Ontological Methodologies for Counselling Intervention: *Do’a* and *Zikr Al-Mā’thur* Corpus

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**Abstract:**

*Do’a* and *Zikr Al-Mā’thur* (authentic supplications and remembrance of ALLAH ‘Azza wa Jalla) can be suggested to Muslims to help them deal with challenges or issues in life. Counselling cases affect a person’s feelings. *Do’a* and *Zikr Al-Mā’thur* are often applied as a counselling intervention. Unfortunately, the authentic *Do’a* and *Zikr Al-Mā’thur* are dispersed in many resources not visible to users, and the fact that not all online resources offer access to accurate *Do’a* and *Zikr Al-Mā’thur* to users and the dubious *Do’a* and *Zikr Al-Mā’thur* frequently credited to the Prophet (pbuh). The goal of this research is to develop an ontology for the purpose of providing credible results to counselling cases in need of relevant *Do’a* and *Zikr Al-Mā’thur*.

This research focused on presenting how an ontology could support to provide accurate information to cases supervised by high school counsellors. This research developed the ontology for *Do’a* and *Zikr Al-Mā’thur* for counselling in Protégé. The methodology implemented in the ontology development included the models designed by Fernandez-Lopez et al., Thunkijanukij, Gomez-Perez et al., and Kreider. The ontology was verified, validated, and evaluated by two subject domain experts. Most concepts were rated as ‘Compliant’ and some as ‘Partially Compliant’. Queries in SPARQL produced answers to the competency questions. Feedbacks from the user assessment proved that the executed results from the *Do’a* and *Zikr Al-Mā’thur* ontology for counselling succeeded in fulfilling the users’ requirement. It is recommended that the sustainability of the ontology should be secured through constant submission of real cases by counsellors and people with similar roles for query analysis and results. Credible scholars should provide direction to trustworthy sources. Such essential input is valuable for content management and contributes towards very few domain ontologies that deliver support to professional works. It also provides the step-by-step procedures to ontology construction and assessment for Islamic collection for counselling intervention.

**Key words:** Islamic knowledge, Knowledge representation, Ontology, Ontology evaluation, Ontology development, Semantic technology.

**Introduction:**

Islam emphasises on the use of accurate information despite its availability in any format. The online setting faces dubious sites with misleading and fabricated information. Due to the advancement in technology, end-user searching for information in an online environment has become more popular. The yearnings and necessities of online users to obtain accurate information promptly have also strikingly escalated. Information related to counselling is of no exception as it is significantly searched on the Internet by counsellors. Nowadays, counsellors have access to possible solutions to their various cases with mental and spiritual needs. Nevertheless, online resources are not all designed to directly meet users’ need for accurate information.

*Do’a* and *Zikr Al-Mā’thur* (authentic supplications and remembrance of ALLAH ‘Azza wa Jalla) can be suggested to Muslims to help them deal with challenges or issues in life. *Do’a* and *Zikr Al-Mā’thur* are authentic collections of supplication and remembrance of ALLAH ‘Azza wa Jalla and practised by Muslims for spiritual enrichment (1). Al-Qahtani emphasised that it is recommended for Muslims seeking cure to use the noble *Al-Quran* and authentic *Hadith* (prophetic traditions) because...
of their usefulness and ability to lead towards a complete recovery (2). Counselling cases often related to emotions can affect a person’s feelings. Research indicates that prayers (supplications) to God is often applied as a counselling intervention, and it is considered significant to counselling departments handled by many prominent practitioners. Ontology would be a useful mechanism to link between the targeted search result (Do’a and Zikr Al-Ma’thur) and the users in need (counsellors). Among the fundamental issues of concern are the inconveniency of the information retrieval for its exact use, the dispersed collection of Do’a and Zikr al-Ma’thur in many dubious sources, and the deferment in finding the accurate search outcomes caused by the existence of information in enormous databases.

The process of retrieving relevant information within the ocean of resources is a challenging task (3, 4). Resources related to Islamic knowledge available through traditional search engines are considered as natural language text documents, whereas the imprints of scholars’ compilation are unstructured text documents (5). This scattered and unorganised information becomes a hindrance to its exact usage (6). The scattered information on the Internet often leads users to a set of undesirable information (3). These are also concerns for the Do’a and Zikr al-Ma’thur collection. Therefore, an ontological approach is one practical way that could contribute to better and related results.

Do’a and Zikr al-Ma’thur are kept under various headings. Placing the Do’a and Zikr al-Ma’thur under one heading only instead of their multiple concepts would not give much clue to how their query and application should be (7). This arrangement affects targeted search results. Moreover, a majority of the Do’a and Zikr al-Ma’thur are compiled under inconsistent headings due to the subjectivity of the scholars’ interpretation (8). If a user conducted a search applying only the headings, then the search terms would omit Do’a and Zikr al-Ma’thur with overlooked concepts. Thus, ontology plays a fundamental role in preserving the semantic meaning of each Do’a and Zikr al-Ma’thur and its retrieval.

The second issue is related to the many unauthentic Do’a and Zikr al-Ma’thur claimed to be from Prophet Muhammad (peace and blessings of ALLAH be upon him) shared in the online environment. Figure 1 below demonstrates the non-filtered search results of a Do’a found from the conventional search engine results. That Do’a does not exist in a reliable Islamic source. Thus, having the ontology for Do’a and Zikr al-Ma’thur derived from trustworthy sources will only allow users to access and retrieve reliable Do’a and Zikr al-Ma’thur for counselling.

Figure 1. Sample of non-filtered Do’a and Zikr al-Ma’tthur found from a conventional search engine result. Red arrow: Do’a to have a beautiful body (English translation)

The goal of this research is to develop an ontology for the purpose of providing credible results to counselling cases in need of relevant Do’a and Zikr Al-Ma’thur. This research focuses on presenting how an ontology could support in providing accurate information (Do’a and Zikr al-Ma’thur) to cases supervised by high school counsellors.

Ontology is widely accepted as an explicit specification of a conceptualisation (9) and applicable as an effective tool in searching and retrieving information (10, 11). An ontology should be machine-readable and human-understandable. Concepts used must be unambiguously well-defined. The ontology must also be shared, which indicates a group acceptance or a community consensus (12, 13).

Ontology has become an evolving means of handling the massive amount of information sources (14, 15). Moreover, semantic information incorporated within ontology has been proven to have contributed towards a more impactful process of retrieving information (16-19). In Malaysia alone, there are more than 30 million Internet users (refer to Table 1). The emergence and development of ontology enriched with the semantic relationship would assist this huge group of users to find relevant information to their search (17).
Table 1. Statistic of Internet usage and population growth in Malaysia. Source: internetworldstats.com (2020)

| Year | Internet Users | Population |
|------|----------------|------------|
| 2016 | 21,090,777     | 31,630,000 |
| 2017 | 25,500,000     | 32,020,000 |
| 2018 | 27,560,000     | 32,380,000 |
| 2019 | 29,010,000     | 32,580,000 |
| 2020 | 30,440,000     | 33,000,000 |

In Anjewierden and Kabel’s work, ontology functions as fixed vocabularies used to index data from different points of view (20). Several methodologies for ontology development have contributed to the area of information retrieval (IR) and ontology works. Among the prevalent methodologies for ontology development include the TOVE methodology by Gruninger and Fox, Uschold and King methodology, Methontology, 101 methodology, Formal Concept Analysis (FCA), and knowledge engineering steps; as well as the ontological engineering approach by Brusa, Laura, and Chiotti (21-28). Part of the review was referring to Breitman, Casanova and Truszkowski (29). More recently, the literature has included the methodology outlined in the work of Aminu, Oyefolahan, Abdullahi, and Salaudeen (30). This research aims to develop an ontology for Do’a and Zikr al-Mā’thur with regard to counselling in Protégé – a commonly used ontology development tool.

The next forthcoming section will be a review on the related works, and a thorough discussion on the methodology utilised for the Do’a and Zikr al-Mā’thur ontology development. Afterwards, it will be followed by the findings section, which focuses on elaborating and discussing the developed ontology and its assessment procedures. The paper will finally wrap up with the conclusion section, which outlines the overall summary of this research.

Related Works:

Several ontological works have constructed ontologies for Islamic knowledge corpus. These works include several studies conducted by Iqbal (31) and Iqbal et al. (32, 33), which focused on developing ontology specifically for Sufism and Quranic corpuses. While the works by Saad et al. (34-36) and Salim, et al. (37) ventured on creating a framework of Islamic knowledge for ontology construction based on the concepts contained in the Al-Quran, Latif, Haron, and Annamalai presented an ontology creation utilising the software engineering method, which was suggested to be more reliable, longer lasting, and constantly adjusted (38-40). This approach concentrated on the Islamic banking domain and the ontology claimed to have the capability of adapting to the purpose of its circumstance.

In 2018, Keloum, Nabila, and Djamel constructed a reference ontology specifically for the Islamic finance and banking domain (41). The ontology adopted the NeOn Methodology, which is known to support the collaborative aspects of ontology and its dynamic evolution. The ontology provided common vocabularies (concepts), descriptions, and relationships between the concepts. Fairouz and Nora introduced an ontology representing the Islamic knowledge as well as a system that could analyse the selected knowledge (42). This ontology concentrated on the Islamic legislative as its main source.

In the research executed by Ta’a et al. the researchers demonstrated the ontology of Al-Quran and implemented a method used for retrieving the Quranic knowledge via the semantic search approach (43, 44). On the other hand, a research by Almeida, Roche, and Costa (45) and Almeida and Costa (46) emphasised on the significance of the Islamic artefacts and archaeology in the built ontology, namely OntoAndalus. This top-level ontology supported experts and students in the Islamic archaeology field. Alsammak and Sahib established an ontology-based system that focused on a particular field of knowledge (time nouns) encompassed in the book of Nahjul Balaghah (a collection of speeches and letters by Ali Ibn Abi Talib) (47). It depended on the Vector Space Model (VSM) for the indexing and retrieval system.

A recent research by El Bakly, Darwish, and Hefny proposed a model using an ontology of main jurisprudence doctrines as a semantic feature and a pioneer in authorship attribution (48). This proposed ontology model was established to particularly solve the unknown fatwa (authoritative legal opinion given by a legal scholar) assigned to one of the main Islamic jurisprudence doctrines. To highlight the most recent work, this research focused on building a new Quranic documented ontology based on the words extracted from the Quranic grammatical book and having the grammatical functions as the ontological concepts (49).

However, all these existing ontologies only fed the answers to a set of stipulated questions. These completed research on Islamic collections were reflected as inadequate and needed to be wide-ranging. None of the research had a specific focus on the ontology of Do’a and Zikr al-Mā’thur for counselling. Therefore, this effort would be counted as additional research to the body of knowledge, specifically on Islamic collections.
Methodology:

The research design was divided into three major parts: identification phase of ontology development methodologies, ontology development phase for Do’a and Zikr al-Mā’thur for counselling, and finally its evaluation phase. The identification method was generated from a systematic literature review. The ontology development was highly influenced by the methodology demonstrated by Fernandez-Lopez et al. (22) with close reference to Thunkijjanukij’s (50) work, following the Protégé practical guide by Horridge et al. (51). The ontology development phase comprised five main stages, namely ontology specification, knowledge acquisition, ontology conceptualisation, ontology formalisation, and ontology implementation.

The Ontology Evaluation Phase followed the guideline and criteria recommended by Gomez-Perez et al. (52) and Kreider (53), which involved validation and verification by two experts. One validation was conducted after the ontology conceptualisation stage had completed, while the other was performed after the ontology implementation was accomplished through the execution of competency questions in SPARQL Query in the Protégé Ontology Editor (version 5.1). Subsequently, user assessment was circulated among the prospective users for collection and was recorded in assessment forms to evaluate how much the executed results from the Do’a and Zikr al-Mā’thur ontology for counselling had succeeded in fulfilling the users’ requirements.

Ontology Development Activities

The ontology development began with a specification of its purpose and scope. Its goal set the direction of the ontology development and its basic and competency questions. The basic questions listed are answered as follows:

- a) What domain would the ontology cover?
  : The ontology domain covered the ontology domain of Do’a and Zikr al- Mā’thur for counselling.

- b) For what purpose was the ontology used?
  : Primarily, the ontology was constructed with the aim to provide support to high school counsellors to the relevant Do’a and Zikr al- Mā’thur corresponding with the counselling cases that occur in schools. This ontology should provide the Do’a and Zikr al-Mā’thur as the possible remedy or solution for counselling cases.

c) What types of questions should the ontology provide answers?
  : The ontology should provide answers on the relevant Do’a and Zikr al-Mā’thur corresponding with the counselling cases.

d) Who would benefit from the ontology?
  : The ontology would directly benefit the high school counsellors during the counselling intervention session with their respected clients.

The finalised 86 competency questions should be answered by the developed ontology to ensure its correctness. All the competency questions were constructed to meet the purpose of the Do’a and Zikr al-Mā’thur ontology for counselling. Examples of these competency questions are:

- a) Which items should one consider if one is having a difficult time?
- b) How many Do’a and Zikr al-Mā’thur are available as a remedy for stress?
- c) What is the Do’a and Zikr al-Mā’thur to provide ease in understanding the subject taught at schools?
- d) What Do’a and Zikr al-Mā’thur should be practised in the case of bullies?
- e) Which Do’a and Zikr al-Mā’thur should be considered if a person suddenly meets a gangster group?
- f) What is the Do’a and Zikr al-Mā’thur for good manners?
- g) What is the recommended Do’a and Zikr al-Mā’thur for the case Pornography Addiction?
- h) What is the Do’a and Zikr al-Mā’thur for good manners?
- i) What are the endorsed Do’a and Zikr al-Mā’thur for the case of a suicide attempt?

Content analysis was conducted on the selected compilations of Do’a and Zikr al-Mā’thur (Table 2) and counselling segments from the Ministry of Education. The analysis was set to identify the structure of ontology and prepare for the extraction process of the main concepts (classes and subclasses) and all the related information and knowledge to form the ontology content at the ontology conceptualisation stage.
Table 2. Do’a and Zikr al-Mā’thur sources

| No. | List of sources                                                                 | Scholars (Imprint/ Online Publication) | Number of Do’a and Zikr al-Mā’thur | Actual number of Do’a and Zikr al-Mā’thur that met the criteria |
|-----|---------------------------------------------------------------------------------|----------------------------------------|-----------------------------------|---------------------------------------------------------------|
| 1.  | Ensiiklopedia Zikir – KitabAl-Adzkar (Encyclopedia – Remembrance of ALLAH)       | Imam Nawawi                           | 467                               | 258                                                           |
| 2.  | Perisai Muslim – Hisnul Muslim (Fortress of Muslim)                              | Dr. Said Wahf Al-Qahtani               | 142                               | 142                                                           |
| 3.  | Amal Youm wa Laylah – (Day and Night of the Holy Prophet (peace and blessings of ALLAH be upon him)) | Imam An-Nasaie – Abu Abd al-Rahman Ahmad bin Ali bin Syuaib bin Ali bin Sinan bin Bahr al-Khurasani al-Qadi | 1141                              | 164                                                           |
| 4.  | 101 Doa Para Nabi & Rasul Dalam Al-Quran (101 Do’a and Zikr al-Mā’thur of the Prophets & Messenger in Al-Quran) | Dr. Zahazan Mohamed                   | 120                               | 120                                                           |
| 5.  | 101 Doa daripada Hadis-Hadis Sahih (101 Do’a and Zikr al-Mā’thur in Authentic Hadith) | Dr. Zahazan Mohamed                   | 118                               | 118                                                           |
| 6.  | Kompilasi Do’a-Do’a daripada Al-Quran (Compilation of Do’a and Zikr al-Mā’thur from Al-Quran) | An-Nawawi                             | 88                                | 88                                                            |
| 7.  | Do’a daripada Al-Quran dan Sunnah (Do’a and Zikr al-Mā’thur from Al-Quran and As-Sunnah) | Khadimah Al-Ilm Al-Syarif              | 125                               | 125                                                           |
|     | TOTAL                                                                          |                                        | 2,201                             | 1,015                                                         |

The concepts for counselling are derived from three major sources: policies, reports, and documents under the counselling and guidance unit for schools prepared by the Ministry of Education Malaysia. A total of 201 real counselling cases were gathered from three high schools in the Gombak district and were similar to cases reported in daily newspapers. The school counsellors also participated in the user assessment on the suitability of retrieved results. The cases represented instances or individuals within Protégé and the competency questions (see Table 3).

Table 3. A case and its definition

| No. | Case                  | Definition                                                                 |
|-----|-----------------------|---------------------------------------------------------------------------|
| 1   | Masalah bercinta/     | Student involved in a prohibited boy-girl relationship                     |
|     | Berpasangan           | (Unlawful relationship issue)                                             |

Table 4 partly lists the ontology comprising the Do’a and Zikr al-Mā’thur and their corresponding cases as verified by a subject matter expert after the conceptualisation stage. A cross-reference check was carried out in other credible sources validated by a subject matter expert after the ontology conceptualisation stage. This was a crucial step to ensure the credibility of Do’a and Zikr al-Mā’thur and their relation to the right cases.

Table 4. Do’a and Zikr al-Mā’thur and the corresponding cases

| Do’a and Zikr al-Mā’thur Headings | Counselling Cases                                                                 |
|-----------------------------------|-----------------------------------------------------------------------------------|
| Agar_tidak_tergolong              | Sukar_ingat_pelajaran                                                            |
| ing dalam_golongan ganyang_jahil  | (Difficulties in memorising lessons),                                            |
| (Do’a and Zikr al-Mā’thur to seek refuge from being among the ignorant) | Susah_faham_pelajaran                                                            |
| Kurang_pengetahuan_agama         | (Difficulties to understand lessons), Masalah_akademik                            |
| Tidak_tahu_membezakan_mana_       | (Lack of Islamic knowledge),                                                     |
| yang_boleh_dan_mana_yang_tidak    | Sukar_ingat (Difficulty to memorise)                                             |
|                                  |                                                                                   |

The organisation of concepts was commonly managed using a class hierarchy comprising the main classes and subclasses concept connected through relationships. The conceptual model developed in this research could be divided...
into two types: **hierarchical relationships** and **associative relationships**. Hierarchical relationship linked the main classes and subclasses within the same hierarchy. While associative relationship linked concepts between different hierarchies. Figure 2 depicts and reveals the structure of hierarchies and relationships constructed within the Do’a and Zikr al-Mā’tthur ontology for counselling.

![Figure 2. Ontology structure model](image)

The concepts were identified using top-down and bottom-up approaches. In the top-down approach, the most general classes were first defined and sequentially decomposed into more specialised classes. In the bottom-up approach, the most specific classes were first defined, and then successively grouped according to some generalisation criteria, and a more generic class was chosen for each group as a superclass of the more specific classes. Table 5 exhibits a sample of identified concepts (main classes and sub-classes) from Do’a and Zikr al-Mā’tthur.

**Table 5. Sample list of identified concepts from Do’a and Zikr al-Mā’tthur segment**

| Texts of Do’a and Zikr al-Mā’tthur | Identified Classes and Subclasses |
|------------------------------------|-----------------------------------|
| KECUKUPAN (Sufficiency) Penyerahan segala urusan (Submission of all affairs) | Cukuplah ALLAH bagi kami dan kepadaNYA tempat diserahkan segala urusan [Ali-Imran: 173] (ALLAH is sufficient for us and to HIM we handed over all matters) |
| PERLINDUNGAN (Protection) Bala kesengsaraan, keburukan qadha’ dan kegembiraan musuh (Torment, misery, bad fate, and the joy of the enemy) | Wahai Tuanku, sesungguhnya aku berlindung kepadaMU dari kesusahan bala, hinanya kesengsaraan, keburukan qadha’ dan kegembiraan musuh ( terhadap masalahku) [Hadith Bukhari & Muslim] (O ALLAH I seek refuge in YOU from severe calamities and hardships, grips of ill hope, evil destiny, and from the rejoice of enemies) |

This research was of the view that the relation of hasSubclass could have an inverse relation, namely isSubclassOf. All available relations between all hierarchical concepts were listed within this activity. An associative relationship was assigned by identifying the verbs related to the concepts and a relation name was assigned by forming a meaningful statement. This research labelled a relationship based on the role names, and assigned new relationships when there was no existing relation or when a specific relation was needed. In total, there were 13 significant relationships identified in this research. The associative relationship included hasSupplication and isSupplicationFor. Table 6 lists the most significant role of all relationships within this ontology.

**Table 6. List of identified Properties (Relationship)**

| Properties (Semantic Relationships) | Relationship Description |
|-------------------------------------|--------------------------|
| hasSupplication | Counselling case has a corresponding Do’a and Zikr al-Mā’tthur |
| isSupplicationFor | Do’a and Zikr al-Mā’tthur is the corresponding supplication for counselling cases |
Individuals may belong to more than one class. The ontology’s main classes were made up of the main themes extracted from within the Do’a and Zikr al-Mâ’tthur. The subclasses were built from the Do’a and Zikr al-Mâ’thurs that have the same theme. Therefore, any Do’a and Zikr al-Mâ’tthur that have the same concept is grouped as a subclasses under this class. Classes were also made up of the concepts for counselling. Figure 3 illustrates the bird’s eye view of Do’a and Zikr al-Mâ’tthur ontology informal draft model to further guide the construction of the ontology components and hierarchy.

![Figure 3. Concept and relationship of Do’a and Zikr al-Mâ’tthur and counselling in MindManager](image)

Note: DZM1 & BK1 = Main Classes, DZM i & BK i = Subclasses, InstDZM & InsBK = instances/individual

DZM= Do’a and Zikr al-Mâ’tthur, BK = Bimbingan & Kaunseling (Guidance & Counselling)

Figure 3 shows that Permohonan (Invocation) was assigned as one concept under the main classes of Do’a and Zikr al-Mâ’tthur. Therefore, any Do’a and Zikr al-Mâ’tthur that had the same concept of Permohonan (Invocation) were grouped as subclasses under this class.

There were 13 semantic relationships (or object properties) in the Do’a and Zikr al-Mâ’tthur ontology for counselling. However, this research focused on the function of the dominant relationship: hasSupplication and its inverse relation isSupplicationOf. The object properties reflected the major relations among the classes (concepts) and individuals (instances) in the Do’a and Zikr al-Mâ’tthur ontology. Each of the object properties had its purpose and function, and properties were defined based on their roles. An accurate and complete ontology relationship would be considered as successful when it fulfilled the competency assessment. Individuals were the members belonging to the classes and were formed from the counselling cases and constructed from the Do’a and Zikr al-Mâ’tthur collection. The counselling cases were linked to the relevant individuals of Do’a and Zikr al-Mâ’tthur. For example, ‘Mencuri’ (Theft) was linked to the relevant Do’a and Zikr al-Mâ’tthur using the inverse relation ‘isSupplicationOf’ and ‘hasSupplication’.

In developing an ontology using Protégé, an annotation was added as supplementary information. An annotation is an important information related to the main components of ontology, such as comments, creation date, author, references, a list of web pages, and any related information. The annotations identified within this ontology were definitions of concepts, definitions of instances, and the original Arabic texts of the Do’a and Zikr al-Mâ’tthur.

If the Do’a and Zikr al-Mâ’tthur contained only a general idea without any specification, the class concepts were then extracted based on the heading of the Do’a and Zikr al-Mâ’tthur as assigned by the scholars. Thus, both ways could be used to define the concept or classes for the ontology depending on the situation. Figures 4 and
5 depict the sample of classes and subclasses constructed within the Do’a and Zikr al-Mā’thur ontology in Protégé ontology editor for Do’a and Zikr al-Mā’thur and counselling cases (Bimbingan and Kaunseling / Guidance and Counselling).

Figure 4. Ontology classes built-in Protégé Ontology Editor

Figure 5. Expanded ontology classes and subclasses in Protégé Ontology Editor

A total of 303 individuals were created within the ontology development for Do’a and Zikr al-Mā’thur for counselling. Figure 6 illustrates a sample of individuals created within the ontology, which composed of the main content of Do’a and Zikr al-Mā’thur and counselling cases.

Figure 6. Individuals constructed in Protégé Ontology Editor

Once the ontology classes and the hierarchy were established, they were assigned properties and characteristics. This research applied object properties to serve the purpose of the Do’a and Zikr al-Mā’thur ontology for counselling to be included as data type properties. Moreover, this research used annotation properties to add supplementary information or data. Seven types of characteristics were created under object properties. By having object properties assigned with any of those characteristics, the meaning of each object properties could be enhanced.

In this research, properties were linked to form relations between classes or between individuals and classes or between individuals. From the created properties, it can be inferred that the collection of Do’a and Zikr al-Mā’thur had an interrelation similarity between one another and reflected its knowledge value within the collection. The comprehensiveness and accuracy of the ontology’s semantic relationship indicated the ability of the competency questions to provide the required answers. Figure 7 depicts the object properties built in the ontology.
The use of graphical representation was crucial in facilitating and presenting a clear view on the developed ontology. The completed ontology could be visualised in OntoGraf to ease the overall quality of navigation and visualisation in the built ontology. OntoGraf was one of the effective tools for visualisation and interactive navigation of the semantic relationships or the object properties in the ontology. This visualisation included the class axioms “is-a”, “disjoint-with”, and “equivalent-to”.

Findings: The Developed Ontology and Evaluation

This ontology evaluation phase encompassed validation, verification, competency questions, and user assessment. It is essential to highlight that not all ontology development involves the participation of experts. Nevertheless, for concepts derived from texts full of wisdom such as Do’a and Zikr al-Mā’tthur, the involvement of an expert is highly recommended to avoid inaccuracies in semantic representations.

The Do’a and Zikr al-Mā’tthur were validated by the contributing scholars. The ontology for Do’a and Zikr al-Mā’tthur for counselling were validated and evaluated by two subject domain experts. The expert in Quran and Sunnah reviewed the concepts derived from the Do’a and Zikr al-Mā’tthur. The expert in counselling reviewed the concepts extracted from the counselling guidance and cases. Each expert was given a validation form listing the validation criteria and the concepts for review. Three points of rating were used: Compliant, Partially Compliant, and Non-Compliant. The five criteria adopted from Kreider (53) are listed as follows:

- **Comprehensive**: The number of concepts in the ontology, relative to the average for the entire concept of the ontologies (54).
- **Consistency**: A given representation is consistent if and only if the individual representation is consistent and no contradictory sentences can be inferred from the representations and axioms (52).
- **Extensible**: The ontology can be extended and specialised monotonically. In other words, the ontology can accept new terms for special uses based on its existing vocabulary, in a way that does not require the revision of the existing definitions (55).
- **Completeness**: The incompleteness of an individual representation can be proved if at least one representation is missing concerning the established reference framework. This is determined by figuring out what entities of the world are or are not explicitly represented, and all entities that are required but are not explicitly represented can be inferred using other representations and axioms. If it can be inferred, the representation is complete. Otherwise, it is incomplete. The common errors associated with completeness are incomplete class classification and partition errors (subclass partition omission and exhaustive subclass partition omission) (Gomez-Perez et al., 2004).
- **Ease of Use**: It refers to the ability to be understood, navigated, and implemented on the related elements including the terms, concepts, and the overall ontology.

The involvement of experts during the validation process could provide a piece of specific knowledge about the concepts, their properties, and their relationships, to evaluate the conceptual model once the conceptualisation activity was completed, and to evaluate its implementation. Outcomes from the validation part were as follows. The concepts for Do’a and Zikr al-Mā’tthur were rated as ‘Compliant’ for Comprehensive, Consistency, Extensible, Ease of Use, and Completeness. The expert suggested that to improve Ease of Use: “It will be much easier if the Do’a and Zikr al-Mā’tthur matched the main concepts with smaller categorisation”. The concepts for the counselling cases were rated as ‘Compliant’ for Consistency, Extensible, and Ease of Use, and ‘Partially Compliant’ for Comprehensive and Completeness. The comments given on the Comprehensive criterion: “Some coverage of the concepts is not suitable and not exhaustive enough” and on Completeness: “Some
concepts are incomplete and incompatible with the latest Counselling and Guidance information”.

Out of 237 concepts derived from the Do’a and Zikr al-Mā’thur, 12 required revisions. Thus, the identified concepts in the ontology had a high accuracy level as reviewed by the expert. The expert thoroughly examined the categorisation of the Do’a and Zikr al-Mā’thur and the matched counselling cases. His review showed that all of the listed Do’a and Zikr al-Mā’thur and their corresponding cases were agreeable without any amendment. His validation was an endorsement for the vigorous semantic relationships built in the ontology.

Out of the 88 concepts extracted from the counselling and guidance cases, 27 were added to the existing list. Of the 27 new concepts, 17 were added under the class of Psychosocial and Mental Health (Psikososial dan Kesejahteraan Mental), 5 were added under the class of Career Education (Pendidikan Kerjaya), 4 were revised and added under the class of Personal Development (Pembangunan Sahsiah Diri), and one was revised under the class of Enhancement of Self-Discipline (Peningkatan Disiplin Diri). A total of 96 cases were categorised into 57 counselling concepts. 11 concepts with their cases were revised, and 23 cases with ambiguous concepts were provided with relevant counselling concepts. The counsellor’s endorsement on the concepts and cases contributed towards the accuracy of counselling classes within the ontology.

**Competency Question Assessment in SPARQL Query**

Competency question assessment requires the right query language before it can be posted into the system. Competency questions are translated and formalised from their natural language into the query language.

The queries for a total of 86 formalised competency questions were formulated based on real counselling cases, and submitted to the system using SPARQL Query. Upon retrieval, the results were transferred onto the assessment form for submission to the participating counsellors for user assessment. The execution of formalised competency questions in SPARQL query indicated that the ontology had the capability of answering the competency questions. Samples of the result from the execution in SPARQL Query are presented follows:

**Competency Question 1**: What is the recommended Do’a and Zikr al-Mā’thur for the case of Ketagih Pornografi (Pornography Addiction)?

This question yielded nine results from the SPARQL query execution, showing that the ontology successfully answered the posed competency question (see Figure 8).

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**Figure 8. SPARQL Query results for Ketagih Pornografi (Pornography Addiction) case**
Figure 9. OntoGraf visualisation: Pornography Addiction case and its corresponding Do’ā

Figure 9 shows the visualised results for Ketagih Pornografi (Pornography Addiction) in OntoGraf. The visualised results corresponded to the nine results of Do’a and Zikr al-Mā’thur obtained through the SPARQL Query execution. This finding showed that the results visualised in OntoGraf were consistent with the findings in SPARQL Query.

The brown-coloured links pointed to multiple Do’a and Zikr al-Mā’thur, indicating a hasSupplication relationship between the counselling case to the recommended Do’a and Zikr al-Mā’thur. The links in yellow coming out from the Do’a and Zikr al-Mā’thur to the counselling case had an inverse relationship of isSupplicationFor. In the ontology hierarchy, all Do’a and Zikr al-Mā’thur corresponding to the counselling cases shown in Figure 8 were grouped as the instances under the subclasses of Permohonan (Invocation), Perlindungan (Protection), and Keampunan (Forgiveness).

The user assessment adopted a three-point scale: Suitable, Partially Suitable, and Not Suitable. Users from among the qualified counsellors in the participating schools were given an assessment form to submit their assessment on the capability of the ontology based on the Suitable level. The form included details such as the case name and list of corresponding Do’a and Zikr al-Mā’thur. The users were asked to judge the suitability of the Do’a and Zikr al-Mā’thur retrieved from the ontology and the Do’a and Zikr al-Mā’thur resulted from the execution in SPARQL and to provide reasons for the Partially Suitable selection and the Not Suitable ones. Table 7 shows the results of the user assessment.

### Table 7. Results of user assessment

| Assessors (Counsellors) | Counselling | Do’a and Zikr al-Mā’thur | Percentage of Suitability |
|--------------------------|-------------|--------------------------|--------------------------|
|                          |             |                          | Suitable: 638            | 83% |
|                          |             |                          | Partially Suitable: 107  | 14% |
|                          |             |                          | Not Suitable: 27         | 3%  |

The counsellors rated a majority of the Do’a and Zikr al-Mā’thur as Suitable because of their appropriateness in solving the cases and that the reasonable length of the retrieved Do’a and Zikr al-Mā’thur helped their students to practise those Do’a and Zikr al-Mā’thur. The Do’a and Zikr al-Mā’thur viewed as Partially Suitable were considered as supplementary Do’a and Zikr al-Mā’thur. The reasons for the small number of Do’a and Zikr al-Mā’thur rated as Not Suitable were that they were too lengthy and too general in meaning. The users expressed their eagerness of having the ontology. The ontology provided the suitable Do’a and Zikr al-Mā’thur to their cases and supported their intervention.
Conclusion:

This research developed an ontology for Do’a and Zikr al-Ma’tthur for counselling. This ontology is used as a mechanism to ease the way of finding the right Do’a and Zikr al-Ma’tthur to counselling cases and functions as a dynamic knowledge base platform for a semantic web. The ontology has been verified, validated, evaluated, and assessed by both experts and users. The ontology has yielded highly encouraging results during the execution of queries in SPARQL Query. The Do’a and Zikr al-Ma’tthur ontology for counselling shall serve as a significant knowledge base for counsellors who would like to enhance their intervention to each case. The ontology shall assist users in obtaining suitable results of Do’a and Zikr al-Ma’tthur. The validation, verification, competency questions, and user assessment have supported a rigorous ontology evaluation. Ontology design is a creative process. Different ontology developers would certainly come up with ontologies designed for different purposes.

This research has been carried out to experience an ontology development for Do’a and Zikr al-Ma’tthur for counselling. Despite the statement: “there is no single correct ontology for any domain”, the use of credible sources and real cases as the key stand of this research has proven that this ontology development offers significant benefits to its users. The feedback received on the ontology from experts and qualified users showed that the ontology has met the evaluation criteria. It is important to highlight that this is the first ontology that appropriately establishes the semantic relationships between Do’a and Zikr al-Ma’tthur and counselling and guidance cases for intervention session.

Several limitations were observed throughout the ontology development phases, such as it needed to be developed not only from scratch, but to be done manually and consequently, time-consuming. It is recommended that the sustainability of the ontology should be secured through constantly providing real cases by counsellors and people with similar roles for query analysis and results. Credible scholars should provide direction to trustworthy sources. Such vital input is treasured for valuable content management. As for recommendations, it is highly suggested for the counselling unit at the participating schools to use the ontology in Protégé and the counsellors are encouraged to constantly offer the yield of current real cases to the managing research centre to ensure the unceasing update for the developed ontology.

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Authors' declaration:

- Conflicts of Interest: None.
- We hereby confirm that all the Figures and Tables in the manuscript are mine ours. Besides, the Figures and images, which are not mine ours, have been given the permission for republication attached with the manuscript.
- Ethical Clearance: The project was approved by the local ethical committee in International Islamic University Malaysia.

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المنهجيات الوجودية للتدخل الإرشادي: الدعاء والذكر في مجموعة المأثور

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الخلاصة:
يمكن اقتراح دعاء وذكر المأثور (دعاء أصيل وذكرى الله عز وجل) على المسلمين لمساعدتهم في التعامل مع التحديات أو القضايا في الحياة. تؤكد حالات الاستشارة على مشاعر الشخص. غالبًا ما يتم استخدام دعاء وذكر المأثور كتدخل إرشادي. إلا أنه من سوء الحظ، فإن دعاء وذكر المأثور الأصليين مشتقان في العديد من الموارد غير المرتبطة للمستخدمين، وحقيقة أنه ليست كل الموارد عبر الإنترنت توفر وصولًا دقيقة إلى دعاء وذكر المأثور المستخدمين ودعاء المشكوك فيها حيث ذكر المأثور كثيرا ما ينسب إلى النبي صلى الله عليه وسلم. الهدف من هذا البحث هو تطوير علم الوجود لغرض تقديم موثوقة لمعايير تقييم الطلب للحالات التي تحتاج إلى دعاء وذكر المأثور ذات الصلة.

هذا البحث على تقديم طريقة تمكن علم الوجود من دعم تقديم معلومات دقيقة للحالات التي يشرف عليها مسؤولو المدارس الثانوية. طور هذا البحث أنطولوجيا لدعاء وذكر المأثور لتقديم المشورة في بروتيج. وضعت المناهجية التي تم تنفيذها في تطوير علم الوجود النماذج التي صممتها فرنانديز لوبير وآخرون، وتونيجيوكي، وزومير وآخرون، وكيدير. تم التحقق من الأنطولوجيا والتحقق من صحتها، وثبّتها من قبل خبرين في مجال الموضوع، ثم تصنيفها على أنها "متوافقة" و"شبه متوافقة" وتقييمها من قبل خبرين أخرى. استخدمت البيانات التي تم جمعها لكتابة الاستنتاجات، والتي تبين أن الأنطولوجيا توفر دعمًا للمستخدمين.

كما يجب على العلماء الموثوقين تقديم التوجيه للمصادر غير الموثوقة. تعتبر هذه المدخلات أساسية ذات قيمة لإدارة الأدوات والإشراف على حسابات الألعاب الإلكترونية. كما يوفر البحث إجراءات خطوة بخطوة لبناء الأنطولوجيا وتقييم التحصيل الإسلامي للتدخل الإرشادي.

الكلمات المفتاحية: المعرفة الإسلامية ، تمثيل المعرفة ، الأنطولوجيا ، تقييم الأنطولوجيا ، تطوير الأنطولوجيا ، التكنولوجيا الدولية