



Patently-Drafted Titles: Focusing on Form and Content of Research Article Titles in Iranian Applied Linguistics Journals

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Abstract

Research article (RA) titles are one of the most important elements of a manuscript, influencing the reviewers' decision and editors' judgment, attracting the readers, and conveying the main idea of the article. Investigating 3197 RA titles published in 16 approved Iranian linguistic journals, this study aimed to map their pattern and portray their features of form and content. To this end, all the RA titles of the 16 Iranian journals publishing articles in applied linguistics up to 2022 (3197 titles) were collected. Then, they were analyzed for their length, presence of non-alphanumeric characters, syntactic structure, lexical diversity, as well as type and trend of information encoded. Results show that RA titles in Iranian linguistic journals tend to be pretty long (average of 13.88) but mostly consist of non-repetitive words with high lexical diversity (.94). Authors mainly used colons (average of 82), hyphens (average of 79), and commas (average of 37) to form titles by nominal (average of 94) and compound (average of 82) grammatical structures. These titles mostly tended to embed information about the method, data, and results of the works and appeared to be highly informative. Interrelationships between features resulted in a checklist for RA title features that can be used by prospective researchers, academic writing instructors, and reviewers.

Keywords: Encoded Information, Lexical Diversity, Linguistic Research Articles, Syntactic Structures, Titles

Research articles (RAs) play a critical role in transferring scientists' and researchers' findings; they are published in journals to be read by intended readers and cited in future works over and over (Ruiying & Allison, 2004). In order to be chosen and read, their title

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is first seen and markedly determines whether the RAs are informative and interesting enough. Despite being short in size, RA titles have to encode as much information as possible inside themselves (Moattarian & Alibabae, 2015; Peacock, 2002). The significance of titles caused the emergence of the field of precisely-studied titles called titleology. This field justifies and paves the path to systematically studying the features of RA titles (Baicchi, 2003).

RA titles in various scientific fields have been studied for more than three decades (Bérubé et al., 2018). It has been suggested that titles written for RAs in different scientific fields have differing features. Thus, investigating patterns of RA titles in different fields emerged as a popular trend to elucidate how an eye-catching and informative title should be drafted for an RA (Cortés, 2021; Moattarian & Alibabae, 2015). Among the investigated linguistic features, titles' length, and grammatical structure have been the highly studied characteristics because syntactic issues are of primary importance for most prospective writers (see for example, Cheng et al., 2012; Paiva et al., 2012; Shahidipour & Alibabae, 2017). Additionally, lexical diversity, degrees of informativity, and types of non-alphanumeric characters used to organize the words comprising titles have also been addressed in separate works (see for example, Bérubé et al., 2018; Buter & Raan, 2011; Sahragard & Meihami, 2016). However, a few studies considered almost all the features together (see for example, Xiang & Li, 2020) to suggest a well-supported, comprehensive framework for drafting RA titles (Cargill & O'Conner, 2021).

Since the linguistic features reported in the literature can be associated with each other and even affect each other (Xiang & Li, 2020), investigating all of them can be more clarifying for RA drafting courses and also for those who wish to draft a title. Comprehensive studies on RA titles can be steps toward suggesting a framework for those who find drafting a title challenging. However, challenges from the perspective of RA writers and those teaching RA drafting courses are yet to be studied, and titleology is only investigating the RA titles from a theoretical perspective (Iskandar et al., 2018).

According to the literature, journals set limitations for the number of words used to draft a title; thus, authors need to think about titles comprised of as few words as possible (Paiva et al., 2012). Non-alphanumeric characters such as hyphens and slashes are one of the tools to decrease the number of words in a title. In addition to Non-alphanumeric characters, how words are ordered or the syntactic structure of titles may affect their number. For example, selecting some structures, such as nominal or prepositional

structures, allows for omitting the verb from the title and drafting a shorter title (Cheng et al., 2012).

However, manipulating a title in terms of size should not be the only concern in drafting an RA title. An RA title needs to include as many keywords as possible to encode as much information as possible and allow the RA to be findable (Sahragard & Meihami, 2016). In order to do so, authors are required to undergo the challenging task of considering all the features. Since different fields of science are reported to be different in terms of keyword diversity, the degree of challenge of drafting an RA title varies in different scientific fields (Moattarian & Alibabae, 2015). For example, medical and engineering sciences are reported to be more concentrated in terms of keywords, while fields of human sciences have more disparate lexical resources to be used as keywords (Bérubé et al., 2018; Diao, 2021). Thus, investigating the required features to draft RA titles in different fields of science and mapping a pattern can help future authors undergo the less challenging task of drafting a title for an RA.

During the three decades of studying features of RA titles, several scientific fields have been addressed, mainly those written in medical and engineering sciences. However, RAs written in applied linguistics received less attention (Cortés et al., 2021; Diao, 2021; Fox & Burns, 2015; Wang & Bai, 2007), while applied linguistics RAs have a double significance in the world of science (Sahragard & Meihami, 2016; Xiang & Li, 2020). Firstly, applied linguistics RAs can impact the teaching and learning process of the English language and have the potential to improve the quality of second/foreign language learning; they can ultimately lead to training highly proficient second/foreign language learners who may write RAs in different fields. Secondly, applied linguistics RAs can impact RA drafting because experts in the English language write them and can be used as a model for RA writers of different fields who aim to draft an RA in the English language (Lei & Liu, 2019; Ruiying & Allison, 2004).

In order to map a pattern for applied linguistics RA titles, the current paper chooses to study all RAs published in applied linguistics journals in Iran to minimize the effect of generalization by selecting a random sample; thus, the paper aims to cast light on features of RA titles written in the whole population. The study aimed to investigate titles' length, syntactic structure, alphanumeric characters, lexical diversity, and degree of informativity. Since these RAs are written and reviewed by English language experts and are published in scientifically authorized and confirmed journals, their features can be used as principles in teaching article drafting and article reviewing.

Literature Review

Research articles have been studied for different purposes and from different angles, each one focusing on one specific section. Previous studies have investigated other sections of a manuscript such as abstracts (Farjami, 2013), introductions (Jalilifar, 2010), and methods (Hashemi & Shirzadi, 2016). Titles are the front matter or the summary matter of the RAs (Swales, 2003). They are the smallest and the first part of a scholarly work that appears in the front section of the work. Titles, recognized as the “first impressions” of scholarly works, have a profound impact on the success of the work (Cheng et al., 2012; Haggan, 2004; Watson et al., 2022). Despite their size, they play an eminent role in creating an identity for the academic work and summarizing the information embodied in the work, either an article, a dissertation, a conference paper, or a book (Moattarian & Alibabae, 2015; Peacock, 2002). The significance of titles lies in their impact on readers’ or reviewers’ decision to consider whether the work is worth being read by communicating the authors’ intention (Fox & Burns, 2015).

Due to the well-recognized importance of titles, a field of studying titles was shaped and called titleology (Baicchi, 2003). Having been concerned with the significance of the title, linguists started to analyze the titles as a form of discourse (Cheng et al., 2012). In the last three decades, titles have been investigated and analyzed in different fields because every field has its own discourse (see, for example, Cortés, 2021; Moattarian & Alibabae, 2015; Watson et al., 2022). Such analysis attempted to specify the features and characteristics of titles and their trend. The main features depicted for titles are conciseness and being informative (Sahragard & Meihami, 2016; Xiang & Li, 2020). For the sake of conciseness, titles have been suggested to be as short as possible using specific grammatical structures and non-alphanumeric characters. Whilst short titles are reported to be the most concise ones, they are considered to be less likely to be informative enough. Informative titles need to include as many pieces of information as possible; information about the method, design, results, and conclusions. Since these two important features are roughly in contrast, composing an efficient title is reported to be challenging (Jalilifar et al., 2010; Xiang & Li, 2020). Although separate features of titles have been addressed in various works since the emergence of titleology, a solid foundation or framework suitable for use by RA writers, RA drafting courses, or RA reviewers is yet to be determined.

Given the recognized features of an efficient title, its form and content are worth being investigated. The form of a title is related to its appearance. The appearance of a title depends on the number of used words (Paiva et al., 2012), the non-alphanumeric characters that appear in the title (Buter & Raan, 2011), how words are ordered (Cheng

et al., 2012; Shahidipour & Alibabae, 2017), and whether words are repeated in the title (Bérubé et al., 2018). On the other hand, the content of a title is investigated to examine how much information about the nature of the work and the findings is encoded in the title (Xiang & Li, 2020). All features related to the form and content of a title have been reported as important for the function of a title that is eye-catching (Soler, 2007; Xiang & Li, 2020).

One of the immediate features of a title's form is the number of words used to compose it. In this regard, journal editors mostly set limits on the number of words to compose titles, and suggest shorter and more concise titles (Paiva et al., 2012). However, this cannot be known as a rule, because depending on scientific fields, the number of words written for the academic work varies. For example, works written in the field of medicine are more likely to have longer titles with an average of 13.8 words per title (Anthony, 2001; Haggan, 2004), while articles written in the field of linguistics have been reported shorter with an average of 8 to 9 words per title during the last decades (Anthony, 2001; Haggan, 2004). However, titles in the field of linguistics are reported to be increasing in length by reaching more than 11.2 words in recent years (Xiang & Li, 2020), tending to embed more keywords. Such a reported difference between the length of RA titles in different scientific fields signifies a potential relationship between title length and fields' discourse and degrees of concentration or diversity in their lexicon (Cortés, 2021; Moattarian & Alibabae, 2015; Watson et al., 2022) Also, the field-dependent differences might be due to the required levels of informativity of an RA title in different fields (Haggan, 2004). Therefore, the length of RA titles cannot be studied independently and needs to be studied in relation to other factors such as titles' lexical diversity and their levels of informativity to allow for clarifying a pattern for their features.

In order to keep the titles shorter and avoid making long phrases, clauses, and sentences punctuation marks are used to indicate clause and phrase boundaries (Lewison & Hartley, 2005). Thus, the presence of punctuation marks or non-alphanumeric characters is a feature that is worth being investigated. These marks serve as a tool to keep the balance of the title's length, help them encode more information within themselves by being able to include more phrases, and also be more eye-catching (Buter & Raan, 2011; Xiang & Li, 2020). For example, hyphens are frequently used to create new adjectives by linking two or three words but are counted as only one word. Forming adjectives, and hyphens can be easily used to make noun phrases (Bertram et al., 2011). Also, slashes are commonly used to avoid including words such as "and" and "or" (Buter & Raan, 2011). So, they can be used to form shorter titles (Woo, 2019). Additionally,

colons (:), which are reported to be the most standard and the most frequently used non-alphanumeric character in the titles of academic works in different fields of science (Hartley, 2007), can be used to include more information in a title by listing some features after the colon such as its type of the study or its participants (Ball, 2009). Thus, this feature might be associated with others such as length, embedded information, and syntactic structures. Given such a possible relationship, a mere report of this mechanical feature (e.g., in Jiang & Hyland, 2022; Watson et al., 2022; Xiang & Li, 2020) might not fully clarify the rationales for using specific characters in composing RA titles.

Another feature to be investigated in RA titles is lexical diversity. As stated, each scientific field of study has its own specific discourse and accordingly specific terminology (Diao, 2021). The degree of concentration or disparity of words in the terminology determines degrees of word frequency in texts written using that terminology. Along with developments in science, the disparity of vocabulary items grows (Bérubé et al., 2018). However, degrees of comprehensibility and eligibility of texts, including titles, depend on the concentration of terminology. In fact, the more concentrated the scientific terminology, the easier the texts would be to comprehend and follow (Cortés, 2021; Guo et al., 2012). Thus, lexical diversity is worth being noticed in every field of science to portray whether written texts, including titles, of the field enjoy a concentrated set of terminology or a disparate one (Diao, 2021).

According to Jarvis (2013), lexical diversity is calculated by dividing the number of words used in a text (called token) by the number of different words used (called type). The obtained ratio demonstrates the degree to which a text uses repeated words more (i.e., are concentrated) or uses new words (i.e., are more lexically diverse). Since titles are the very first position that readers come across, the way that they transmit information matters. In case titles use more concentrated vocabulary items, they are more comprehensible, and therefore, have more potential to attract readers. However, depending on the key information to transmit, and also new concepts being added to a field, different fields of study necessitate different levels of lexical diversity (Cortés, 2021; Jarvis, 2013; Jiang & Hyland, 2022); this calls for examining possible relationships between lexical diversity and type of information encoded in titles. In an attempt to cast light on RA titles' lexical diversity, Bérubé et al. (2018) report that fields like mathematics and physics maintained the same level of lexical diversity during a period of 40 years, while the indicator of lexical diversity increased by about 8% in natural sciences, social sciences, and humanities in the same period. Although the results obtained from the study conducted by Bérubé et al. (2018) show an increase in the indicators of lexical diversity

in the titles on RAs written in the social science and humanities, Xiang and Li (2020) state that during a period of 30 years degrees of lexical diversity decreased in the titles of RAs written in the fields of linguistics, which are similar to social sciences and humanities. Thus, lexical diversity seems strictly field-specific and is an indicator that needs to be investigated in every field separately.

Putting a specific set of concentrated or diverse lexical items together and separating them using different non-alphanumeric characters would cause different syntactic structures to be formed (Cheng et al, 2012; Shahidipour & Alibabae, 2017). According to the literature, several frameworks are suggested for examining the syntactic pattern of RA titles. For example, Moattarian and Alibabae (2015) classified syntactic structures into three groups of nominal, verbal, and prepositional structures, and compared the syntactic structures of titles composed in journals publishing RAs in applied linguistics, civil engineering, and dentistry. They found that irrespective of the field of study, nominal sentences have been mostly used in titles of RAs. Similarly, Wang and Bai (2007) used the same framework and concluded that nominal structures including uni-head, bi-head, and multi-head ones are the dominant structure used to order words in a title. Despite previous works agreeing that nominal sentences are the widely-used structure, it seems that a more inclusive framework that roughly encompasses all potential structures likely to appear in a title is necessary to be used.

One of the highly-referred frameworks, which offers an inclusive category for titles' syntactic structures, presented a five-level framework including nominal structures, compound structures, full-sentence structures, gerund phrases, and prepositional phrases (Cheng et al., 2012). Such a framework allows for more meticulous investigations into RA titles' syntactic structures. Relying on the framework suggested by Cheng et al. (2012), Xiang and Li (2020) conducted a diachronic study on linguistic RA titles and found that the popularity of nominal structures decreased during this time, and compound structures are being used more frequently. Thus, studying a full range of RA titles written in a specific field of science has great potential to cast light on the pattern of composing titles.

Given what has been stated, features of RA titles such as length, non-alphanumeric characters, lexical diversity, and syntactic structures have the potential to be tied to titles' being informative (Paiva et al., 2012; Xiang & Li, 2020). This feature has been reported to help titles effectively transmit vital pieces of information and notify the readers about what is contained inside the article. Given the reported association between degrees of informativity and the function of RA titles, investigating how informative a title is and

examining its content is of great importance (Djurayev, 2020; Xie, 2020). Tocatlian (1970) suggested a method to examine how informative is a title of an RA; based on his method percentage of non-substantive words such as articles, conjunctions, and auxiliaries that bear no information could determine the degrees of informativity of titles. However, this method doesn't clarify which type of information is depicted in a title.

Seeking a method that reveals more detailed data about types of information presented in a title, Goodman et al. (2001) presented a framework based on which several types of information are likely to appear in RA titles including method, design, dataset, results, and conclusion; however, they state that some titles contain no specific types of information and only depict general information about the field of the study. Using the same method, Sahragard and Meihami (2016) found that applied linguistics RA titles published in three international journals contained more information about method and design, while Xiang and Li (2020) stated that information about general topics comprises the main type of information presented in applied linguistics RA titles published in seven international journals. These studies only counted the frequency of each type of information in their corpus but did not look for categories that may be formed as a result of encoding different types of information in a given title. Scrutinizing new categories that are formed based on the number of information types can cast light on how variedly or concentratedly a set of titles embed various types of information inside themselves. Such an investigation can also clarify which types of information are more likely to appear together and can pave the path for examining meaningful relationships between features of RA titles_ an investigation that has yet to be attempted.

Having recognized the importance of RA titles, a large body of research has addressed and reported the requirements and features of RA titles in different fields and different periods of time. However, a number of gray areas still limit the knowledge about the RA titles and their features. Firstly, not only descriptive reports of features, but relationships between features, and how and why they may be associated with each other can portray a clear map for RA titles (Watson et al., 2022). Secondly, more fields of science need to be investigated such as language-related ones that received less attention in comparison to those published in medical sciences and engineering (see for example, Cortés et al., 2021; Diao, 2021; Fox & Burns, 2015; Wang & Bai, 2007). Applied linguistics journals are important to study since they are pioneers in language teaching and learning, with the potential to impact the quality of articles and academic works written in English and shape their patterns (Sahragard & Meihami, 2016; Xiang & Li, 2020). Lastly, due to inconsistencies between the results of previous studies, conducting

research on a wide range of journals and accordingly a large number of RAs can be more clarifying; for example, studying a whole population instead of selecting a few journals as a sample can be more clarifying. In order to address these gray areas, the current research aims to study all issues of all approved applied linguistics journals published in Iran to sketch a pattern for their titles' features and examine the possible relationships between them. Iranian RA titles were chosen to study since academic writing in Iran needs clearer guidelines with precise features to make prospective writers more focused (Farsani et al, 2014); therefore, this study can provide a comprehensive framework for them to use. So, the following research questions are designed:

1. What are the features of research articles' titles of Iranian applied linguistics journal articles in English regarding form (i.e., title length, presence of non-alphanumeric characters, syntactic structure, and lexical diversity) and content (i.e., type and trend of information encoded in titles)?
2. Are features of form and content of RA titles published in Iranian applied linguistics journals positively correlated with each other?

Method

Design

The present study aimed to investigate the titles of RAs published in Iranian journals of applied linguistics to reveal their features and potential relationships between them. The study, which is descriptive in nature, used both quantitative and qualitative text analysis to investigate the features of research titles and delineate the characteristics of their pattern. In order to investigate title length, non-alphanumeric characters, and lexical diversity, which only deal with counting the number of words, quantitative text analysis is used. However, to investigate the syntactic structure of the research titles and to examine whether research methods, datasets, results, and conclusions of the studies are encoded in the titles, as different types of information, qualitative text analysis is used. In this section, frameworks and coding units are used to identify instances of each category of syntactic structure and the type of information encoded in research article titles. Then, instances are counted and results are quantified (Sahragard & Meihami, 2016).

Corpus

In order to avoid sampling bias in selecting journal articles from among the approved and qualified Iranian journals by the Ministry of Science, Research, and Technology (MSRT), the study included the population in its corpus. Thus, the corpus of the study comprises all the applied linguistics RAs published in sixteen journals that the MSRT has

scientifically approved. In doing so, scientifically approved and qualified Iranian applied linguistics journals were found by reviewing the public website of the Ministry of Science, Research, and Technology (MSRT). The MSRT public website annually publishes the list of approved scientific journals and provides some information about them as well as a link to the journals' electronic page. Having found a list of approved Iranian applied linguistics journals, the electronic pages of the sixteen journals were investigated to calculate the number of articles published annually in each journal. Detailed information about the journals including their names, the publisher, and the number of articles published in these journals are presented in Table 1.

Table 1
Applied Linguistics Journals Approved by the Iranian Ministry of Science, Research, and Technology

Journals	Publisher	No. of Articles
1. Journal of Research in Applied Linguistics	Shahid Chamran University of Ahvaz	181
2. Research in English Language Pedagogy	Islamic Azad University –Isfahan Branch	159
3. Journal of Foreign Language Research	University of Tehran	307
4. Iranian Journal of Applied Language Studies	University of Sistan and Balouchestan	228
5. Iranian Journal of Applied Linguistics	Kharazmi University	167
6. Teaching English Language	Teaching English Language and Literature Society of Iran (TELLSI)	254
7. Journal of Applied Linguistics and Applied Literature: Dynamics and Advances	Shahid Madani University of Azerbaijan	154
8. Applied Research on English Language	University of Isfahan	188
9. Journal of English Language Teaching and Learning	University of Tabriz	221
10. Iranian Journal of Academic Purposes	Chabahar Maritime University	147
11. Issues in Language Teaching Journal	Allameh Tabatabaei University	146
12. Journal of Language and Translation	Islamic Azad University, South Tehran Branch	267
13. Language Horizons	Alzahra University	97
14. Iranian Journal of Language Teaching Research	Urmia University	176
15. Journal of Modern Research in English Language	Imam Khomeini International University	201
16. Teaching English as a Second Language Quarterly	Shiraz University	306

Data Analysis Framework

This study aimed to scrutinize features of forms (i.e., title length, presence of non-alphanumeric characters, syntactic structure, and lexical diversity) and content (i.e., type and trend of information encoded in titles) of titles of RAs published in Iranian applied linguistics journals and examine the potential relationship between them. In order to do so, frameworks are required to be delineated to allow for systematically examining each feature. Given the absence of a solid framework suggesting all the features of RA titles, the study has gathered various theoretical frameworks to examine different reported features of RA titles.

First off, to examine the title length, the number of words used in each title is counted by using manually. In the word counting task, words that are separated by spaces are counted as one, those linked by hyphens are counted as one, and those separated by slashes are counted as one because there is no space between them (Bertram et al., 2011). Regarding the acronyms, they are counted as one word. In acronyms letters are put together and create a specific concept that is well-known in the field; acronyms are known as a blessing for authors who aim to reduce the number of words in the title (Barnett & Doubleday, 2020).

Then, non-alphanumeric characters refer to punctuation characters such as colons (:), commas (,), apostrophes (‘), question marks (?), and quotation marks (“). These characters are not counted in word count (Buter & Van Raan, 2011). Thus, checking the types of non-alphanumeric characters and their frequency that appear in research titles is an opportunity to investigate whether these characters are commonly used to separate phrases in research titles of Iranian applied linguistics journal articles.

Next, in order to investigate lexical diversity Type-Token Ratio (TTR) framework is used. According to this framework, type represents the number of different words used in the title, and token represents the total number of words used in the title. Then, dividing the number of types by the number of tokens demonstrates the ratio for lexical diversity. This ratio of lexical diversity represents a pattern for word repetition (Bérubé et al., 2018).

The next feature to be examined is the syntactic structure of the research titles. In order to check for the syntactic structure of the research titles, the framework suggested by Cheng et al. (2012) is used. In this proposed framework five categories are suggested including nominal structures, compound structures, full-sentence structures, gerund phrases, and prepositional phrases. In this framework nominal-structured sentences consist of one or more nouns that are preceded or followed by modifiers, compound-structured sentences consist of two or more parts separated by non-alphanumeric

characters, full sentences refer to complete declarative or interrogative sentences or clauses, gerund phrases refer to those titles that begin with gerund form of verbs, and prepositional phrases refer to those titles that begin with prepositions.

The type of information encoded in titles is the last feature to be investigated. In order to investigate whether types of information indicating studies methods, datasets, results, and conclusions are encoded in the titles, the framework proposed by Goodman et al. (2001) and used by Sahragard and Meihami (2016) and Xiang and Li (2020) is used. According to this framework, there are five categories for the type of information encoded in titles including topic only, method/design, dataset, result, and conclusion. The framework and description of each category are presented in Table 2. It is notable that some titles may belong to more than one category of information type because they may provide more than one type of information.

Table 2

Framework of Encoded Type of Information (Sahragard & Meihami, 2016; Xiang & Li, 2020)

Type of Information	Descriptor
Topic Only	Title indicates a subject but does not include information on other categories listed below, or it seems ambiguous. Titles referring to second language acquisition in general are categorized in this category.
Method/Design	Title specifies the topic and an approach to study design, data management, or analysis (such as case-control, cohort, effectiveness, efficacy, frequency, incidence, prevalence, trend, or validity study; meta-analysis; randomized), or provides a vague description of a method (such as assessment, evaluation, or comparison) or refers to the statistical tests used in a study (ANOVA, ANCOVA, MANOVA). It may contain information about the method of the study but not its design (for example randomization), or vice versa.
Dataset	Title indicates the topic and name or acronym of a specific study, which can reveal the origin of the dataset considered or the population sample consulted
Result	Title includes the topic and quantitative information (a specific value), semiquantitative or ordinal information (such as increased, decreased, high, or low), or some other specification of a relation (such as association, change, correlation, determinants, effect, evidence, impact, influence, outcomes, predictors, relation, remission, risk, variability, or variation) about the findings. Other titles may contain terms such as role, effectiveness, relationship etc.
Conclusion	Title includes the topic and an unequivocal statement based on the analysis of the reported evidence such as the implications of a study or the overall conclusion.

Data Analysis Procedure

Having collected the titles of RAs, the corpus of the study is constructed. Afterward, based on the described frameworks, titles are to be investigated five times, each with a different lens, to be examined in terms of length, presence of non-alphanumeric characters, syntactic structure, lexical diversity, and type of information they provide. Both quantitative and qualitative calculations are to be done mainly manually.

The first set of data supposed to be extracted from the gathered titles was the number of words comprising each. To count the number of words as building blocks of each title, wordcount.com was used to speed up the counting process, but the counted numbers were checked manually as well to avoid inconsistencies with the research aims and objectives.

Secondly, the number of repeated and different words within the titles was counted to provide grounds for lexical diversity calculations. In order to do so, all the titles were checked manually and repeated words were highlighted to find the number of genuine, different words. In this process, singular and plural words were counted as repeated words, because they both indicated the same concept. Given the meaning indicated by words, different parts of speech of the same root were counted as different words. Having counted the number of genuine, different words, the number of different words (i.e., type) was divided by the total number of the words comprising titles (i.e., token) to calculate the Type-Token ratio representing lexical diversity.

Then, the grammatical structure of the titles was studied to categorize the titles based on the framework proposed by Cheng et al. (2012), which states five categories of grammatical structures for RA titles. Titles could only belong to one of the categories including nominal, compound, gerund, prepositional, or full sentence. According to the framework, nonverbal titles with a noun in their head that are preceded or followed by a modifier are nominals, titles beginning with a gerund form of a verb that is followed by objects are gerunds, titles consisting of two parts separated by a dash, colon, semicolon, question mark or a period are compounds, titles beginning with a preposition that is followed by an object are prepositional, and titles with all elements of a sentence are full sentences. Despite the clear definition presented in the framework, each and every title beginning with a gerund could not be categorized as a gerund; some beginning with a gerund such as “Enhancing EFL Learners' Emotional Intelligence through Fuzzy Thinking and Emotional Engineering” could be nominals.

In order to be concise, in addition to the researcher's work on the titles, a research assistant, who was a graduate student in TEFL with an advanced level of English language proficiency, was briefed about the study and also the framework. Then, the assistant

worked alongside the researcher to categorize the titles based on their grammatical structures. Having categorized the titles, the ratings of both researchers were compared and correlations were calculated to examine the interrater reliability of categorizations. According to calculated correlations, categorizing titles based on their grammatical structures in categories of nominal structures ($r = 1$), gerund structures ($r = .99$), full sentence structure ($r = 1$), prepositional structures ($r = .98$), and compound structures ($r = .99$) were highly correlated. Thus, the categorization was reliable for further calculations.

Finally, types of information encoded in the titles were studied. According to the framework (Goodman et al., 2001) describing the categories of information types encoded in the titles, titles may include four types of information including the work's method or design, dataset, results, and/or conclusions. The framework also designed a fifth category, called topic only, for the titles that include none of the mentioned specific information and contain some general information about the field of the study. Based on the framework, except for titles that fall under the *topic-only* category, titles do not necessarily fall under one of the categories, they may rather include two or more types of information simultaneously. In other words, the number of categories of types of information depends on the corpus of the study and they would be clarified once the counting is done. For example, a title may inform the reader about only one type of information depicted in the framework, or it may include two, three, or all types of information. The current paper does not aim to work on all possible categories, it rather investigates and reports the categories that are formed in the corpus under study.

Since determining the type of information encoded in each title needs precision, the same research assistant was briefed about the framework and worked alongside the researcher to categorize the titles based on encoded types of information. Having categorized the titles, the ratings of both researchers were compared and correlations were calculated to examine the interrater reliability of categorizations. According to correlations, researchers agreed on the 13 newly formed categories of encoded information. Their reports of the categories of information types for the topic only ($r = .87$), method/design only ($r = .83$), the dataset only ($r = .86$), the conclusion only ($r = .82$), method/design and dataset ($r = .85$), method/design and results ($r = .84$), dataset and results ($r = .86$), dataset and conclusion ($r = .87$), method/design and conclusion ($r = .83$), method/design, dataset and results ($r = .85$), method/design, dataset and conclusion ($r = .82$), method, results and conclusion ($r = .84$), method/design, dataset, results and conclusion ($r = .80$) were acceptably correlated.

Results

The present study aimed to cast light on the pattern of a total of 3197 research article titles published in 16 approved Iranian linguistic journals. In order to map the pattern, length of titles, their lexical diversity, alphanumeric characters used in titles, their grammatical structure, and the type of information encoded in them were investigated and the potential relationship between them was examined. To present the results, first descriptive statistics regarding each area of investigation are reported and then, correlations between areas are presented to examine the possible relationship between characteristics of the titles.

Descriptive Statistics

As the first feature of RA titles, the number of words in the titles was investigated and the average length of titles is reported in Table 3. According to Table 3, RAs' titles published in Iranian linguistic journals consist of an average of 13.88 words.

Table 3.
Length of Titles

Minimum	maximum	Mean	SD
12.81	14.71	13.88	.59

As the second feature of RA titles, the lexical diversity of titles was investigated. To this end, the total number of words comprising titles (Token) was divided by the number of different words used to draft titles (Type), and the results are shown in Table 4. The average of Type/Token Ratio, which shows the lexical diversity of titles, is .94. The number indicates that titles published in Iranian linguistic RAs mostly do not consist of repetitive words and most of the words are different from each other.

Table 4.
Lexical Diversity_ Type Token Ratio (TTR)

	Minimum	Maximum	Mean	SD
Token	12.81	14.71	13.88	.59
Type	12.20	13.70	13.08	.45
TTR	.92	.98	.94	.01

As the third feature of RA titles, alphanumeric characters used in RA titles were investigated. To this end, all titles were studied to find and report different types of alphanumeric characters and then, their average in titles is reported in Figure 1. Based on

the results shown in Figure 1, eleven types of alphanumeric characters were found in the studied titles. Among all characters, colons, with an average of 82, hyphens, with an average of 79, and commas, with an average of 37, are the highly used characters in the titles published in Iranian linguistic RAs. On the other hand, the least-used characters are exclamation marks, with an average of 4, square brackets, and semicolons, each with an average of 2.

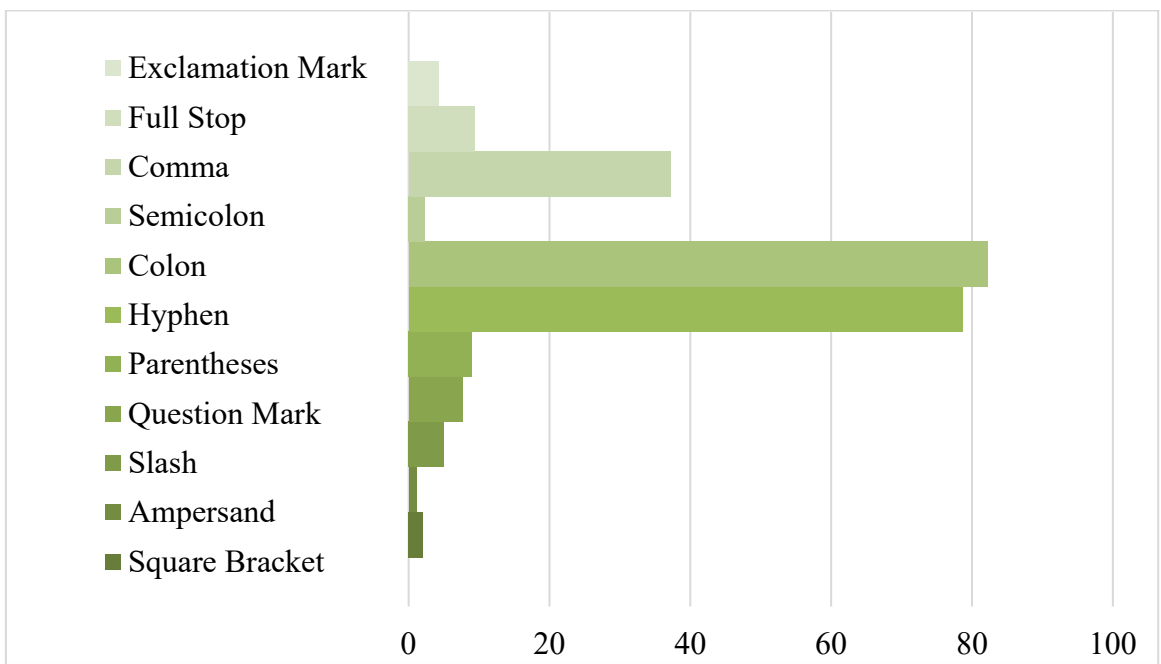


Figure 1. Alphanumeric Characters Average

As the fourth feature of RA titles, grammatical structures used to form the titles were investigated. In order to report the grammatical structures used in titles of Iranian linguistic RAs, the framework introduced by Cheng et al. (2012) was used. Based on the framework, the grammatical structure of RA titles may fall into the nominal, compound, full-sentence, gerund, and prepositional categories.

The average grammatical structures used to form titles of Iranian linguistic RAs are presented in Figure 2. According to Figure 2, among five types of grammatical structures, titles were mainly formed by nominal structure, with an average of 94, and compound structure, with an average of 82. Also, gerund structure, with an average of 18, seems to be roughly popular for drafting titles. On the other hand, prepositional structure, with an

average of 4, and full-sentence structure, with an average of 2, were the least-used structures to form RA titles.

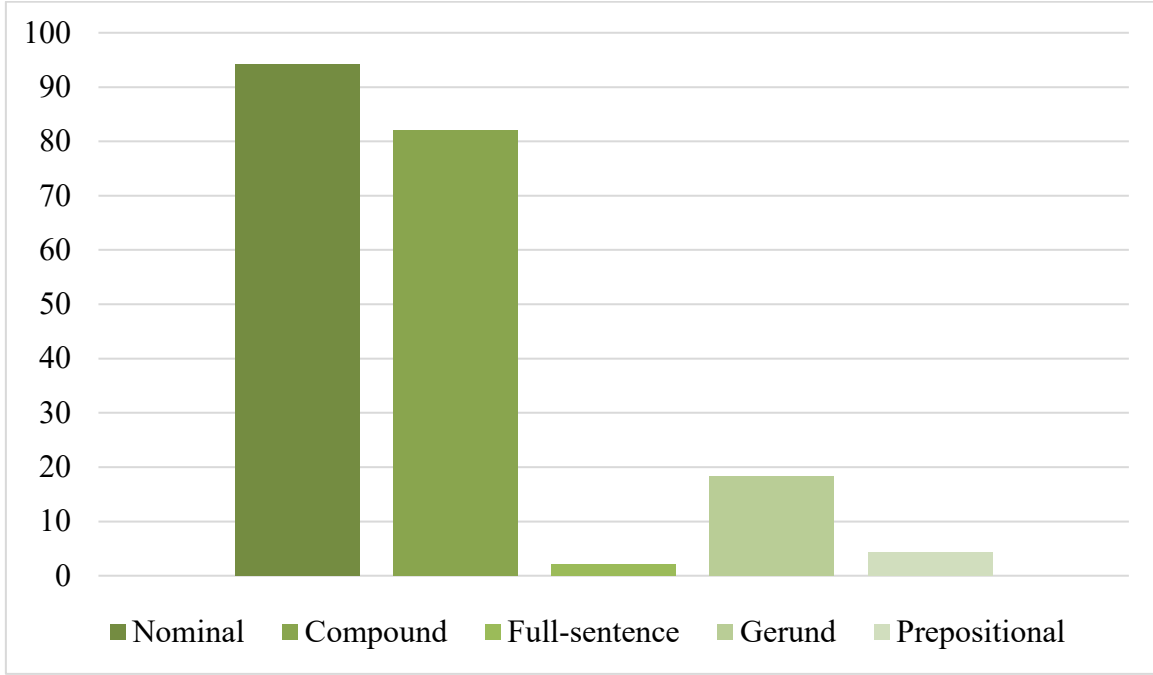


Figure 2. Grammatical Structures Average

As the fifth and the last feature of RA titles, the type of information encoded in titles was investigated. In order to identify and report the types of information encoded in the titles, we used the framework proposed by Goodman et al. (2001), used in Sahragard and Meihami (2016) and Xiang and Li (2020) as well. Based on the framework, titles may offer general topics and do not specify any information about the study; therefore, they are counted as “topic-only” titles. Otherwise, titles may contain four other types of information including, the study’s method and design, dataset, results, and conclusion. As stated in the framework, each title does not necessarily contain one type of information, and more than one type of information might be encoded in a title.

Previous studies that used the framework only reported the frequency of repetition of each information type in topics but did not report new classifications that can be formed based on different types of information encoded in a single title. The present study rather aims to shed light on new classifications formed by information types encoded in each title. Based on our calculations, types of information encoded in RA titles published in

Iranian linguistic journals can be classified into 13 categories; the categories, shown in Figure 3, contain a variety of information types ranging from only one type of information to four types.

As shown in Figure 3, highly-encoded information types in RA titles are method/design and dataset, with an average of 121, method/design, dataset, and result, with an average of 50, and method/design only, with an average of 9. Based on reported statistics in Figure 3, RA titles published in Iranian linguistic journals mostly contain information about the studies' method and design and also the dataset while categories with information about conclusion are the least-reported ones.

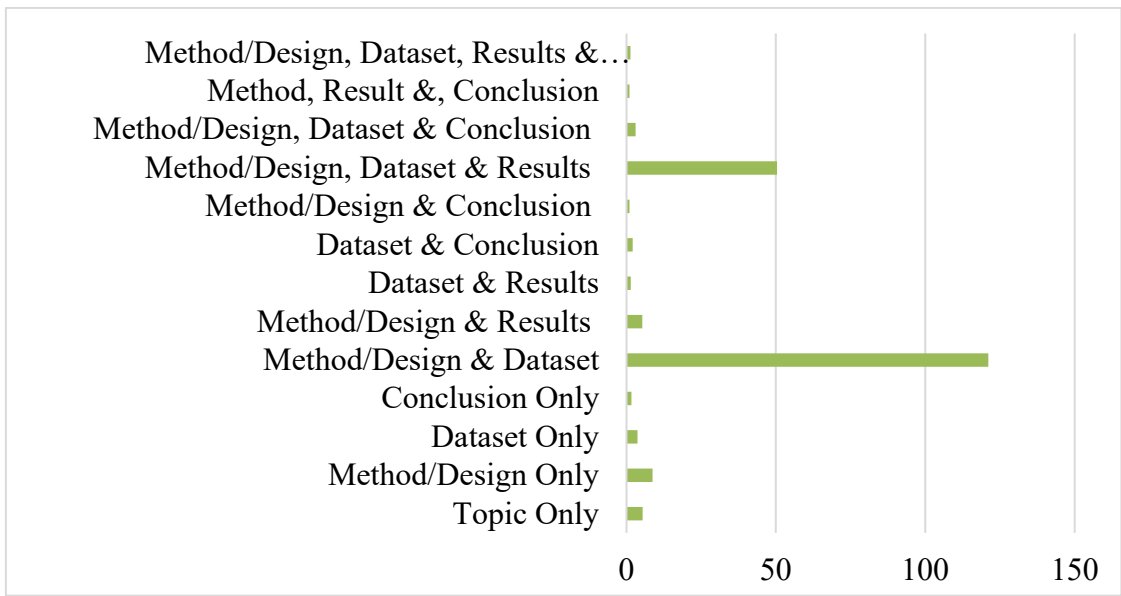


Figure 3. *Types of Information*

Correlations

After reporting the features of RA titles published in Iranian linguistic journals, it is worth examining whether there is a meaningful relationship between the features. To this end, correlations were calculated. Firstly, a negative correlation ($r = -.64$, $p\text{-value} = .00$) between title length and lexical diversity was found; according to the correlations, the longer the title, the lower the lexical diversity might be. It suggests that longer titles are more likely to contain repetitive words and as a result, they may have lower lexical diversity. However, the RA titles in the present study were longer and enjoyed a high lexical diversity.

Except for lexical diversity, title length was only significantly correlated with one type of information that allows for encoding as much information as possible; title length was correlated with method/design, dataset, results, and conclusion ($r = .82, p < .05$). It suggests that longer titles are more likely to contain more information. It was not further significantly correlated with classifications of other variables. Having a few correlations was the same for lexical diversity; except for its meaningful relationship with title length, it was not significantly correlated with classifications of other variables.

Then, correlations between alphanumeric characters and grammatical structures were calculated. Results are shown in Table 5. According to the results, the highly used alphanumeric characters are correlated with highly-used grammatical structures. Significant correlations detected between nominal structure and alphanumeric characters suggest that using alphanumeric characters such as parentheses, hyphens, slashes, colons, and commas can help form titles with nominal structures. Also, there was a correlation between nominal structure and question marks; interrogative nominals may grammatically seem odd but since titles are intended to be as short as possible, authors can use question marks for nominal titles to signify the importance of the study (Kari, 2018).

Table 5.

Correlations between Alphanumeric Characters & Grammatical Structures

	Nominal	Compound	Full-sentence	Gerund	Prepositional
Exclamation Mark	.00	.24	.08	.42	.05
Full Stop	.47	.56*	.36*	.42	.28
Comma	.56*	.67**	.10	.65**	.31
Semicolon	.20	.13	.00	.30	.34
Colon	.56*	.99**	.29	.63**	.05
Hyphen	.82**	.62*	.01	.79**	.13
Parentheses	.86**	.35	.15	.75**	.26
Question Mark	.59**	.12	.62**	.41	.11
Slash	.80**	.51*	.12	.75**	.32
Ampersand	.11	.43	.00	.11	.27
Square Bracket	.00	.00	.00	.00	.00

** : P value $\leq .00$

* : P value $\leq .05$

Given the significant relationships between compound structure and alphanumeric characters, it can be suggested that commas, colons, hyphens, and slashes can be used to

form titles with compound structure. The results indicate that this set of characters is the best to connect two or more clauses to form titles with a compound structure. Further, significant correlations between gerund structure and alphanumeric characters show that hyphens, slashes, parentheses, colons, and commas were highly used to form titles with gerund structure. However, gerund structure only depends on the verb form used at the beginning of the title and does not necessitate linking phrases or clauses; so, using specific characters in this structure might be due to the authors' intention for encoding more information into such structures. Significant correlations between full sentence structure and alphanumeric characters indicate that full stops and question marks can be used to form titles with full sentence structure; the fact that is in line with grammatical rules of punctuation. Finally, prepositional structures were not significantly correlated with alphanumeric characters, which might be caused by the very low frequency of this structure in the corpus.

Next, correlations between alphanumeric characters and categories of information types were calculated. Since there is a large number of alphanumeric characters and classifications of information types, only significant correlations are reported. Interestingly, only four types of information, which were mainly encoded in titles, had significant correlations with highly used alphanumeric characters. The detected significant correlations are presented in Table 6.

Table 6.

Correlations between Alphanumeric Characters & Information Types

	Parentheses	Hyphen	Colon	Comma	Full Stop
Method/Design Only			.58*	.52*	.59*
Method/Design & dataset	.83**	.73**	.65**	.58*	
Method/Design & Results	.61*	.91**	.72**		.72**
Method/Design, Dataset & Results		.55*	.53*	.59*	

** : P value $\leq .00$

* : P value $\leq .05$

The alphanumeric characters that showed significant relationships with information types are mostly those characters that are in a strong relationship with nominal, compound, and gerund grammatical structures- the highly used structures. It indicates there might be meaningful relationships between highly-used grammatical

structures and those types of information that were mainly encoded in titles. To examine whether such a potential relationship exists correlations between categories of grammatical structures and information types were calculated. The results are shown in Table 7.

Table 7.
Correlations between Types of Information & Grammatical Structures

	Nominal	Compound	Gerund	Prepositional	Full Sentence
Topic Only	.37	.48	.42	.33	.59
Method/Design Only	.36	.59*	.19	.74**	.15
Dataset Only	.13	.25	.25	.16	.40
Conclusion Only	.89	.97	.91	.11	.00
Method/Design & Dataset	.92**	.68**	.84**	.22	.27
Method/Design & Results	.74**	.68**	.80**	.13	.06
Method/Design & Conclusion	.22	.14	.17	.31	.09
Dataset & Results	.82	.17	.60	.00	.57
Dataset & Conclusion	.21	.22	.15	.15	.98**
Method/Design, Dataset & results	.59*	.57*	.70**	.17	.17
Method/Design, Dataset & Conclusion	.00	.02	.15	.35	.28
Method/Design, Results & Conclusion	.11	.06	.23	.17	.08
Method/Design, Dataset, Results & Conclusion	.50	.38	.40	.12	.100**

** : *P value* ≤ .00

* : *P value* ≤ .05

According to the results, mainly four categories of information types encoded in titles are significantly correlated with grammatical structures. Categories of method/design and dataset, method/design and results, and method/design, dataset, and results are significantly correlated with nominal, compound, and gerund structures. It suggests that using these three structures to form titles might be more helpful to embed more types of information in titles. Moreover, the category of method only is correlated with compound and prepositional structures. Finally, correlations for two categories that contain information about the conclusion were detected. The category of dataset and conclusion

was significantly correlated with full-sentence structure. Also, the category of method/design, dataset, results, and conclusion, which contains as much information as possible, is highly correlated with full-sentence structure. These indicate that to embed information about the conclusion in a title, complete sentences are the best choices. Since complete sentences are more likely to be longer, this is nicely in line with the correlation between the category of method/design, dataset, results, and conclusion and title length, which was reported earlier.

Discussion

Being aware of the features of RA titles and how they possibly correlate with each other helps authors to make a checklist of features of form and content, and to know how to use these features wisely and carefully. Wisely-drafted titles would increase the chance of authors receiving more attention from both sides of publications and readers (Cheng et al., 2012; Haggan 2004; Watson et al., 2022). Also, publications and journals might be able to make a more informed decision while setting rules and regulations for features of titles in RAs to be submitted and also while reviewing them (Fox & Burns, 2015).

As previous works on RA titles reported (e.g., Jiang et al., 2022; Xiang & Li, 2020) titles' length has been increasing chronologically. In line with the foregoing results, the present study found that RA titles drafted by Iranian applied linguists are pretty long (with an average of 13.88 words); longer than word counts of titles a decade ago, which was reported to be 8 to 9 words per title (Anthony, 2001; Haggan, 2004). As science is developing and more concepts are being added to scientific fields (Bérubé et al., 2018), there are more words to be included in titles. Thus, increases in RA titles should be expected and journals that set strict rules for the number of words in titles may wish to reconsider their rules to be consistent with scientific developments. Also, authors need to know that drafting longer titles for their RAs might not be assumed as their weakness.

Although RA titles drafted by Iranian authors are pretty long, it does not mean that the authors did not use tools and strategies to reduce the title length. In fact, Iranian authors skillfully used non-alphanumeric characters such as colons, hyphens, and commas, which allow for joining phrases and creating hyphenated adjectives (Bertram et al., 2011). They also used grammatical structures such as nominal and compound, which allow for omitting verbs, creating phrases, and joining them. Such strategies helped Iranian authors reduce the number of words used in composing titles (Paiva et al., 2012; Shahidipour & Alibabae, 2017). It shows the authors' intention to draft as short titles as possible, but interestingly the titles still are among the longest ones ever reported.

Conclusion

Titles' length is not a feature to be studied on its own because as the length grows, other features such as the lexical diversity of a title might be changed correspondingly. According to the results of the current study, there is a negative relationship between titles' length and lexical diversity, which indicates a higher chance of the presence of repetitive words in longer titles. However, Iranian authors seemed to have spent quality time drafting RA titles because despite using many words in their titles, they didn't use repetitive words (with a lexical diversity average of .94). Using mostly unique words to compose a title does not seem an aesthetic feature. Unique, non-repetitive words carry different meanings that pave the path to refer to more concepts.

As more concepts are depicted in titles, there would be a possibility of encoding more information in RA titles. The more encoded information in titles, the higher the chance of attracting readers' attention (Moattarian & Alibabae, 2015; Peacock, 2002). Titles that negotiate more information allow the potential readers to easily decide how useful the article can be. Informative titles reduce the time that potential readers have to spend to decide whether or not the article is worth being read (Watson et al., 2022). In fact, the more the authors spend time carefully drafting an RA title, the less the potential readers need to spend time deciding whether or not to select an article.

Iranian authors of applied linguistics RAs seem to have engineered titles to be able to encode as much information as possible. According to the results of the current study and based on information types encoded in titles, 13 categories of information types were formed. It shows that Iranian authors desire to negotiate a wide range of information with potential readers and reviewers, which justifies the high index of lexical diversity in RA titles. Among all types, information about the study's method and design, dataset, and results were highly encoded. As expected, longer titles corresponded with including more information types. Encoding more information types in RA titles would make the whole work more expressive, and reduces the possibility of being mistaken with other similar works as well; this feature helps the RA stand uniquely by showing the work's outstanding features like the dataset and results.

Thus, titles might seem like the smallest section of an RA, but they need to be drafted patiently to be able to resonate all the invested attempts into the work. Iranian authors of applied linguistics RAs paid plenty of attention to almost all features of titles; they tried hard to select vocabulary items that carry proper information and are unique and non-repetitive at the same time. While opting for lots of unique words to raise the possibility of negotiating more information, Iranian authors were not distracted from the size of RAs'

titles. They used non-alphanumeric characters and syntactic structures as tools and strategies to reduce the number of words in RAs' titles as much as viable. Although seems challenging (Jalilifar et al., 2010; Xiang & Li, 2020), the final results indicate that authors considered several features of form and content to compose RAs with comprehensible titles powerful enough to express their unique features rather than negotiating general information.

Prospective writers, RA drafting courses, and RA reviewers can benefit from the findings of the current study as a comprehensive checklist to ensure the inclusion of essential components in their RA titles. While this study represents an attempt to propose a framework, the examination of the form and content of the RA titles, along with their interrelationships can be valuable for involvement in drafting, teaching, and assessing RA titles to stay focused on the key features.

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