

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

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Received 28/3/2021, Accepted 11/4/2021, Published 20/6/2021



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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., Thunkijjanukij, 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-Mā'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-Mā'thur* collection. Therefore, an ontological approach is one practical way that could contribute to better and related results.

*Do'a* and *Zikr al-Mā'thur* are kept under various headings. Placing the *Do'a* and *Zikr al-Mā'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-Mā'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-Mā'thur* with overlooked concepts. Thus, ontology plays a fundamental role in preserving the semantic meaning of each *Do'a* and *Zikr al-Mā'thur* and its retrieval.

The second issue is related to the many unauthentic *Do'a* and *Zikr al-Mā'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-Mā'thur* derived

from trustworthy sources will only allow users to access and retrieve reliable *Do'a* and *Zikr al-Mā'thur* for counselling.

#### Searches related to doa untuk cantik

doa agar terlihat cantik dimata semua orang  
doa untuk kulit cantik  
doa pemanis wajah untuk wanita  
doa agar wajah bercahaya dan disukai banyak orang  
doa agar wajah cantik seperti bidadari  
zikir penyeri wajah  
doa untuk memutihkan seluruh tubuh  
doa untuk badan cantik ←

**Figure 1. Sample of non-filtered *Do'a* and *Zikr al-Mā'thur* 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-Mā'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 corporuses. 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. Latiff, 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, Keltoum, 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 <i>Do'a</i> and <i>Zikr al-Mā'thur</i>	Actual number of <i>Do'a</i> and <i>Zikr al-Mā'thur</i> that met the criteria
1.	<i>Ensiklopedia Zikir – KitabAl-Adzkar</i> (Encyclopaedia – Remembrance of ALLAH)	Imam Nawawi	467	258
2.	<i>Perisai Muslim – Hisnul Muslim</i> (Fortress of Muslim)	Dr. Said Wahf Al- Qahtani	142	142
3.	<i>Amal Youm wa Laylah –</i> (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.	<i>101 Doa Para Nabi &amp; Rasul Dalam Al- Quran</i> (101 <i>Do'a</i> and <i>Zikr al-Mā'thur</i> of the Prophets & Messenger in Al-Quran)	Dr. Zahazan Mohamed	120	120
5.	<i>101 Doa daripada Hadis-Hadis Sahih</i> (101 <i>Do'a</i> and <i>Zikr al-Mā'thur</i> in Authentic Hadith)	Dr. Zahazan Mohamed	118	118
6.	<i>Kompilasi Do'a-Do'a daripada Al-Quran</i> (Compilation of <i>Do'a</i> and <i>Zikr al-Mā'thur</i> from Al-Quran)	An-Nawawi	88	88
7.	<i>Do'a daripada Al-Quran dan Sunnah</i> ( <i>Do'a</i> and <i>Zikr al-Mā'thur</i> 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. 1	Case	Definition
	<i>Masalah bercinta/ Berpasangan</i>  (Unlawful relationship issue)	Student involved in a prohibited boy-girl relationship

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**

<i>Do'a</i> and <i>Zikr al- Mā'thur</i> Headings	Counselling Cases
Agar_tidak_tergol ong_dalam_golon ganyang_jahil ( <i>Do'a</i> and <i>Zikr al- Mā'thur</i> to seek refuge from being among the ignorant)	Sukar_ingat_pelajaran (Difficulties in memorising lessons), Susah_faham_pelajaran (Difficulties to understand lessons), Masalah_akademik (Academic issues), Tidak_tahu_membezakan_m ana_yang_boleh_dan_mana_ yang_tidak (Inability to differentiate between what is permissible and what is not), Kurang_pengetahuan_agama (Lack of Islamic knowledge), 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'thur* ontology for counselling.

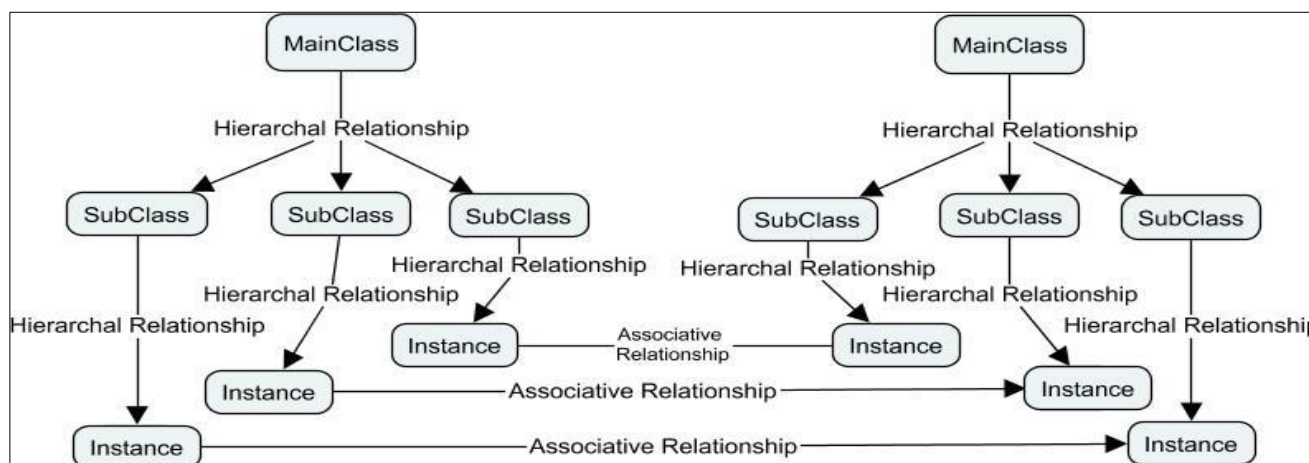


Figure 2. Ontology structure model

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'thur*.

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

Texts of <i>Do'a</i> and <i>Zikr al-Mā'thur</i>	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 Tuhanku, 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

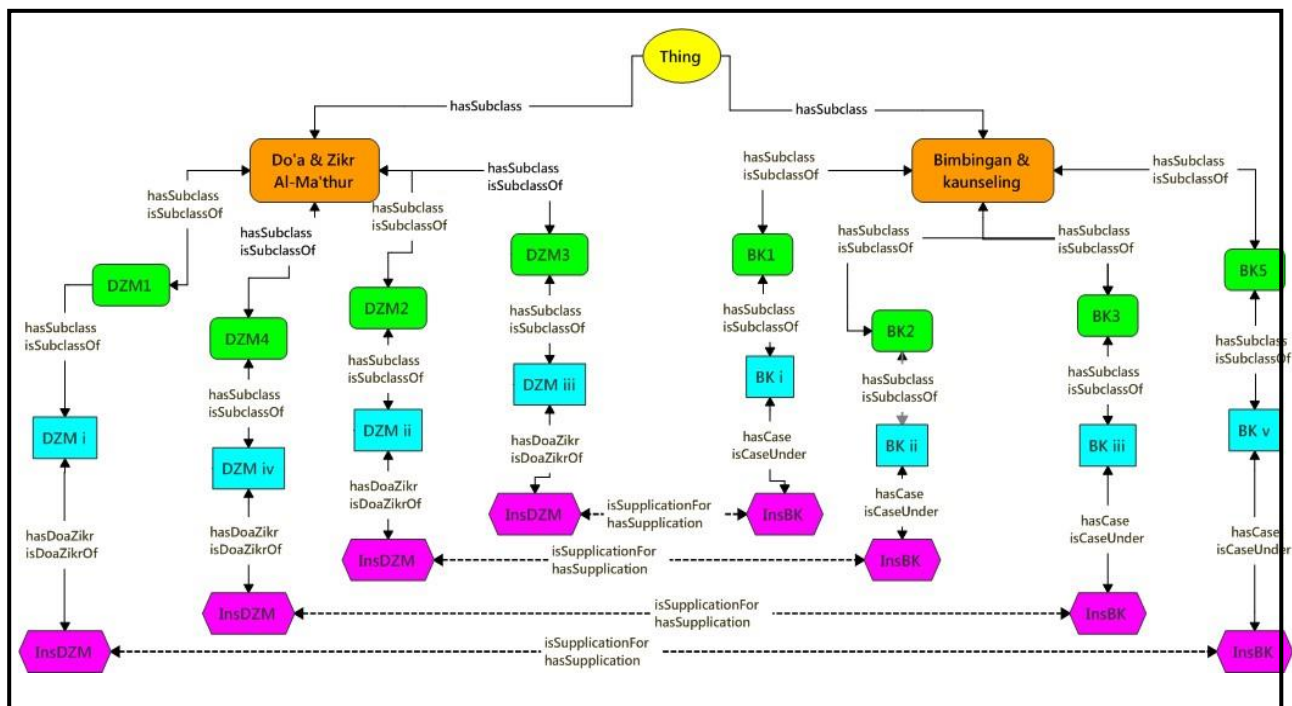
significant role of all relationships within this ontology.

Table 6. List of identified Properties (Relationship)

Properties (Semantic Relationships)	Relationship Description
hasSupplication	Counselling case has a corresponding <i>Do'a</i> and <i>Zikr al-Mā'thur</i>
isSupplicationFor	<i>Do'a</i> and <i>Zikr al-Mā'thur</i> 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-Mā'thur*. The subclasses were built from the *Do'a* and *Zikr al-Mā'thurs* that have the same theme. Therefore, any *Do'a* and *Zikr al-Mā'thur* 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-Mā'thur* ontology informal draft model to further guide the construction of the ontology components and hierarchy.



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

DZM= *Do'a* and *Zikr al-Mā'thur*, BK = *Bimbingan & Kaunseling* (Guidance & Counselling)

Figure 3. Concept and relationship of *Do'a* and *Zikr al-Mā'thur* and counselling in MindManager

Figure 3 shows that *Permohonan* (Invocation) was assigned as one concept under the main classes of *Do'a* and *Zikr al-Mā'thur*. Therefore, any *Do'a* and *Zikr al-Mā'thur* 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-Mā'thur* 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-Mā'thur* 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-Mā'thur* collection. The

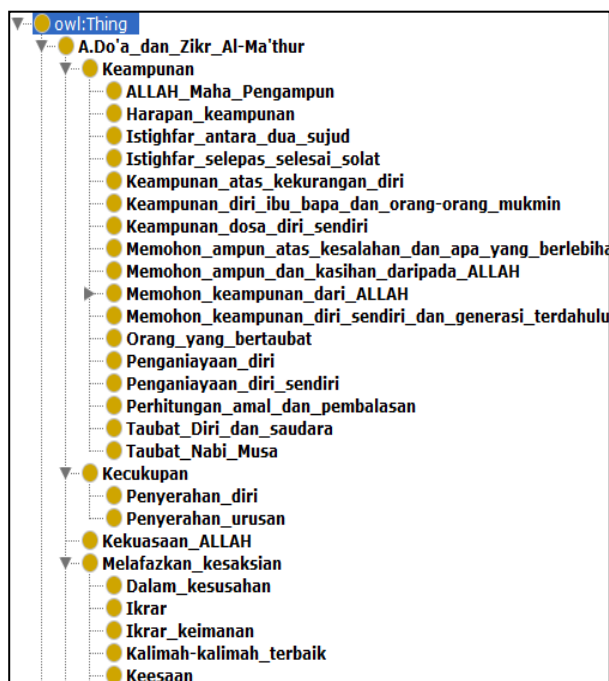
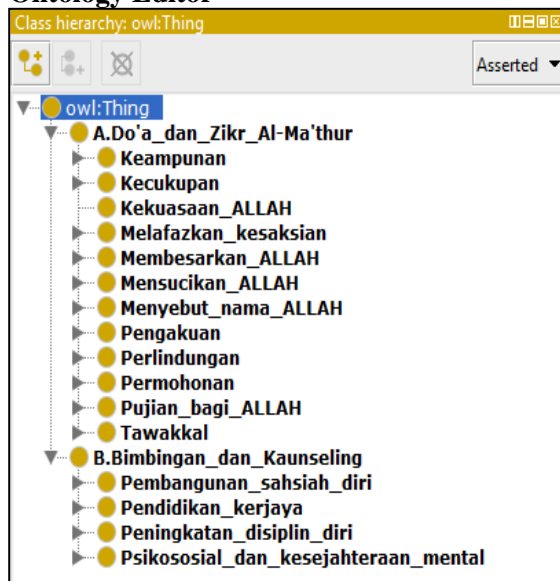
counselling cases were linked to the relevant individuals of *Do'a* and *Zikr al-Mā'thur*. For example, 'Mercuri' (Theft) was linked to the relevant *Do'a* and *Zikr al-Mā'thur* using the inverse relation 'isSupplicationOf' and 'hasSupplication'.

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-Mā'thur*.

If the *Do'a* and *Zikr al-Mā'thur* 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-Mā'thur* 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.



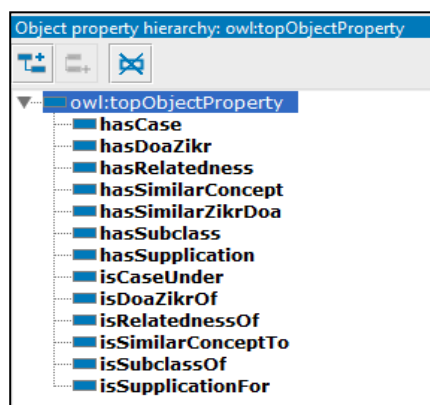


Figure 7. List of object properties created in Protégé Ontology Editor

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'thur*, the involvement of an expert is highly recommended to avoid inaccuracies in semantic representations.

The *Do'a* and *Zikr al-Mā'thur* were validated by the contributing scholars. The ontology for *Do'a* and *Zikr al-Mā'thur* 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'thur*. 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:

**i- Comprehensive:** The number of concepts in the ontology, relative to the average for the entire concept of the ontologies (54).

**ii- 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).

**iii- 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).

**iv- 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).

**v- 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'thur* 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'thur* 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 Sahsia 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).

```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX dzm:<http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#>
SELECT?object
WHERE { dzm:Ketagih_pornografi dzm:hasSupplication?object }
```

**RESULTS:**

[http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya\\_ALLAH\\_aku\\_memohon\\_kepadaMu\\_petunjuk,\\_ketakwaan,\\_iffah\\_\[kesucian\\_maruah\\_d\\_iri\]\\_dan\\_kecukupan\\_harta.\[HR. Muslim\]](http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya_ALLAH_aku_memohon_kepadaMu_petunjuk,_ketakwaan,_iffah_[kesucian_maruah_d_iri]_dan_kecukupan_harta.[HR. Muslim])

[http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Aku\\_berlindung\\_kepada\\_ALLAH\\_\[dari\\_perbuatan\\_yang\\_keji\\_itu\];\\_sesungguhnya\\_Tuh\\_anku\\_telah\\_menjagaku\\_dengan\\_sebaik-baiknya;\\_sesungguhnya\\_orang-orang\\_yang\\_zalim\\_tidak\\_akan\\_berjaya\\_\[Yusuf:23\]](http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Aku_berlindung_kepada_ALLAH_[dari_perbuatan_yang_keji_itu];_sesungguhnya_Tuh_anku_telah_menjagaku_dengan_sebaik-baiknya;_sesungguhnya_orang-orang_yang_zalim_tidak_akan_berjaya_[Yusuf:23])

[http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya\\_ALLAH\\_aku\\_berlindung\\_kepadaMu\\_dari\\_kejahatan\\_pendengaranku,\\_dari\\_kejahatan\\_pandanganku,\\_dari\\_kejahatan\\_lisanku,\\_dari\\_kejahatan\\_hatiku\\_&\\_dari\\_kejahatan\\_air\\_maniku\\_\[Hadith\\_Abu\\_Daud\]](http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya_ALLAH_aku_berlindung_kepadaMu_dari_kejahatan_pendengaranku,_dari_kejahatan_pandanganku,_dari_kejahatan_lisanku,_dari_kejahatan_hatiku_&_dari_kejahatan_air_maniku_[Hadith_Abu_Daud])

[http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya\\_ALLAH\\_Ya\\_Tuhanku\\_sebagaimana\\_Engkau\\_telah\\_memperelokkankan\\_kejadianku,\\_ma\\_ka\\_perelokkan\\_budi\\_pekertiku](http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya_ALLAH_Ya_Tuhanku_sebagaimana_Engkau_telah_memperelokkankan_kejadianku,_ma_ka_perelokkan_budi_pekertiku)

[http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya\\_ALLAH\\_aku\\_berlindung\\_kepadaMU\\_dari\\_akhlak\\_amal\\_dan\\_hawa\\_nafsu\\_yang\\_mungkar\\_\[Hadith\\_Tirmidzi\]](http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya_ALLAH_aku_berlindung_kepadaMU_dari_akhlak_amal_dan_hawa_nafsu_yang_mungkar_[Hadith_Tirmidzi])

[http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya\\_ALLAH\\_ampunilah\\_aku,\\_berilah\\_hidayah\\_padaku,\\_anugerahkanlah\\_aku\\_dengan\\_rezeki,\\_berilah\\_afiati\\_kepadaku,\\_aku\\_mohon\\_perlindunganMU\\_dari\\_kesempitan\\_tempat\\_berdiri\\_di\\_hari\\_akhirat\\_kelak.\\_\[Hadith\\_AnNasaie\]\\_\[Hadith\\_Ibnu\\_Majah\]](http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya_ALLAH_ampunilah_aku,_berilah_hidayah_padaku,_anugerahkanlah_aku_dengan_rezeki,_berilah_afiati_kepadaku,_aku_mohon_perlindunganMU_dari_kesempitan_tempat_berdiri_di_hari_akhirat_kelak._[Hadith_AnNasaie]_[Hadith_Ibnu_Majah])

[http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya\\_ALLAH\\_sesungguhnya\\_aku\\_berlindung\\_kepadaMU\\_dari\\_hari\\_yang\\_buruk,\\_malam\\_yang\\_buruk,\\_waktu\\_yang\\_buruk,\\_teman\\_yang\\_jahat\\_dan\\_jiran\\_yang\\_jahat\\_di\\_tempat\\_tinggal\\_tetapku.\\_\[Hadith\\_AtTabrani\]](http://www.semanticweb.org/user/ontologies/2012/8/untitled-ontology-17#Ya_ALLAH_sesungguhnya_aku_berlindung_kepadaMU_dari_hari_yang_buruk,_malam_yang_buruk,_waktu_yang_buruk,_teman_yang_jahat_dan_jiran_yang_jahat_di_tempat_tinggal_tetapku._[Hadith_AtTabrani])

Figure 8. SPARQL Query results for *Ketagih Pornografi* (Pornography Addiction) case

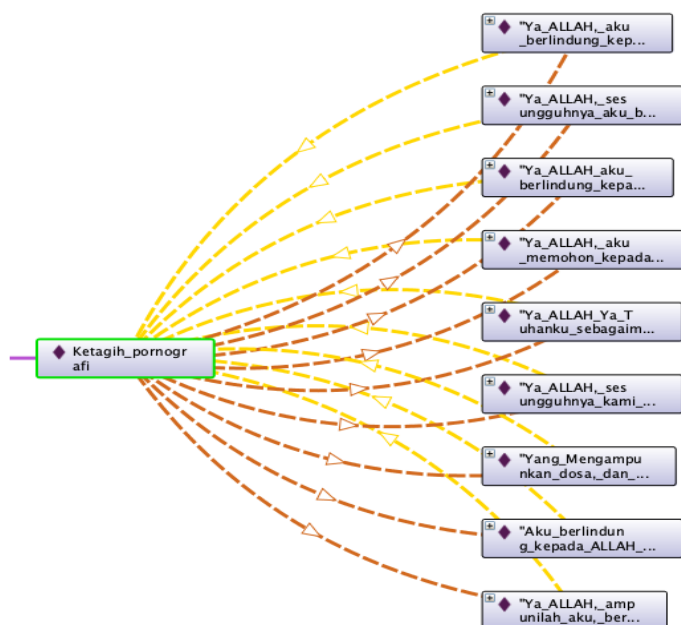


Figure 9. OntoGraf visualisation: Pornography Addiction case and its corresponding Do'a

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-	Percentage of Suitability	
15	86	772	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-Mā'thur* for counselling. This ontology is used as a mechanism to ease the way of finding the right *Do'a* and *Zikr al-Mā'thur* 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-Mā'thur* 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-Mā'thur*. 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-Mā'thur* 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-Mā'thur* 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.

## Acknowledgement:

The authors would like to acknowledge that this project was partially supported under PRGS12-007-007 from the Ministry of Higher Education. The authors would also like to gratefully thank all the participants of this study for their help and cooperation.

## 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 re-publication 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 الماثور

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<sup>2</sup> جامعة اسلام سنيس في ماليزيا

### الخلاصة:

يمكن اقتراح دعاء وذكر الماثور (دعاء أصيل وذكرى الله عز وجل) على المسلمين لمساعدتهم في التعامل مع التحديات أو القضايا في الحياة. تؤثر حالات الاستشارة على مشاعر الشخص. غالبًا ما يتم استخدام دعاء وذكر الماثور كتدخل استشاري. إلا أنه من سوء الحظ ، فإن دعاء وذكر الماثور الأصليتين مشتقتان في العديد من الموارد غير المرئية للمستخدمين ، وحقبة أنه ليست كل الموارد عبر الإنترنت توفر وصولاً دقيقاً إلى دعاء وذكر الماثور للمستخدمين و دعاء المشكوك فيها حيث ذكر الماثور كثيراً ما يُنسب إلى النبي صلى الله عليه وسلم. الهدف من هذا البحث هو تطوير علم الوجود لغرض تقديم نتائج موثوقة لتقديم المشورة للحالات التي تحتاج إلى دعاء وذكر الماثور ذات الصلة. ركز هذا البحث على تقديم طريقة تمكن علم الوجود من دعم تقديم معلومات دقيقة للحالات التي يشرف عليها مستشارو المدارس الثانوية. طور هذا البحث الأنطولوجيا لدعاء وذكر الماثور لتقديم المشورة في بروتيجي. وتضمنت المنهجية التي تم تنفيذها في تطوير علم الوجود النماذج التي صممها فرنانديز لوبيز وآخرون ، وتونكيجيانوكيج ، وجوميز بيريز وآخرون ، وكريدر. تم التحقق من الأنطولوجيا والتحقق من صحتها وتقييمها من قبل خبيرين في مجال الموضوع. تم تصنيف معظم المفاهيم على أنها "متوافقة" والبعض على أنها "متوافقة جزئياً". أنتجت الاستعلامات في سباركل إجابات لأسئلة الكفاءة. وأثبتت التعليقات من تقييم المستخدم أن النتائج المنفذة من علم الوجود "دعاء" و "ذكر الماثور" للاستشارة نجحت في تلبية متطلبات المستخدمين. يوصى البحث بضرورة ضمان استدامة الأنطولوجيا من خلال التقديم المستمر للقضايا الحقيقية من قبل المستشارين والأشخاص الذين لهم أدوار مماثلة لتحليل الاستعلام والنتائج. كما يجب على العلماء الموثوقين تقديم التوجيه للمصادر الجديرة بالثقة. تعتبر هذه المدخلات الأساسية ذات قيمة لإدارة المحتوى وتساهم في عدد قليل جداً من أنطولوجيات المجال التي تقدم الدعم للأعمال المهنية. 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 الدلالية