



**Tikrit Journal of Administrative
and Economics Sciences**

مجلة تكريت للعلوم الإدارية والاقتصادية

ISSN: 1813-1719 (Print)

E-ISSN: 3006-9149



**A Statistical Study on the Perceptions of Students and Teachers About
the Use of Social Networks in the Process of Knowledge and Learning**

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Keywords:

Knowledge, social networks, language learning, data analysis.

ARTICLE INFO

Article history:

Received 14 Jan. 2024
Accepted 12 Mar. 2024
Available online 31 Mar. 2024

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Abstract: The aim of this study is to investigate the role and importance of social networks in the process of knowledge and learning, whether social networks can be used as a tool for the purpose of development and discussion of scientific and learning topics, especially among students and university teachers. Does the gender of the participants affect their attitudes about the use of social networks for the aspect of knowledge and learning? Using a survey form adopted as a tool to collect data among university students and teachers, in 2022, by taking a random selection of 362 students and teachers, the data were analyzed with SPSS version 24, the results showed that students' perceptions of its use social networks are positive in the process of knowledge and learning. Using the Chi-Square, participants regardless of gender find out social networks as an opportunity to find and meet professional people and use them to find jobs. But the use of social networks for the purpose of learning a foreign language, males are more likely than females try to learn a foreign language and become acquainted with the culture of the country.

دراسة إحصائية عن تصورات الطلاب والمعلمين حول استخدام شبكات التواصل الاجتماعي في عملية المعرفة والتعلم

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المستخلص

تهدف هذه الدراسة إلى معرفة دور وأهمية شبكات التواصل الاجتماعي في عملية المعرفة والتعلم، وهل يمكن استخدام شبكات التواصل الاجتماعي كأداة لغرض تطوير ومناقشة المواضيع العلمية والتعليمية، خاصة بين الطلاب ومعلمون جامعات. هل يؤثر جنس المشاركين على اتجاهاتهم نحو استخدام شبكات التواصل الاجتماعي في الجانب المعرفي والتعلمي؟ استخدام استمارة المسح المعتمدة كأداة لجمع البيانات بين طلاب الجامعة والمعلمين، عام 2022، وذلك من خلال اختيار عشوائي 362 طالباً ومعلماً، وتم تحليل البيانات باستخدام برنامج SPSS الإصدار 24، وأظهرت النتائج أن تصورات الطلاب لاستخدام شبكات التواصل الاجتماعي إيجابية في عملية المعرفة والتعلم. مع Chi-Square، يكتشف المشاركون، بغض النظر عن جنسهم، الشبكات الاجتماعية كفرصة للعثور على أشخاص محترفين والالتقاء بهم واستخدامهم للعثور على وظائف. لكن باستخدام شبكات التواصل الاجتماعي لغرض تعلم لغة أجنبية، فإن الذكور أكثر ميلاً من الإناث إلى محاولة تعلم لغة أجنبية والتعرف على ثقافة البلد.

الكلمات المفتاحية: المعرفة، الشبكات الاجتماعية، تعلم اللغة، تحليل البيانات.

Introduction

Social networks are a form of advanced technology used through the World Wide Web via various smart devices such as computers, tablets and mobile phones; these devices have an exceptional ability to communicate and connect a large number of users. By these devices, the ability to interact and transact between users is constantly increasing through their participation in these networks by posting and sharing various topics.

Social network users are not only used widely by individuals but also by groups and organizations, businesses and companies to exchange business processes, promote business and marketing business owners, social networking sites play an important role to increase sales of their goods and services, even to reduce their expenses and for advertising purposes and marketing (Boyd and Ellison, 2007: 215). Furthermore, because of the influence of these networks, many individuals and societies are users of these networks and have become a platform for exchanging different opinions that this characteristic of social networks has made them an important factor in changing people's lifestyles, even their thinking, behavior and working style. Through these networks, users are able to communicate directly with each

other anytime and anywhere via different social networks such as (Facebook, Telegram, Twitter, Instagram, Viber, etc.) very easily, quickly, and directly and influence with each other, exchange their opinions and information and users share with each other. If social networks are used for educational and learning purposes, it can bring about a positive change in teachers' opinions. The virtual environment of social networks assists teachers to do many activities with students, which cannot be done in the classroom. Teachers believe that this environment is very important for improving learning. Using the Internet is popular in everyday life and, and it makes life easier and knowledgeable if used systematically (Bicen and Uzunboylu, 2013, 662; Blbas, 2020: 460).

Currently, students, teachers and higher education staff have used social networks as an opportunity to create groups of students by their departments in order to convey information and be aware of the educational situation, but how can we use these networks to promote and continue the learning process. Social networks should not be used only to spend time and waste time, but it is important to use them and put them on their right path and use them to post articles related to the educational process and learning in all subjects and specialties that benefit everyone. They also are used to achieve common goals and strive to complete and achieve learning and teaching objectives. Research presents different views on learners' perspectives on the use of social networks. And the various ways that students choose to incorporate social media into their university learning process, they are seen as a double-edged sword that is both useful and engaging, capable of both helping and hindering learning. The interviews and open-ended survey results emphasize the importance of social media for learning. In general, students' perceptions of social networks are important for learning and education, especially the benefits and impact of social networks among students themselves (Smith, 2016: 49).

Currently, the number of users of social networks is constantly increasing that most of the users devote their time to use social networks, especially students, educators and teachers, to what extent these networks utilize for teaching and learning. by using these networks to try to find, communicate and continue with people who are specialized and experts in various fields to benefit from the essential information and also participate in these courses and topics that improve the skills of students and teachers.

The importance of social networks for language learning and the educational programs released through these networks. Therefore, students and scientists see the need for social networks as an effective tool for discussing scientific topics and academic relationships between students and teachers to develop scientific aspect, as well as to find job opportunities and taking the opportunity to get acquainted and find experts in their field of expertise. Moreover, participating in various science courses and becoming aware of the culture and developments of other countries and using social networks to learn different languages.

Objective of the Study: This study attempts to reach the following results:

1. Students' views on the impact of social networks for scientific development.
2. The impact of social networks for discussion of scientific topics among students and teachers.
3. Knowing the views of participants according to gender in the use of social networks for the purpose of obtaining job opportunities and participating in scientific and academic courses and topics.
4. Determine the participants' attitudes according to gender in using social networks for the purpose of learning foreign languages and getting acquainted with the culture and developments of other nations and countries.

Importance of the Study: To what extent can social networks be used as tools to promote scientific aspects and learning, as well as their use for the purpose of getting to know and finding specialized and expert people. In addition, views of gender on using social networks as an effective tool for scientific discussion and participation in various courses and language learning. From this perspective, students and teachers should not only use social networks as a tool to spend time, but can also become a platform to serve the process of knowledge and learning.

Problem of the Study: One of the most important inventions and products that technology has made is social networks, which today have an important impact and structure in the world and societies, the users of social networks worldwide is increasing day by day. They are important in most fields of communication, delivery, trade, marketing of goods and all other fields, and the use and benefits of social networks and mobile devices in transferring resources and information, and interacting with academics in higher education institutions. Moreover, it has significantly influenced the teaching process and sharing of knowledge with peers and teachers. It has also had a

significant impact on student participation, resulting in an impact on students' academic performance. The use of online social media for learning makes it much easier for students to be more aware of process of changes, publications and research (Ansari and Khan, 2020: 11). They are useful tools for communication between teachers and students, but it is crucial in the learning and teaching process to consider cultural differences in formulating topics and teaching materials used by teachers in digital environment (Bartosik-Purgat et al., 2017: 188), in this perspective, the problem of this study is:

1. The role and impact of social networks in the process of scientific development and learning among students and teachers.
2. Are social networks an effective tool for discussing scientific topics, participating in various topics, courses and learning foreign languages?
3. Does the gender of the participants differ and affect the use of social networks for scientific and academic purposes, finding jobs and language learning?

Data Collection: The study is considered a descriptive study in which the survey method is used, which is more appropriate for such studies. For this purpose, the survey form is used to collect data. The form contains 18 questions, of these questions, 6 are general to describe the characteristics of the participants, 12 are specific to express the participants' opinions about the role and impact of social networking issues in the views of students and teachers in the process of knowledge and learning. The scope of the study includes students and teachers of Erbil Polytechnic University, 362 participants were randomly selected and the survey form was distributed to them in paper. It is a practical study in which a small selection of 20 participants was initially taken to ensure the validity and reliability of the questionnaire method, and to ensure data stability. Cronbach's alpha was used for the sequential questions of the survey form (Faraj et. al. 2022, 3; Blbas et. al., 2017: 51; Blbas, et al. 2020: 469; Blbas, 2021: 66). According to Cronbach's equation, the value was found to be (0.922), which indicates a very high degree of reliability of the sequence questions of the survey model.

Data Analysis: Data analysis presented the use of these rules and tools to achieve the objectives of the study, which are: Mean, Standard deviation, Relative frequency, Chi-Square, and Cramer's V. (Aziz et. al., 2023: 4; Aroian et. al., 2017: 114; Blbas, 2019: 210). Chi-square test is a statistical

study to find out the association between two categorical variables. (Blbas et. al., 2020: 3; Saadi et. al., 2023: 44; Ahmed et. al., 2023: 4; Blbas et al., 2024: 153).

Table (1): Descriptive Statistics for respondents' general questions about social networks

Categorical variable		F	%
Age	18-24	196	%54
	25-30	108	%30
	31-36	36	%10
	37-40	15	%4
	41+	7	%2
Gender	Male	197	%64.4
	Female	165	%45.6
Degree Level	Diploma	154	%42.5
	Bachelor's Degree	147	%40.6
	Master's Degree	52	%14.4
	Doctorate	9	%2.5
Family Economic Status	very good	26	%7.2
	good	86	%23.8
	fair	214	%59.1
	bad	16	%4.4
	very bad	12	%3.3
	I don't know	8	
Day-to-day Use of Social Networks	Less than an hour	27	7.5%
	1-less than 2 hours	76	21.0%
	2- less than 4 hours	91	25.1%
	4- less than 6 hours	82	22.7%
	More than 6 hours	86	23.8%

Regarding the age level of the participants, the majority of the participants are between 18 and 24 years old, consists for 54% of the total participants, because the majority of the participants are students, the average age of the participants was approximately 25 years old, and the standard deviation of their ages was 5.344.

The gender of participants is 197 males (64.4 percent) 165 females (45.6 percent) Regarding the degree level of the participants, most of the

participants have diploma and bachelor's degree, most of whom have middle class economic status. With regard to the level of daily use of social networks, 7.5% use social networks for less than an hour daily, 21% use social networks between one and two hours, and 25.1% use it about two hours, 22.7% use social networks for four hours and 23.8% use it for more than six hours. Thus, it finds out that the majority of participants use social networks between two hours and four hours a day, and the second highest is more than six hours, which is a large number of participants who spend their time on social networks daily.

Table (2): Descriptive statistics about the use of types of social networks

Categorical variable		F	%
Facebook	Yes	328	90.6%
	No	34	9.4%
Instagram	Yes	308	85.1%
	No	54	14.9%
Viber	Yes	335	92.5%
	No	27	7.5%
Twitter	Yes	20	%5.5
	No	342	%94.5
Snap chat	Yes	242	%66.9
	No	120	%33.1
Tick tock	Yes	250	%69.1
	No	112	%30.9
Telegram	Yes	239	%66.0
	No	123	%34.0
WhatsApp	Yes	160	%44.2
	No	202	%55.8

And with regard to users of social networking sites which is the most commonly used are Viber, Facebook and Instagram, while Twitter is the least used. 335 Viber users participated (92.5%), followed by Facebook with 90.6%, followed by Instagram with 85.1% and Twitter with 5.5%.

Table (3): Descriptive Statistics for respondents about social networks

Questions	Totally Agree	Agree	Neutral	Disagree	Totally Disagree
Social networks are essential for learning and academic communication with teachers and other students.	62 %17.1	140 %38.7	50 %13.8	95 %26.2	15 %4.1
Social networks are an important tool for academic purposes and acquiring new knowledge.	72 %19.9	211 %58.3	45 %12.4	29 %8.0	5 %1.4
Social networks are important for finding and getting to know academic and scientific experts.	62 %17.1	262 72.4%	29 8.0%	5 1.4%	4 1.1%
Social networks are essential for scientific development.	52 14.4%	184 50.8%	39 10.8%	84 23.2%	3 0.8%
Social networks are an effective tool for discussing scientific topics.	41 11.3%	208 57.5%	47 13.0%	63 17.4%	3 0.8%
Are social networks essential for academic and scientific communication between students and teachers?	53 14.6%	125 34.5%	69 19.1%	96 26.5%	19 5.2%
Social networks are an opportunity to find jobs.	25 6.9%	151 41.7%	61 16.9%	112 30.9%	13 3.6%
Using social networks is a tool for enjoyment and entertainment.	39 10.8%	167 46.1%	61 16.9%	91 25.1%	4 1.1%
Do you think users waste a lot of time using social networks?	71 19.6%	212 58.6%	32 8.8%	42 11.6%	5 1.4%
Social networks are important for participation in scientific and academic courses and topics.	45 12.4%	213 58.8%	40 11.0%	60 16.6%	4 1.1%
Social networks play an important role in learning a foreign language	61 16.9%	227 62.7%	37 10.2%	32 8.8%	5 1.4%
Social networks play an important role in getting to know the culture and developments of other nations and countries.	37 %10.2	213 58.8%	43 %11.9	60 16.6%	9 %2.5

Regarding the views of the participants on the use of social networks for the purpose of education and learning, the results of the data analysis show that the opinions of the survey participants are different and relative that. But of all the issues raised in general the majority of the respondents agreed that social networks can be used as a tool for learning and scientific discussion. It has become a platform for bringing together scientists and students to develop and promote knowledge and learning, and most of them also agree that social networks are important for participating in various courses, topics, and language learning, they also see it as important to find jobs.

Table (4): Correlation between participant gender with other variables using the Pearson Chi-Square

Variables	Pearson Chi-Square	p-value
Social networks are important for the development of knowledge.	4.720340	0.317214
Social networks are an effective tool for discussing scientific topics.	6.372047	0.173033
Social networks are necessary and important for finding and getting to know academic and scientific experts.	5.761699	0.217666
Social networks are important for participation in scientific and academic courses	8.607703	0.071689
Social networks are an opportunity to find jobs	4.408918	0.353484
Social networks are important for improving and learning a foreign language.	29.144484	0.000007
Social networks play an important role in getting to know the culture and developments of other nations and countries.	9.984819	0.040684

To determine students' views on the use of social networks, their role and importance for knowledge and academics, using the chi square test, whether the gender of the participants is related to other variables. For this purpose, we compare the obtained p-value with the value of the chi square table and the value of 0.05. In this regard, we find out that the views of students according to the gender of the participants do not differ with each of the issues of significance of social networks for scientific development. Students also see social networks as an opportunity to find specialists and experts to discuss scientific topics. And there is no difference in students' opinions, i.e., the gender of the participants does not affect the use of social networks to find jobs. Currently, social networks are widely used by both men and women, and for the purpose of participating in scientific courses and various courses also use social networks regardless of the gender of the participants. Regarding the improvement of foreign language learning and acquaintance with other countries' cultures, the P-value is smaller than 0.05.

There are differences in the gender of the participants to use these networks to learn languages and get acquainted with cultures of other countries. Males are more likely to try to learn languages and get acquainted with cultures of other countries, but the difference and relationship are weak as shown by the Cramer's V value shown in the table below. This difference may be due to the fact that males have more opportunities to migrate than females.

Table (5): Level and strength of relationships of gender participants in the use of social networks for the purpose of learning languages and getting acquainted with the cultures of other countries.

Variables	Cramer's V	P-Value
Learning language	0.284	0.000007
Getting to know the culture of other countries	0.166	0.040684

Table (5) explains the influence of gender of participants on the use of social networks for language learning and cultural acquaintance, which shows that there are differences and relationships between the gender of students with the use of social networks for language learning and cultural acquaintance. It is more common in males than in females, and the Cramer's V value explains that the relationship and impact is weak to some extent.

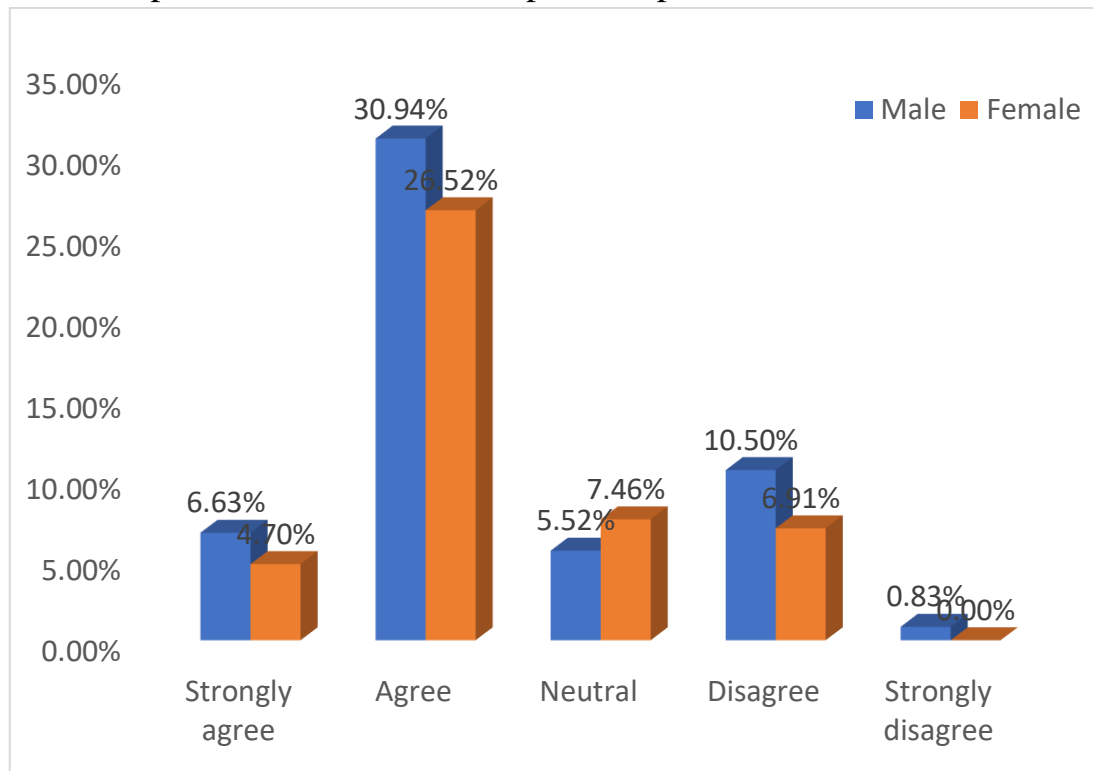


Figure (1): Gender relations with the use of social networks for learning purposes

Figure (1) explains the relationship between the gender of the participants and the use of social networks for language learning purposes. It finds out that males use social networks more than females for this purpose.

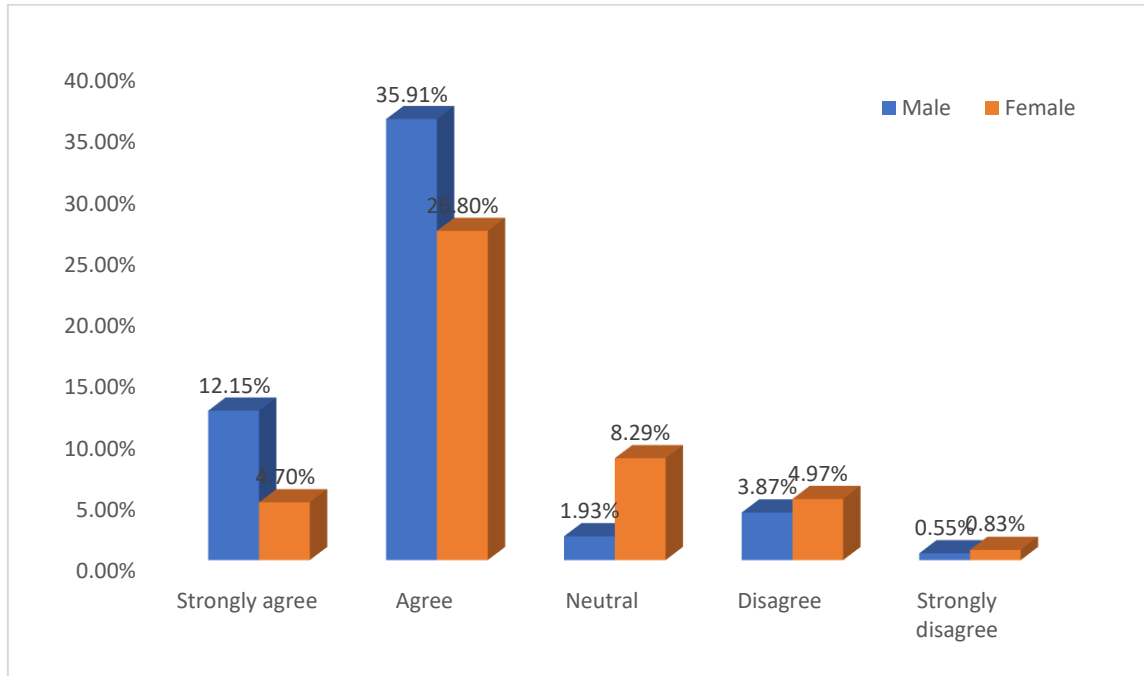


Figure (2): Using social networks for scientific conversation

Figure (2) explains the relationship between the gender of the participants and the use of social networks for scientific discussion, which shows that the gender of the participants has little impact on the use of social networks for scientific discussion.

Conclusions: Currently, as a result of the development and innovation of knowledge, social networks have emerged in the lives of individuals and societies. The purpose of this study is to find out the role and impact of social networks on the learning process and the attitude of students and teachers to use these networks in the scientific process. Do you see social networks as an effective tool for discussing scientific topics and academic relationships between students and teachers, and for the development of knowledge and also to find experts in their field of expertise, as well as for the purpose of participating in various science courses? To learn different languages, are social networks an opportunity to find jobs and use them to be aware of the latest discoveries and developments. The results of the data analysis show that the participants have a positive attitude towards the adaptation and use

of social networks as a tool with the academic and learning environment. It finds out that the average teachers and students are not isolated from the use of social networks, but some of them spend a lot of time on social networks every day, whether for entertainment or for searching information, watching videos and posts and also to communicate with others. By using the chi square, in data analysis and evaluating the p-value of the data, it is revealed that the p-value is greater than 0.05 for each of the questions about using social networks for discussing scientific topics, finding academics, experts, participating in scientific courses, and using them to find jobs. It finds out that there is no difference between men and women in their attitudes to these issues. To a large extent, both men and women have the opportunity to actively participate in education and work, but in terms of knowing their attitudes to use social networks for learning foreign Language. Also use social networks to get acquainted with the culture of other countries, The p-value of less than 0.05 shows that males use social networks more to try to learn foreign languages than females. This difference is due to the fact that males use social networks more than females in trying to learn foreign languages since males are more likely to travel and migrate to other countries.

Suggestions: Technology and social networks are developing very rapidly over time; thus, individuals and society should keep pace with this trend, make social media a tool for communication, knowledge, and learning.

Opening courses, seminars and workshops in order to raise awareness among students and scientists on how to deal with social networks and use them as a tool to facilitate the learning process.

Creating groups and platforms on social networks for communication between teachers, students and experts to discuss scientific and educational issues in the education system.

Reference

1. Abreu, R., Leal, A., & Figueiredo, P., (2018), EEG-informed fMRI: a review of data analysis methods. *Frontiers in human neuroscience*, 12, 29.
2. Ansari, J. A. N., & Khan, N. A., (2020), Exploring the role of social media in collaborative learning the new domain of learning. *Smart Learning Environments*, 7(1), 1-16.
3. Ahmed, S., Abdulqadir, S., Hussein, S., Qurbani, K., Omar, R., Mohamed, M. and Blbas, H., (2023), Knowledge, Attitudes, and Willingness to Vaccinate for Mpox among

- Healthcare Workers in Kurdistan Region of Iraq: A Nationwide Cross-Sectional Study, pp.1-20, [file:///C:/Users/RFC/Downloads/preprints202308.1737.v2%20\(16\).pdf](file:///C:/Users/RFC/Downloads/preprints202308.1737.v2%20(16).pdf).
4. Aroian, K., Uddin, N. and Blbas, H., (2017), Longitudinal study of stress, social support, and depression in married Arab immigrant women. *Health care for women international*, 38(2), pp.100-117.
 5. Blbas, H.T.A., Kahwachi, W.T.S., Ahmed, S.K., Aziz, K.G., Faraj, S.M. and Mohammed, M.S., (2024), Factors contributing to vitamin D deficiency in Erbil, Iraq: A statistical investigation. *Clinical Nutrition Open Science*, pp.151-162.
 6. Aziz, K.G., Blbas, H.T.A. and Tofiq, A.H., (2023), Evaluation of significant factors influencing the survival time of breast cancer patients using the Cox regression model. *Journal of Public Health*, pp.1-6.
 7. Baber, H., (2020), Determinants of students' perceived learning outcome and satisfaction in online learning during the pandemic of COVID-19. *Journal of Education and e-learning Research*, 7(3), 285-292.
 8. Bartosik-Purgat, M., Filimon, N., & Kiygi-Calli, M., (2017), social media and higher education: An international perspective. *Economics and Sociology*, 2017, vol. 10, núm. 1, p. 181-191.
 9. Bicen, H., & Uzunboyulu, H., (2013), The use of social networking sites in education: A case study of Facebook. *J. Univers. Comput. Sci.*, 19(5), 658-671.
 10. Blbas, H., (2019), Statistical analysis for the most influential reasons for divorce between men and women in Erbil-Iraq, *International Journal of Innovation, Creativity and Change*, 6 (2), pp.207-216, https://www.ijicc.net/images/Vol6Iss2/6215_Blbas_2019_TD_R1.pdf.
 11. Blbas, H., (2020), Student's Knowledge and Practices Regarding Standard Use of The Mobile Phone at Cihan University-Erbil-Iraq. *Journal of Al-Rafidain University College For Sciences* (Print ISSN: 1681-6870, Online ISSN: 2790-2293), (1), pp.466-472. <https://www.iasj.net/iasj/download/1267bfbf34ce133a>
 12. Blbas, H.T.A., Aziz, K.F., Nejad, S.H. and Barzinjy, A.A., (2020), Phenomenon of depression and anxiety related to precautions for prevention among population during the outbreak of COVID-19 in Kurdistan Region of Iraq: based on questionnaire survey. *Journal of Public Health*, pp.1-5. <https://link.springer.com/article/10.1007/s10389-020-01325-9>
 13. Blbas, H.T.A., Mahmood, S.H. and Omer, C.A., (2017), A Comparison results of factor analysis and cluster analysis to the migration of young people from the Kurdistan Region to Europe. *ZANCO Journal of Pure and Applied Sciences*, 29(4), pp.44-55.
 14. Blbas, H.T.A., (2021), Statistical Analysis About Negative Reasons of Summer Training at Salahaddin University Using Factor Analysis By SPSS. *Pragya*, 81, p.64-69.
 15. Boyd, D. M., & Ellison, N. B., (2007), Social network sites: Definition, history, and scholarship. *Journal of computer-mediated Communication*, 13(1), 210-230.
 16. Carpineto, C., & Romano, G., (2004), *Concept data analysis: Theory and applications*. John Wiley & Sons.

17. Cheng, C., Lau, Y. C., Chan, L., & Luk, J. W., (2021), Prevalence of social media addiction across 32 nations: Meta-analysis with subgroup analysis of classification schemes and cultural values. *Addictive behaviors*, 117, 106845.
18. Daly, A. J., Moolenaar, N. M., Bolivar, J. M., & Burke, P., (2010), Relationships in reform: The role of teachers' social networks. *Journal of educational administration*, 48(3), 359-391.
19. Faraj, S.M; Blbas, H.T. and, Ahmed A. I., (2022), A statistical study of the influence of COVID-19 on the agricultural supply chain (vegetative) production in Halabja governorate. *Cihan University-Erbil Scientific Journal*, 6(1), pp.1-6.
20. Hamid, S., Waycott, J., Kurnia, S., & Chang, S., (2015), Understanding students' perceptions of the benefits of online social networking use for teaching and learning. *The Internet and higher education*, 26, 1-9.
21. Ma, C., Zhang, H. H., & Wang, X., (2014), Machine learning for big data analytics in plants. *Trends in plant science*, 19(12), 798-808.
22. Ophus, J. D., & Abbitt, J. T., (2009), Exploring the potential perceptions of social networking systems in university courses. *Journal of Online Learning and Teaching*, 5(4), 639-648.
23. Sharpe, D., (2015), Chi-square test is statistically significant: Now what? *Practical Assessment, Research, and Evaluation*, 20(1), 8.
24. Smith, E. E., (2016), "A real double-edged sword:" Undergraduate perceptions of social media in their learning. *Computers & Education*, 103, 44-58.
25. Saadi, H.O., Sdeeq, H.S., Hussein, M.M., Blbas, H.T., Qadir, K. and Muhammed, S.M., (2023), Umbilical Cord Care Knowledge and Practice among Sample of Kurdish Women. *Technium Bio hemmed*, 6, pp.41-55.
26. Tekin, C., & Van der Schaar, M., (2013, October), Distributed online big data classification using context information. In 2013 51st Annual Allerton Conference on Communication, Control, and Computing (Allerton) (pp. 1435-1442). IEEE.
27. Tsai, C. W., Lai, C. F., Chao, H. C., & Vasilakos, A. V., (2015), Big data analytics: a survey. *Journal of Big data*, 2(1), 1-32
28. Wartberg, L., Kriston, L., & Thomasius, R., (2020), Internet gaming disorder and problematic social media use in a representative sample of German adolescents: Prevalence estimates, comorbid depressive symptoms and related psychosocial aspects. *Computers in Human Behavior*, 103, 31-36.
29. Wickham, H., & Wickham, H., (2016), *Data analysis* (pp. 189-201). Springer International Publishing.
30. Zhao, L., Detlor, B., & Connelly, C. E., (2016), Sharing knowledge in social Q&A sites: The unintended consequences of extrinsic motivation. *Journal of Management Information Systems*, 33(1), 70-100.