafi, S., Weerakkody, V., (2010), Factors Affecting E-Government Adoption in the State of Qatar. (Unpublished work)
32. Khaled Khalifa SAID, CHIBANI Belgacem RHAIMI, & Salem Asseed Alatresh. (2024). Skin Diseases Discover based On Artificial Intelligence. Bani Waleed University Journal of Humanities and Applied Sciences, 9(3), 188-198. https://doi.org/10.58916/jhas.vi.305
33. AlAwadhi, S., Morris, A., (2008), The Use of the UTAUT Model in the Adoption of E-Government Services in Kuwait., In: Proc. 41st Annu. Hawaii Int. Conf. Syst. Sci. (HICSS 2008), pp. 219–219. IEEE.
34. Donaldson, R. L., (2010), Student Acceptance of Mobile Learning., Doctoral diss, Florida State Univ.
35. Hevner, A. R., March, S. T., Park, J., Ram, S., (2004), Research Essay: Design Science in Information., MIS Q., 28, 75–105.
36. Khaled Khalifa SAID, Dr. CHIBANI Belgacem RHAIMI, & Salem Asseed Alatresh. (2024). A Review on Melanoma Skin Cancer Detection Using Deep Learning. African Journal of Advanced Pure and Applied Sciences, 3(4), 154–159. https://doi.org/10.65418/ajapas.v3i4.967
37. Elaish, M., Ghani, N., Shuib, N., (2017), Mobile Game Applications (MGAs) for English Language Learning: A Guideline for Development., In: 94th IASTEM Int. Conf., pp. 11–16.
38. Khowaja, K., Salim, S. S., (2015), Heuristics to Evaluate Interactive Systems for Children with Autism Spectrum Disorder (ASD)., PLoS One, 10, e0132187.
39. Almarimi, A. F., & Salem, A. M. (2025). Machine Learning using Simple Linear Regression. Bani Waleed University Journal of Humanities and Applied Sciences, 10(3), 178-184.
40. Alobaidy, S., Elakeili, S., Elaish, M., (2024), Enhancing English Language Learning in Libyan Primary Schools Through Gamification: Guidelines Development., Sci. J. Coll. Educ., 3, 122–105.
41. Zaied Shouran, Mohyaadean Atiya Mousa, Salem Asseed Alatresh, & Mohammed Abdo ulwahad AlSharaa. (2025). Security and Privacy in the Internet of Things: Issues, Challenges, and a Deep Learning-Based Intrusion Detection Framework. Bani Waleed University Journal of Humanities and Applied Sciences, 10(4), 225-233. https://doi.org/10.58916/jhas.v10i4.1003
42. Elaish, M. M., Yadegaridehkordi, E., Sokol, M., Halyna, R., Galyna, R., (2025), Propose a Model of E-Learning Acceptance in Poland and Libya., In: 10th Int. Conf. Control Eng. Inf. Technol. (CEIT'2025); vol. 23: Book Ser.–PBS; pp. 18–23. [Online]. Available at: https://cnpsi.com/PBS/Vol23/003.pdf
43. Maphosa, V., Maphosa, M., (2023), Opportunities and Challenges of Adopting MOOCs in Africa: A Systematic Literature Review., In: Massive Open Online:.