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# A Corpus-Based Analysis of Modal Auxiliaries of William Golding's Novel "The Lord of Flies"

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This study aimed to identify the types of modal auxiliaries and the meanings of modal auxiliaries in the novel The Lord of Flies by William Golding. This study uses mixed methods. First, this study used corpusbased quantitative data to obtain modal auxiliary in The Lord of Flies novel examined by looking at the concordance and frequency of the Ant Conc software tools. Second, the data analysis process used qualitative methods to show the function or meaning of the modal auxiliary verbs in The Lord of Flies novel. Based on data analysis, it shows that there are 549 modal auxiliary verbs in The Lord of Flies novel divided into 9 types of modals, namely the modal could with an occurrence frequency of 161 times (24.49%), the modal can with an occurrence frequency of 136 times (24.91%), the modal would appear with a frequency of 111 times (20.33%), the modal might appear with a frequency of 41 times (7.69%), the modal must appear with a frequency of 37 times (6.78%), the modal should appear with a frequency of 22 times (4.03%), the modal will appear with a frequency of 15 times (2.75%), the modal may appear with a frequency of 14 times (2.56%), and the modal shall appear with a frequency of 8 times (1.47%). And the meanings of modal auxiliary verbs in The Lord of Flies novel are intentional, epistemic, deontic, and dynamic meanings.

ABSTRACT

**Keywords**: A Corpora, Modal Auxiliaries, Novel "The Lord of Flies"

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### INTRODUCTION

The scientific study of language is called linguistics. Linguistics is a basic study of linguistics (Asman dkk., 2023). Gleason (1962) stated that linguistics was a scientific study to understand language from an internal point of view and an external point of view (Yeltriana dkk., 2023). In discussing the structure of language, there are two aspects of language that can be studied, namely internal aspects (linguistic micro) and external

aspects (linguistic macro) (Minarti dkk., 2023). The internal aspects of language include phonology (the study of language sounds and their functions), morphology (the study of word formation), syntax (the study of the formation of words in sentences), and semantics (the study of the meaning of language). The external aspect of language is an aspect that studies language and branches of other disciplines, for example, psycholinguistics and linguistics), sociolinguistics (sociology and linguistics), and ethnolinguistics (ethnology and linguistics) (Balaha dkk., 2021). Aarts and Aarts (1982) stated that words can be grouped into two classes, namely major word class and minor word class (Alsubaie, 2022). The major word class is also known as an open word class because its membership is not limited because new members are still allowed to be added. Open word classes or major word classes are nouns (book, pencil, ruler), verbs (go, come, walk, etc), adjectives (beauty, ugly, angry, happy, etc), and adverbs (always, almost, etc). Minor word classes are referred to as closed word classes whose membership is limited because they do not add new word classes (Kamorudeen, 2021). Kelas kata tertutup yaitu conjunction (and, but, or, etc), article (the, a, an), personal pronoun (you, yourself, myself, etc), quantifier (any, many, much, etc), interjection (wow!, yes!, oh!, etc), dan preposition (in, at, on, etc). Aarts and Aarts (1982) stated that there are sub-classes of verbs in English, namely lexical verb and auxiliary verb (Holly dkk., 2023). A lexical verb is the main verb in a sentence, while an auxiliary verb is a verb that cannot stand alone but must be followed by a lexical verb (Almarzooq dkk., 2020). Auxiliary verbs or commonly called helping verbs are divided into two classes: primary auxiliary verbs, and modal auxiliary verb.

Auxiliary verbs are also referred to as helping verbs which are divided into two classes: the main auxiliary verb and the modal auxiliary verb (Xie dkk., 2019). The main auxiliary verbs consist of be, do, and have. Auxiliary verbs, have and be, have unlimited forms and can be placed at the beginning or in the middle, the variables are limited and generally do not occur in other verbs. The main auxiliary verb is used before the main verb to change the time or emphasis in the sentence.

Modals are part of auxiliary verb that functions as helping verb to get more meaning. This is one of the semantic components such as ability, obligation, and possibility. Modals are one of the helping verb or auxiliary verb adding structural meaning or semantic meaning to verbs that have more meaning than full verbs such as ability, obligation, and possibility (Vicky dkk., 2023). The modal auxiliary verb has two formal tenses: present tense and past tense. In general, words are used to identify possible, impossibility, ability, promise, suggestion, etc. modal auxiliary verbs are words giving meaning to a sentence such as the meaning of possibility, ability, willingness, permission, promise and others (Blanchete dkk., 2018). Beaumont and Granger (1989) stated that the forms of auxiliary verbs or modal verbs are can, could, may, might, will, would, shall, should, and ought to (Sohn & Kwon, 2020). Based on the form, there are two parts of the modal auxiliary verb: Common Modals (Pure Modals) and Semi-modals (Abdul Afwu Godly Prayitno, 2020). Common modals are can, could, will, would, shall, should, may, might, must, need, ought, and dare. In general, these forms are always followed by a verb

without to. But to indicate a condition, modals are also always followed by the word "be". Semi-Modals are have to, ought to, used to, be able to, be about to, be to, be supposed to, and be allowed to (Mustapa dkk., 2022). They have the same meaning as pure modals, but semi-modals are only verbs. However, in this study, researchers only focused on pure modals (can, could, shall, should, may, might, must, ought to, will, would).

Modals are not only found in grammar books but also in novels. A novel is one of the long story of literary work consisting of words, clauses, and sentences (Wang dkk., 2020). A novelist uses language to express ideas and thoughts, emotions, and experiences. Therefore, researchers are interested in examining the forms and meanings of modals used in William Golding's novel The Lord of Flies by using corpus antconc tools to make it easier to read and analyze data.

This research is expected to be able to provide information related to grammatical learning, especially in the form and meaning of modal auxiliary verbs (Wang dkk., 2020). In addition, this research is also expected to be able to provide understanding to readers, especially students majoring in English literature regarding the form and meaning of modal in the novel The Lord of Flies.

### RESEARCH METHODOLOGY

This study used mixed methods (Thaher dkk., 2021). The beginning of the study used corpus-based quantitative data to obtain modals auxiliaries in the novel The Lord of Flies examined by looking at the concordance and frequency of the Antconc tools, and in the process of data analysis using qualitative methods to show the function or meaning of modals auxiliaries in The Lord of Flies novel.

The list of modal auxiliaries generated by the software is carried out in a reduction process to separate modal auxiliaries from other words (Elnagar dkk., 2020). Furthermore, auxiliary modals are classified according to their respective meanings in the sentence. After obtaining the auxiliary data, a qualitative analysis was carried out to find out the function of each auxiliary modal in the sentence to then draw a conclusion.

## RESULT AND DISCUSSION

The tool used in this research is Ant Conc version 4.1.4 developed by Laurence Anthony. Ant Conc is a corpus tool that can be used by researchers to make it easier for them to read data, especially the frequency and concordance of a word. And this tool is suitable for use in this research because it fulfills the features needed to complete this research (Al-Ayyoub dkk., 2018). These features are as follows:

## Frequency

In general, this feature refers to the number of occurrences of a word in a particular corpus. This can be used to show quantitative-based data or count how many times a word appears in the corpus. So that this frequency analysis makes it easier for researchers to recognize the words most often used in the corpus data. In this study, researchers focused on the emergence of auxiliary modals (Boufenar dkk., 2018). This feature helps

researchers to find out which modals appear in The Lord of Flies novel, and how many times these modals appear in the novel.

## Concordance

Concordances are words that accompany a word we are looking for in the corpus tool that is before and after the word we are looking for (Zhang dkk., 2021). One of the most common methods used in linguistic corpus research is the use of keywords in context or KWIC (keyword in context) (Huang dkk., 2021). This feature helps researchers to carry out qualitative analyzes carried out on existing corpus data. So that it allows researchers to explore the meanings of modal auxiliaries in The Lord of Flies novel.

## The result of Ant Conc

Table 2. The data of research

File Name	The Lord of Flies.Pdf
File Tokens	66071
File Types	5989

In the early stages, the novel The Lord of Flies was processed in the Ant Conc software (Osamy dkk., 2021). Then the wordlist feature in the tool generates data in the form of a list of words contained in the novel based on the number of occurrences, as shown in the following data:

Table 3. The Example List of 150 Word based on Their Frequency

No.	Lexicon	Freq	No.	Lexicon	Freq	No.	Lexicon	Freq
1	The	4676	51	came	135	101	still	75
2	And	2338	52	when	126	102	us	75
3	Of	1747	53	only	122	103	beach	74
4	A	1461	54	about	121	104	saw	74
5	То	1164	55	rock	121	105	feet	73
6	He	1132	56	don	117	106	did	72
7	Was	986	57	their	116	107	took	72
8	page	874	58	water	115	108	are	71
9	ralph	795	59	island	114	109	towar	71
10	That	643	60	right	114	110	sat	71
11	You	613	61	see	114	111	way	70
12	On	556	62	or	111	112	Know	69
13	They	538	63	would	111	113	among	68
14	We	518	64	where	109	114	lay	68
15	At	495	65	turned	107	115	hair	68
16	there	429	66	mountain	106	116	boy	66
17	Go	410	67	other	105	117	how	66
18	Him	394	68	more	102	118	my	62
19	It	360	69	stood	102	119	think	53
20	were	347	70	do	101	120	between	51
21	Had	327	71	who	100	121	looking	49
22	For	324	72	forest	99	122	after	49
23	Full	321	73	went	99	123	After	48
24	home	308	74	beast	97	124	became	44
25	Them	305	75	smoke	97	125	end	43
26	contents	292	76	time	96	126	might	42
27	Title	292	77	face	95	127	perhaps	42

28	Quit	291	78	himself	95	128	say	42
29	As	288	79	come	94	129	why	39
30	But	284	80	going	93	130	near	38
31	Said	261	81	here	93	131	another	37
32	By	248	82	round	93	132	Must	37
33	This	242	83	little	89	133	mean	35
34	what	235	84	is	88	134	take	33
35	Be	219	85	roger	88	135	someone	29
36	Not	205	86	thing	88	136	need	26
37	So	201	87	been	87	137	anything	24
38	one	200	88	off	85	138	most	24
39	No	182	89	head	84	139	deep	23
40	now	176	90	made	83	140	should	22
41	An	171	91	too	82	141	hit	19
42	got	167	92	get	82	142	call	17
43	away	165	93	through	80	143	four	15
44	could	161	94	Tw0	80	144	will	15
45	If	154	95	hands	78	145	nobody	14
46	looked	152	96	chief	77	146	alone	12
47	Over	147	97	me	77	147	am	11
48	boys	144	98	something	77	148	myself	11
49	have	144	99	voice	76	149	best	10
50	can	136	100	pig	75	150	shall	8

The data above shows that there are 66071 tokens in The Lord of Flies novel, and the examples of the word list above are reduced, classified, and then analyzed according to the purpose of this study.

## **Data Reduction**

At this stage, the researcher focuses on the data in the previous table which is then reduced by separating the modal auxiliary data in the data. In this research, only focus on pure modals (Tuttle dkk., 2021). Beaumont and Granger (1989) pure modals include can, could, shall, should, may, might, must, ought to, will, would. so that the following data is obtained:

Table 4. Modal Auxiliaries of The Lord of Flies

No.	Modal Auxiliaries	Frequency
1	Could	161
2	Can	136
3	Would	111
4	Might	42
5	Must	37
6	Should	22
7	Will	15
8	May	14
9	shall	8
10	Ought to	-
	TOTAL	546

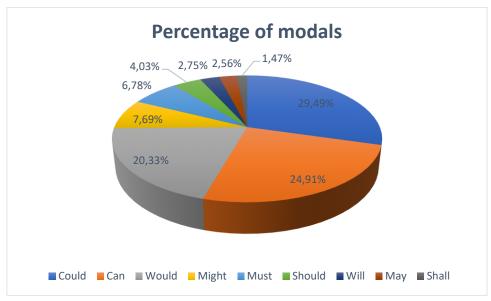


Figure 1. Percentage of modals

The data above shows that there are 549 modal auxiliaries in The Lord of Flies which are divided into 9 types of modal, and there is no type of ought to. The 9 types of modal are modal "could" with a frequency of occurrence of 161 times (29.49%), modal "can" with a frequency of occurrence of 136 times (24.91%), modal "would" with a frequency of occurrence of 111 times (20.33%), modal "might" with a frequency of occurrence of 42 times (7.69%) (Jung, 2019), modal "must" with a frequency of occurrence of 37 times (6.78%), modal "should" with a frequency of occurrence of 22 times (4.03%), modal "will" with a frequency of occurrence of 15 times (2.75%), modal "may" with a frequency of occurrence of 14 times (2.56%), and modal "shall" with a frequency of occurrence of 8 times (1.47%). Then in the next stage, the classification of the existing modal auxiliary data is carried out.

## **Data Classification**

At this stage, the researcher classified the types of modal auxiliaries in table 3 above. The classification is done to group the types of modals based on their respective functions and meanings. Classification based on grammar Beaumont & Granger and Charles J. Fillmore. Beaument and Granger stated that the auxiliary (modal) verb consists of can, could, may, might, must, will, would, shall, should, and ought to. Dan Fillmore divides sentence structure into two elements, namely modality and proposition (Basid, A., Kamil, H. I., & Innah, M. 2021). According to Alwi (1990) through Musdolifah, A. (2018) modality consists of intentional, epistemic, deontic, and dynamic meanings. As in the table below:

Table 5. Classification of modal auxiliaries

Meaning of modals	Kind of meanings
Intensional	Desire
	Hope
	Invitation
	Negation of invitation
	Request

Epistemic	Possibility/Impossibility
_	Prediction
	Must
	Certainty
Deontic	Giving permission
	Command
Dinamic	Ability
	Volition

#### **Modal Could**

To find out the meaning of the modal can in The Lord of Flies novel, the researcher conducted a search using the KWIC (Keyword in Context) feature, in order to obtain the following data:

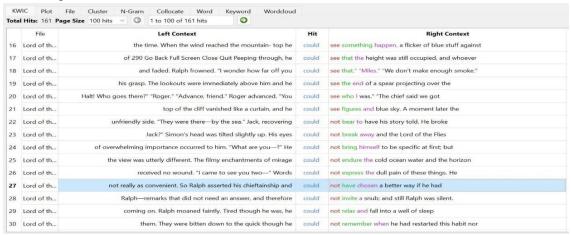


Figure 2. Concordance of Could

Based on the corpus data above, it shows that the modal could in The Lord of Flies contains epistemic, deontic and dynamic meanings. Examples of modal could containing epistemic meaning (Impossibility) can be seen in corpus data No.27, examples of modal could containing deontic meanings (Giving permission) can be seen in corpus data No.20, and examples of modal could containing dynamic (Ability) meanings can be seen in data corpus No.23.

#### **Modal Can**

To find out the meaning of the modal can in The Lord of Flies novel, the researcher conducted a search using the KWIC (Keyword in Context) feature, in order to obtain the following data:



Figure 3. Concordance of Can



Figure 4. Concordance of Can

Based on the corpus data above, it shows that the modal can in The Lord of Flies novel contains epistemic and dynamic meanings. An example of modal can showing an epistemic (Impossibility) meaning can be seen in corpus data No.1, and an example of modal can showing a dynamic (Ability) meaning can be seen in corpus data No.61.

## **Modal Would**

To find out the meaning of modal would in The Lord of Flies novel, the researcher conducted a search using the KWIC (Keyword in Context) feature, so that the following data was obtained:



Figure 5. Concordance of Would

Based on the corpus data above, it shows that the modal would in The Lord of Flies novel contains intentional and epistemic meanings. An example of modal would showing intentional meaning (Desire) can be seen in corpus data No.77, and an example of modal would showing epistemic meaning (Prediction) can be seen in corpus data No.63.

## **Modal Might**

To find out the meaning of modal would in The Lord of Flies novel, the researcher conducted a search using the KWIC (Keyword in Context) feature, so that the following data was obtained:

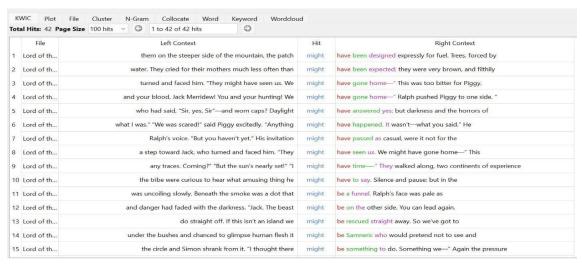


Figure 6. Concordance of Might

Based on the corpus data above, it shows that the capital might in The Lord of Flies novel contains epistemic meaning. In addition, the capital might can also be used to show past and present times.

## Modal Must

To find out the meaning of the modal must in The Lord of Flies novel, the researcher conducted a search using the KWIC (Keyword in Context) feature, in order to obtain the following data:

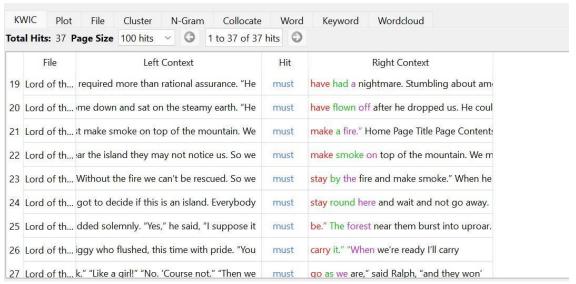


Figure 7. Concordance of Must

Based on the corpus of data, it shows that the modal must in The Lord of Flies novel contains epistemic and deontic meanings. Examples of modal must which contain epistemic meaning (possibility) can be seen in corpus data No.19, and modal must which contains deontic meaning (command) can be seen in corpus data No.26.

## **Modal Should**

To find out the meaning of modal should in The Lord of Flies novel, the researcher conducted a search using the KWIC (Keyword in Context) feature, in order to obtain the following data:



Figure 8. Concordance of Should

Based on the corpus of data, it shows that the modal should in The Lord of Flies only contains epistemic meaning.

### Modal Will

To find out the meaning of the modal will in The Lord of Flies novel, the researcher conducted a search using the KWIC (Keyword in Context) feature, in order to obtain the following data:

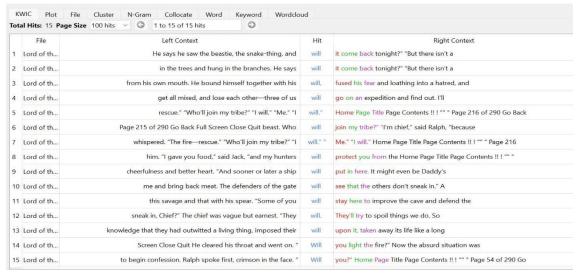


Figure 9. Concordance of Will

Based on the corpus data, it shows that the modal will in The Lord of Flies contains intentional, epistemic, and dynamic meanings. An example of will capital which contains intentional meaning can be seen in data corpus No. 14, an example of modal will which contains epistemic meaning can be seen in corpus data No.11, and modal will in corpus data No.8 means ability based on the context, so modal will also contains dynamic meaning.

## **Modal May**

To find out the meaning of modal may in The Lord of Flies novel, the researcher conducted a search using the KWIC (Keyword in Context) feature, so that the following data was obtained:



Figure 10. Concordance of May

Based on the corpus of data, it shows that the capital must in The Lord of Flies novel only contains epistemic meaning.

## Modal Shall

To find out the meaning of the modal shall in The Lord of Flies novel, the researcher conducted a search using the KWIC (Keyword in Context) feature, in order to obtain the following data:



Figure 11. Concordance of Shall

The corpus data shows that the modal must in The Lord of Flies only contains epistemic meaning.

#### **CONCLUSION**

The conclusions obtained try to answer the questions in the problem formulation previously described, namely what types of modals are in The Lord of Flies novel and what the meanings of modal auxiliaries are contained in The Lord of Flies novel. Based on data analysis, it shows that there are 549 modal auxiliaries in The Lord of Flies which are divided into 9 types of modal, and there is no type of modal "ought to" found. The 9

types of modal are modal "could" with an occurrence frequency of 161 times (29.49%), modal "can" with a frequency of occurrence of 136 times (24.91%), modal "would" with an occurrence frequency of 111 times (20.33%), modal "might" with a frequency of occurrence of 42 times (7.69%), modal "must" with a frequency of occurrence of 37 times (6.78%), modal "should" with a frequency of occurrence of 22 times (4.03%), capital "will" with a frequency of occurrence of 15 times (2.75%), modal "may" with a frequency of occurrence of 14 times (2.56%), and modal "shall" with an occurrence frequency of 8 times (1.47%). And the meanings of modal in The Lord of Flies are intentional, epistemic, deontic, and dynamic.

## REFERENCES

- Abdul Afwu Godly Prayitno, M. Z. M. (2020). PENGEMBANGAN KURIKULUM PEMBELAJARAN BAHASA ARAB PADA MASA PANDEMI COVID-19. *AL-AF'IDAH: Jurnal Pendidikan Bahasa Arab dan Pengajarannya*, *4*(2), 15–29. <a href="https://doi.org/10.52266/al-afidah.v4i2.591">https://doi.org/10.52266/al-afidah.v4i2.591</a>
- Al-Ayyoub, M., Nuseir, A., Alsmearat, K., Jararweh, Y., & Gupta, B. (2018). Deep learning for Arabic NLP: A survey. *Journal of Computational Science*, 26, 522–531. https://doi.org/10.1016/j.jocs.2017.11.011
- Aljarah, I., Habib, M., Hijazi, N., Faris, H., Qaddoura, R., Hammo, B., Abushariah, M., & Alfawareh, M. (2021). Intelligent detection of hate speech in Arabic social network: A machine learning approach. *Journal of Information Science*, 47(4), 483–501. https://doi.org/10.1177/0165551520917651
- Almarzooq, Z. I., Lopes, M., & Kochar, A. (2020). Virtual Learning During the COVID-19 Pandemic. *Journal of the American College of Cardiology*, 75(20), 2635–2638. https://doi.org/10.1016/j.jacc.2020.04.015
- Alsubaie, M. A. (2022). Impacts of Technology in Learning: Mobile Typing Applications for Writing and Accomplishing Academic Tasks among Arabic-Speaking Undergraduate Students. *Education Sciences*, 12(12), 891. <a href="https://doi.org/10.3390/educsci12120891">https://doi.org/10.3390/educsci12120891</a>
- Avisyah, G. F., Putra, I. J., & Hidayat, S. S. (2023). Open Artificial Intelligence Analysis using ChatGPT Integrated with Telegram Bot. *Jurnal ELTIKOM*, *7*(1), 60–66. https://doi.org/10.31961/eltikom.v7i1.724
- Balaha, H. M., Ali, H. A., Saraya, M., & Badawy, M. (2021). A new Arabic handwritten character recognition deep learning system (AHCR-DLS). *Neural Computing and Applications*, *33*(11), 6325–6367. <a href="https://doi.org/10.1007/s00521-020-05397-2">https://doi.org/10.1007/s00521-020-05397-2</a>
- Blanchete, I., Mourchid, M., Mbarki, S., & Mouloudi, A. (2018). Formalizing Arabic Inflectional and Derivational Verbs Based on Root and Pattern Approach Using NooJ Platform. Dalam S. Mbarki, M. Mourchid, & M. Silberztein (Ed.), Formalizing Natural Languages with NooJ and Its Natural Language Processing Applications (Vol. 811, hlm. 52–65). Springer International Publishing. <a href="https://doi.org/10.1007/978-3-319-73420-0\_5">https://doi.org/10.1007/978-3-319-73420-0\_5</a>
- Boufenar, C., Kerboua, A., & Batouche, M. (2018). Investigation on deep learning for off-line handwritten Arabic character recognition. *Cognitive Systems Research*, *50*, 180–195. <a href="https://doi.org/10.1016/j.cogsys.2017.11.002">https://doi.org/10.1016/j.cogsys.2017.11.002</a>
- Boukil, S., Biniz, M., Adnani, F. E., Cherrat, L., & Moutaouakkil, A. E. E. (2018). Arabic Text Classification Using Deep Learning Technics. *International Journal of Grid*

- *and Distributed Computing*, *11*(9), 103–114. https://doi.org/10.14257/ijgdc.2018.11.9.09
- Elnagar, A., Al-Debsi, R., & Einea, O. (2020). Arabic text classification using deep learning models. *Information Processing & Management*, 57(1), 102121. https://doi.org/10.1016/j.ipm.2019.102121
- Ertefaie, A., Small, D. S., & Rosenbaum, P. R. (2018). Quantitative Evaluation of the Trade-Off of Strengthened Instruments and Sample Size in Observational Studies. *Journal of the American Statistical Association*, 113(523), 1122–1134. <a href="https://doi.org/10.1080/01621459.2017.1305275">https://doi.org/10.1080/01621459.2017.1305275</a>
- Guerrero-Ibáñez, J., Zeadally, S., & Contreras-Castillo, J. (2018). Sensor Technologies for Intelligent Transportation Systems. *Sensors*, 18(4), 1212. https://doi.org/10.3390/s18041212
- Guillén-Gámez, F. D., & Mayorga-Fernández, M. J. (2020). Quantitative-comparative research on digital competence in students, graduates and professors of faculty education: An analysis with ANOVA. *Education and Information Technologies*, 25(5), 4157–4174. <a href="https://doi.org/10.1007/s10639-020-10160-0">https://doi.org/10.1007/s10639-020-10160-0</a>
- Heikal, M., Torki, M., & El-Makky, N. (2018). Sentiment Analysis of Arabic Tweets using Deep Learning. *Procedia Computer Science*, 142, 114–122. https://doi.org/10.1016/j.procs.2018.10.466
- Holly, S., Maulik, B., & Samuel, I. (2023). Use of Whatsapp as A Learning Media to Increase Students' Learning Interest. *Scientechno: Journal of Science and Technology*, 2(1), 35–48. https://doi.org/10.55849/scientechno.v2i1.57
- Huang, P., Miao, Q., Sang, G., Zhou, Y., & Jia, M. (2021). Research on quantitative method of particle segregation based on axial center nearest neighbor index. *Minerals Engineering*, 161, 106716. https://doi.org/10.1016/j.mineng.2020.106716
- Jung, Y. M. (2019). Data Analysis in Quantitative Research. Dalam P. Liamputtong (Ed.), *Handbook of Research Methods in Health Social Sciences* (hlm. 955–969). Springer Singapore. https://doi.org/10.1007/978-981-10-5251-4\_109
- Kamorudeen, B. (2021). The Impact of Information and Communication Technology on the Teaching and Learning of Arabic in Nigeria. *Journal of Muslim Minority Affairs*, 41(4), 608–614. <a href="https://doi.org/10.1080/13602004.2022.2029011">https://doi.org/10.1080/13602004.2022.2029011</a>
- Kato, N., Mao, B., Tang, F., Kawamoto, Y., & Liu, J. (2020). Ten Challenges in Advancing Machine Learning Technologies toward 6G. *IEEE Wireless Communications*, 27(3), 96–103. https://doi.org/10.1109/MWC.001.1900476
- Larabi Marie-Sainte, S., Alalyani, N., Alotaibi, S., Ghouzali, S., & Abunadi, I. (2019). Arabic Natural Language Processing and Machine Learning-Based Systems. *IEEE Access*, 7, 7011–7020. https://doi.org/10.1109/ACCESS.2018.2890076
- Loderer, K., Pekrun, R., & Lester, J. C. (2020). Beyond cold technology: A systematic review and meta-analysis on emotions in technology-based learning environments. *Learning and Instruction*, 70, 101162. https://doi.org/10.1016/j.learninstruc.2018.08.002
- Lulu, L., & Elnagar, A. (2018). Automatic Arabic Dialect Classification Using Deep Learning Models. *Procedia Computer Science*, 142, 262–269. https://doi.org/10.1016/j.procs.2018.10.489
- Mensah, C. N., Long, X., Dauda, L., Boamah, K. B., Salman, M., Appiah-Twum, F., & Tachie, A. K. (2019). Technological innovation and green growth in the Organization for Economic Cooperation and Development economies. *Journal of Cleaner Production*, 240, 118204. https://doi.org/10.1016/j.jclepro.2019.118204

- Mohammed, A., & Kora, R. (2019). Deep learning approaches for Arabic sentiment analysis. *Social Network Analysis and Mining*, 9(1), 52. https://doi.org/10.1007/s13278-019-0596-4
- Mulyasari, D., Noer, R. M., Sari, N., Ermawaty, E., Triharyadi, F., Tampubolon, D., & Catherine, S. (2023). Improving Health Status in The Elderly Through Health Checks and Education at Nuriah Nursing Homes in Karimun. *Pengabdian: Jurnal Abdimas*, *I*(2), 75–81. <a href="https://doi.org/10.55849/abdimas.v1i2.183">https://doi.org/10.55849/abdimas.v1i2.183</a>
- Mustapa, A. M., Ghani, S. Ab., Rahman, M. A., Nawawi, Z., & Kamarudin, M. A. (2022). Evaluation of the online arabic treasure hunt as learning games activities using the technology acceptance model (TAM). 040017. https://doi.org/10.1063/5.0092716
- Osamy, W., Salim, A., Khedr, A. M., & El-Sawy, A. A. (2021). IDCT: Intelligent Data Collection Technique for IoT-Enabled Heterogeneous Wireless Sensor Networks in Smart Environments. *IEEE Sensors Journal*, 21(18), 21099–21112. https://doi.org/10.1109/JSEN.2021.3100339
- Pamuji, S., & Limei, S. (2023). The Managerial Competence Of The Madrasa Head In Improving Teacher Professionalism And Performance At Mi Al-Maarif Bojongsari, Cilacap District. *Pengabdian: Jurnal Abdimas*, *I*(2), 66–74. https://doi.org/10.55849/abdimas.v1i2.158
- Ramadhan, F. K., Faris, M. I., Wahyudi, I., & Sulaeman, M. K. (2023). PEMANFAATAN CHAT GPT DALAM DUNIA PENDIDIKAN. *Jurnal Ilmiah Flash*, *9*(1), 25. <a href="https://doi.org/10.32511/flash.v9i1.1069">https://doi.org/10.32511/flash.v9i1.1069</a>
- Shorman, S., Jarrah, M., & Alsayed, A. R. (2022). The Websites Technology for Arabic Language Learning Through COVID-19 Pandemic. Dalam A. Hamdan, A. Harraf, P. Arora, B. Alareeni, & R. Khamis Hamdan (Ed.), *Future of Organizations and Work After the 4th Industrial Revolution* (Vol. 1037, hlm. 327–340). Springer International Publishing. <a href="https://doi.org/10.1007/978-3-030-99000-8\_18">https://doi.org/10.1007/978-3-030-99000-8\_18</a>
- Sohn, K., & Kwon, O. (2020). Technology acceptance theories and factors influencing artificial Intelligence-based intelligent products. *Telematics and Informatics*, 47, 101324. https://doi.org/10.1016/j.tele.2019.101324
- Staszak, M., Staszak, K., Wieszczycka, K., Bajek, A., Roszkowski, K., & Tylkowski, B. (2022). Machine learning in drug design: Use of artificial intelligence to explore the chemical structure—biological activity relationship. *WIREs Computational Molecular Science*, *12*(2). <a href="https://doi.org/10.1002/wcms.1568">https://doi.org/10.1002/wcms.1568</a>
- Tan, J., Liu, W., Xie, M., Song, H., Liu, A., Zhao, M., & Zhang, G. (2019). A low redundancy data collection scheme to maximize lifetime using matrix completion technique. *EURASIP Journal on Wireless Communications and Networking*, 2019(1), 5. https://doi.org/10.1186/s13638-018-1313-0
- Thaher, T., Saheb, M., Turabieh, H., & Chantar, H. (2021). Intelligent Detection of False Information in Arabic Tweets Utilizing Hybrid Harris Hawks Based Feature Selection and Machine Learning Models. *Symmetry*, *13*(4), 556. https://doi.org/10.3390/sym13040556
- Theobald, E. J., Hill, M. J., Tran, E., Agrawal, S., Arroyo, E. N., Behling, S., Chambwe, N., Cintrón, D. L., Cooper, J. D., Dunster, G., Grummer, J. A., Hennessey, K., Hsiao, J., Iranon, N., Jones, L., Jordt, H., Keller, M., Lacey, M. E., Littlefield, C. E., ... Freeman, S. (2020). Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math. *Proceedings of the National Academy of Sciences*, 117(12), 6476–6483. <a href="https://doi.org/10.1073/pnas.1916903117">https://doi.org/10.1073/pnas.1916903117</a>

- Tuttle, J. F., Blackburn, L. D., Andersson, K., & Powell, K. M. (2021). A systematic comparison of machine learning methods for modeling of dynamic processes applied to combustion emission rate modeling. *Applied Energy*, 292, 116886. https://doi.org/10.1016/j.apenergy.2021.116886
- Vicky, D., Adrianna, H., & Phan, B. (2023). Use of Gadgets by Early Childhood in the Digital Age to Increase Learning Interest. *Scientechno: Journal of Science and Technology*, 2(1), 17–34. <a href="https://doi.org/10.55849/scientechno.v2i1.58">https://doi.org/10.55849/scientechno.v2i1.58</a>
- Wang, B., Hu, S. J., Sun, L., & Freiheit, T. (2020). Intelligent welding system technologies: State-of-the-art review and perspectives. *Journal of Manufacturing Systems*, 56, 373–391. https://doi.org/10.1016/j.jmsy.2020.06.020
- Weidlich, J., & Bastiaens, T. J. (2018). Technology Matters The Impact of Transactional Distance on Satisfaction in Online Distance Learning. *The International Review of Research in Open and Distributed Learning*, 19(3). https://doi.org/10.19173/irrodl.v19i3.3417
- Xie, H., Chu, H.-C., Hwang, G.-J., & Wang, C.-C. (2019). Trends and development in technology-enhanced adaptive/personalized learning: A systematic review of journal publications from 2007 to 2017. *Computers & Education*, *140*, 103599. https://doi.org/10.1016/j.compedu.2019.103599
- Zhang, J., Yu, J., Fu, S., & Tian, X. (2021). Adoption value of deep learning and serological indicators in the screening of atrophic gastritis based on artificial intelligence. *The Journal of Supercomputing*, 77(8), 8674–8693. https://doi.org/10.1007/s11227-021-03630-w

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