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MatchApp Innovation to Assist in the Learning of Science, Technology and Engineering

Inovasi *MatchApp* dalam Membantu Pembelajaran Sains, Teknologi (S&T) dan Kejuruteraan

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ABSTRACT

The learning of science, technology, engineering and mathematics (STEM) has, in recent years, been a popular topic of deliberation in the context of the Malaysian education scenario. It pivots on suitable teaching-learning approaches to ensure that students achieve optimum competencies in STEM. The latter is particularly important in the light of Malaysia's aspiration to be a developed nation by 2020. However, research has shown that students face particular challenges in the learning of STEM, especially in learning contexts where English is the main medium of instruction. One such challenge is their inability to comprehend concepts, partly contributed by their weak proficiency in the English language. The problem is further compounded when the majority of STEM students do not have a specialist (technical) dictionaries to help them during their learning. In such a situation, the MatchApp web-based system provides a possible learning platform. Developed for the main purpose of helping the user match English science, technology and engineering terms to the best, context-fitting and appropriate Malay equivalents, we have found that the process of matching can, in fact, double-up as an opportunity for learning. The paper will demonstrate how MatchApp can be utilised to aid learners to understand the senses of words and terms. In this way, they will be able to grasp the concepts intended to be conveyed by the terms, thus eliminating the hurdle in their comprehension and improving their learning process.

Keywords: Malay terminology; terminology matching; concepts and terms; STEM; teaching and learning

ABSTRAK

Pembelajaran sains teknologi, kejuruteraan dan matematik (STEM) merupakan fenomena baharu dalam dunia pendidikan di Malaysia. Fenoneman ini berkisar pada pendekatan pengajaran dan pembelajaran yang sesuai bagi memastikan pelajar mencapai kecekapan yang optimun dalam pendidikan STEM. Pendekatan ini penting untuk menyongsong aspirasi Malaysia mencapai status negara maju pada tahun 2020. Namun, hasil penelusuran kajian lalu mendapati bahawa terdapat kalangan pelajar yang menghadapi masalah dalam memahami konsep tertentu dalam STEM, terutamanya dalam konteks penggunaan bahasa Inggeris sebagai bahasa pengantar. Masalah bertambah rumit apabila sebahagian besar pelajar STEM tidak mempunyai kamus bidang yang berkaitan untuk membantu mereka ketika proses pembelajaran berlangsung. Antara faktor yang menyebabkan pelajar, khususnya pelajar Melayu gagal memahami konsep adalah tidak menguasai bahasa Inggeris yang dijadikan bahasa pengantar dengan baik. Dalam hal ini, MatchApp, sebuah sistem berasaskan web yang dibangunkan untuk membantu memadankan istilah bahasa Melayu, khususnya dalam bidang Sains dan Teknologi juga dapat dimanfaatkan untuk tujuan pembelajaran STEM. Justeru, kajian ini bertujuan mengenal pasti keberkesanan MatchApp sebagai alat bantu mengajar yang dapat digunakan untuk memahami sesuatu konsep dalam bidang yang berkaitan dengan lebih mudah, sekali gus meningkatkan penguasaan mereka dalam bidang tersebut.

Kata kunci: Istilah bahasa Melayu; padanan istilah; istilah dan konsep; STEM; pengajaran dan pembelajaran (P&P)

INTRODUCTION

The prominence of the teaching of science, technology, engineering and mathematics (STEM) has been a recent phenomenon in the world of education in Malaysia, despite the fact that the teaching of these disciplines or subject matter has always been present ever since the country achieved its independence in 1957. STEM education refers to concept-based learning in four main areas of science and technology, engineering and mathematics, through subject-matter integration and application in real-world contexts. This approach is important in ensuring that the government is able to increase the number of its research and industry specialists in STEM to propel Malaysia to its desired developed

nation status by 2020. It is also the aspiration of the Ministry of Education Malaysia that teaching approaches in STEM education focus on activities that are challenging, exciting and meaningful so that more students would be persuaded to choose STEM over other fields of study (Kementerian Pendidikan Malaysia 2016). This would help prepare them to face challenges at the workplace and enable them to become competitive on the global platform.

STEM skills which would involve students to explore, solve problems, design and engage in production activities need to be supported by students' understanding of ideas, concepts, principles and theories in the relevant fields of study. Conceptual understanding is one of the main components in the curriculum that has to be given attention as it is a key element that will enable the student to be more proficient in the subject matter. For example, in the learning of mathematics, the understanding of concepts is very important, as it is the concepts that will give rise to theories and formula that will eventually be applied to relevant situations (Herman Hudojo 2005).

The same in maintained in the learning of chemistry, where students ability to solve problems in the subject is dependent on their ability, tendency and attitude in the learning of terminologies related to concepts in the first place (Sumfleth 1988). As such, the learning has to focus on the understanding of concepts first and foremost, which can be learnt through subject-matter terminologies. Larkin et al. (1980) contends that terminologies play a key role in the teaching and learning process as they are existing knowledge upon which the command of concepts can be acquired more effectively and meaningfully.

CONCEPTS AND TERMS

Concept is a term used to reflect in abstraction an idea, intention or general notion. Cognitive psychologists and philosophers contend that concepts are the basic constituents of thought and belief, which have a functional role in the operation of any intelligent system. It is through concepts that we are able to categorise "things" (Wallis 2015). In other words, concepts may be referred to as (i) person or thing (ii) quality (iii) action, and (iv) position, situation or relationship. Verhoeff (2014) defines concept as "a general idea with a specific focus" (p.2) providing examples of the concept of a number, a set, incidence (in geometry); and compares concept with "terminology" which is defined as "the typical words used in connection with a concept" (p.2).

In fact, multiple definitions of "terms" are available. For instance, *Pedoman Pembentukan Istilah Bahasa Melayu* (PUPIBM 2004) defines "terms" as a word or phrase that encapsulates a specific concept within a particular discipline or profession. A term usually has a specific meaning within its discipline so that it can convey the intended concept, and is semantically stable. *Kamus Dewan* (1994) defines terms as words that have specific meaning in a particular body of knowledge. A more recent edition of the same dictionary (Kamus Dewan 2005) defines terms as words or phrases that refers to something that is correct, accurate and appropriate. Felber, in the work translated by Zahrah dan Salamiah (1995) entitled *Panduan Peristilahan* defines terms as a linguistic symbol that may comprise of a word, string of words or phrase, graphic symbol acronym or notation that represents one or more concepts in a particular fields.

In Malaysia, the task of coining, coordinating and standardising terminology has been given to Dewan Bahasa dan Pustaka[1] (DBP henceforth) (under Dewan Bahasa dan Pustaka Act., Amendment and Extension 1995). In this regard, users are encouraged to refer to DBP before the use of any (new) terminology. To date, DBP has coined and standardised more than one million terms in various fields, both at national and regional levels. In the coining of terms, DBP base its work on international standards *ISO/TC 37* that is related to terminology, the General Guideline on the Coinage of Malay Terminology (*Pedoman Umum Pembentukan Istilah Bahasa Melayu* 1972) and the General Guideline on the Coinage of Malay Terminology New Edition 2004 (*Pedoman Umum Pembentukan Istilah Bahasa Melayu Edisi Baharu* 2004). These guides have been agreed upon by members of the Brunei Darussalam-Indonesia-Malaysia Language Council (Majlis Bahasa Brunei Darussalam-Indonesia-Malaysia; MABBIM). The standards document entails that all terminology work must begin with, and depart from, concepts.

SOME LITERATURE AND PROBLEM STATEMENT

The level of understanding of normally abstract concepts will be enhanced by addressing the concept in the learning process (Effandi Zakaria 2007). A learner is said to have understood a concept when he

or she is able to show functional understanding of the said concept. When a learner is not able to understand the basics of a particular concept, the learner is then not able to apply the concept, thus failing in his/her command of the field. This is because a learner's ability to learn a new concept is dependent on their ability to remember and understand the basic concept associated with knowledge in the field. In this regard, Baker (1991) opines that a learner unable to have a good command of concepts will not be able to solve relevant problems, even when the problems are presented multiple times.

A study by Meor Ibrahim Kamarudin et al. (n.d.) found students' weaknesses in explaining the concept of mole at three levels of thinking, which are at the level of knowledge of terminology, command of concept and problem solving. This has led the student to provide an explanation of the concept that deviates from the scientific concept (as explained in science). Indeed, the importance of having foundational knowledge and understanding of concept is also found in a study on students learning mathematics, where these are imperatives in enabling students to think on how to solve mathematical problems in the classroom and in everyday life (Kesumawati 2008). This idea, in fact, has been mentioned much earlier by Novak & Gowin in their 1985 book "Learning How to Learn", which posits that to make learning meaningful, new knowledge has to be connected and linked to relevant concepts that already exist in the students' cognitive structure. Should the concepts not be present as yet, then the new knowledge learnt will be reduced to only memorisation.

In Malaysia, most STEM terminologies found in use in textbooks and reference materials are in English. This is especially so for tertiary studies. Some universities also conduct their lectures in English, due to this reason (availability of mostly-English reference) and also with the aim of familiarising their students to terminologies relevant to their intended profession, so that they will not face difficulties once they are out in the world of work. What is happening in Malaysia is not very different from elsewhere in some parts of the world. Gasablova (2015) contends that "it is becoming increasingly more common for students to study content through a non-native language, whether in bilingual programmes in their home country or as international students abroad. In these educational contexts, teaching is as a rule delivered by subject (not language) specialists who follow the methodology typical of mainstream classes" (p. 62). As no or very little emphasis is given to the actual language of the subject, students find themselves struggling in understanding concepts and/or technical terms used in the content. In Malaysia, for many students, English is not their mother tongue nor is it their first language. So, when they encounter English terminologies in their studies, apart from having the lecturers explain to them the concept intended by the terms, the students will have to find ways and means to understand the terminologies. For many students in this learning context, "disciplinary vocabulary ... remains one of the most challenging areas" (Gablasova 2015: 62). However, the student has to persevere and find ways on how to learn concepts best, as having clear knowledge of the concept and meaning of subject-specific or technical terms is key to command of the subject (Bravo & Cervetti 2009; Woodward-Kron 2008). The difficulties students have in learning concepts are backed-up by many research which, time and again, have found that students having to learn technical terms or terms that are related to particular discipline face insurmountable difficulties in understanding, learning and using the terms during their studies (Evans & Morrison 2011; Mezek 2013; Lessard-Clouston 2006; Ryan 2012).

Based on the notions mentioned above, and the problem we have mentioned, we explored an alternative that will enable students and even lecturers to overcome the problem through the use of an innovative system we call *MatchApp*. *MatchApp* is a web-based system that has been developed primarily to assist users who use English terminology to "match" the terms with their appropriate Malay equivalence. After some exploration, we found that *MatchApp* can be utilised for the purpose of the learning of STEM-based terminologies.

This article thus aims to describe the *MatchApp* system, and how it may be utilised particularly by STEM-related users for the purpose of understanding concepts. It is hoped that this will provide yet another avenue to enhance the teaching and learning of STEM, and amplify students' knowledge in the relevant fields. While we contend that the system can be used to cater for the learning of STEM, a prerequisite to such a claim is that the database comprises terminologies that relate to and are used in the fields. The current *MatchApp* database, however, comprises terminologies only in the fields of science, technology and engineering. A simple entry procedure will readily allow for the inclusion of mathematics terminology, or terminologies from any other fields or disciplines. However, for the purpose of this paper, we restrict our

explanation based on our current database, which is yet to include mathematical terminologies.

MATCHAPP'S ASSISTING ROLE IN THE LEARNING OF SCIENCE, TECHNOLOGY AND ENGINEERING

MatchApp is a web-based system that has been developed specifically to assist users who use English terminology to "match" the terms with their appropriate Malay equivalence. The matching process is not always straightforward as there are instances where users will be required to coin terminologies. However, *MatchApp* makes this process quicker than the currently existing conventional manual approach and at the same time, ensures that the matching and coinage processes result in equivalent terms that are accurate, aligned to actual meaning and satisfy standards as well as the users' liking (Junaini Kasdan et al. 2016). The system is currently based on approximately 250,000 terms used in engineering, science and technology. All the terms have been standardised by DBP and can be accessed via *http://istilah-frgs.unimap.edu.my/matchapp*. For the development of *MatchApp*, all the terms were first processed. By this, we mean that several steps have to be taken to ensure that the database comprises single word terms. Thus, firstly, multi-word terms were first separated into single words. The separation would lead to the database comprising single words that have been found in the database to form with other words to make up a term. Then spelling errors, which have been present in the original database, and that have resulted from the process of separation were rectified. Table 1 exemplifies the multi-word terms that have been supplied by the DBP standardised database that we have had to separate into single word forms.

TABLE 1. Terms sourced from English and existing Malay matches found in the database

Bahasa Inggeris	Bahasa Melayu
frame analysis	analisis kerangka
frame axis	paksi kerangka
frame building	kerangka bangunan
frame check sequence	jujukan semak kerangka
frame clamp	pengapit bingkai
frame construction	rangka binaan
frame control	kawalan bidang
frame counter	pembilang bidang
frame frequency	frekuensi kerangka
frame grabber	pencekau bingkai
frame line	garis bingkai
frame maker	pembuat bingkai
frame method	kaedah kerangka
frame needle	jarum kerangka
frame number	nombor bidang
frame pointer	penunjuk bidang
frame representation	perwakilan bingkai
frame saw	gergaji bingkai
frame size	saiz rangka
frame spacing	jeda kerangka
frame stiffness matrix	matriks kekukuhan kerangka
frame story	cerita bingkai
frame substitution	gantian rangka
frame synchronizing pulse	denyut penyegerakan kerangka
frame table entry	masukkan jadual bingkai
frame viewfinder	pemidang tilik bingkai
frame weir	sekat kerangka
frame window	jendela berbingkai

The separated terms were also scrutinised for errors in matching (of single English-Malay terms). In matching up the single terms, we have found some multiple entries of the source (English) terms that have multiple Malay matches of the same word. In these cases, we retained only one Malay match. However, different Malay matches for the same English source are retained *in toto*, since they are regarded as different terms. Hence, one English source may be matched to one or more Malay terms, such as the word *frame* in Table 2 below, which has been matched to five different Malay words, resulting in five entries of the word *frame*. An example of the result of data separation is as shown in Table 2.

TABLE 2. Result of the separation of English multiword terms into single terms and their Malay matches

English	Malay
analysis	analisis
axis	paksi
building	bangunan
check	semak
clamp	pengapit
construction	binaan
control	kawalan
counter	pembilang
entry	masukkan
frame	berbingkai
frame	bidang
frame	bingkai
frame	kerangka
frame	rangka
frequency	frekuensi
grabber	pencekau
line	garis
maker	pembuat
matrix	matriks
method	kaedah
needle	jarum
number	nombor
pointer	penunjuk
pulse	denyut
representation	perwakilan
saw	gergaji
sequence	jujukan
size	saiz
spacing	jeda
stiffness	kekukuhan
story	cerita
substitution	gantian
synchronizing	penyegerakan
table	jadual
viewfinder	pemidang tilik
weir	sekat
window	jendela

The new entries of single terms both in the source (English) and target (Malay) language enable the users to coin a new term to refer to a source term that has not been coined by DBP or is present in the latter's database, by matching up existing single words. The benefits of the system for the user at this stage is two-fold: firstly, the user coins a new term appropriate for his/her intention; and secondly, the process of the coinage of a term forces the user to be conscious of the concept(s) underlying the source term which has to be captured in the new target term in order to ensure semantic accuracy. The second benefit, we feel, is additionally useful to help the student understand the concept underlying the terms that she wishes to focus on.

Diagrams 1 and 2 illustrate the work flow within the system in order for us to further understand the innovative process of the model used in the coinage of terms via *MatchApp.*

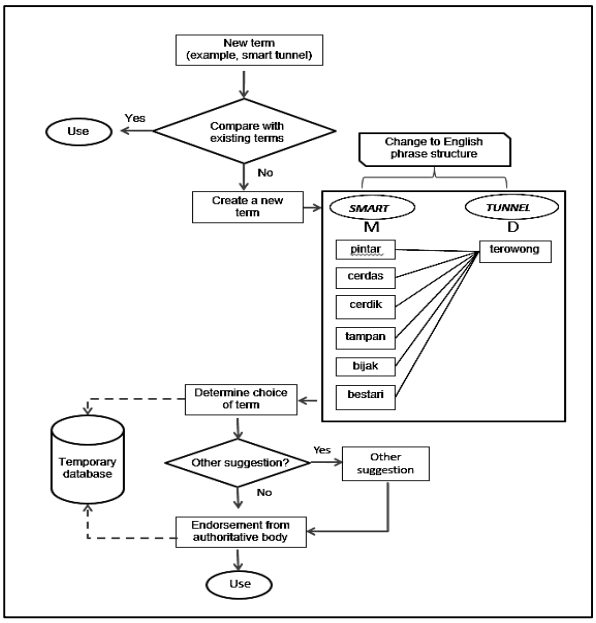


DIAGRAM 1. Workflow of the Malay Terminology Matching System Model (Case 1)

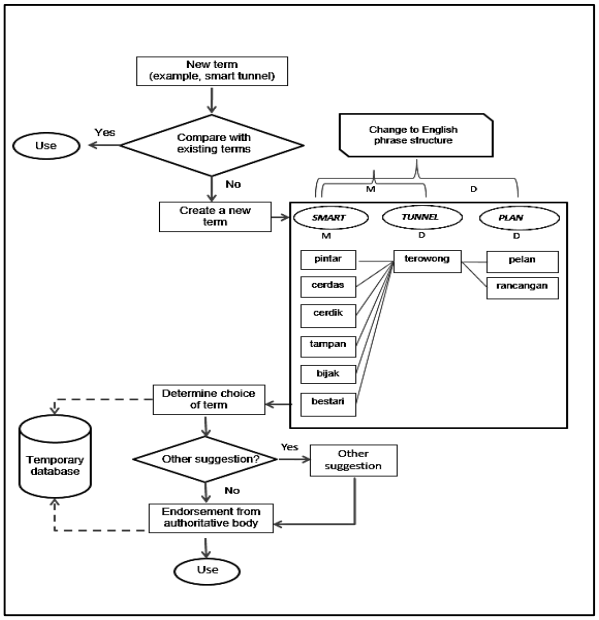


DIAGRAM 2. Workflow of the Malay Terminology Matching System Model (Case 2)

When a user goes to *http://istilah-frgs.unimap.edu.my/matchapp*, she or he will first be greeted by a screen[2] as shown in Diagram 3:

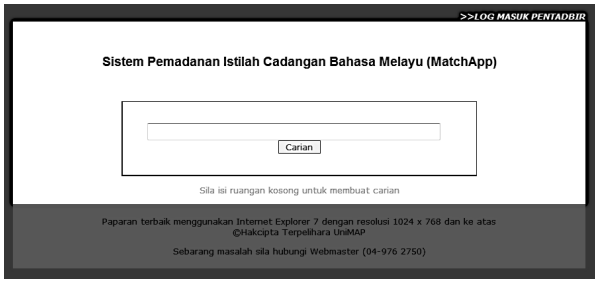
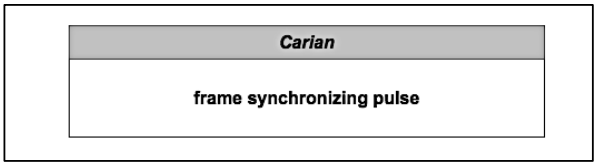


DIAGRAM 3. Main screen of MatchApp

In order to proceed with finding a match for an intended term, the user needs to fill in the search space, leading the system to extract all possible matches that are in the current DBP database. At this stage the user is able to choose from any term that matches the concept of the source term. This process adheres to the guide that has been set by DBP via the General Guideline on the Coinage of Malay Terminology (*Pedoman Umum Pembentukan Istilah Bahasa Melayu* (PUPIBM)), which emphasises on the need to enhance the use of existing terms first (before the coinage of new ones). For example, typing in *frame synchronizing pulse* in the search box will yield the following result once the search button is clicked.



The result that currently exists in the DBP terminology corpus is as shown in Diagram 4, together with details on the concept represented by the terminology (*Huraian*):

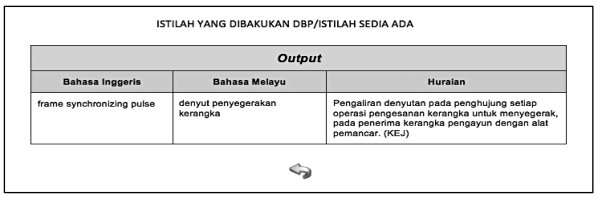


DIAGRAM 4. Search result that includes concept explanation

Through this mechanism, the user, especially students, would be able to find a match for the source term thus making *MatchApp* an online terminology reference. However, a value add of the system is that it enables the user to also obtain further information on the concept conveyed by the term. If used within a classroom context, for terms that already comprise detailed explanation of the concept, a lecturer will be able to perhaps recap on the concept and how it relates to other concepts already learnt in the subject. Based on the example above (*frame synchronizing pulse),* the student would be able to obtain information pertaining to the term in question, such as the time of the pulse '*pada penghujung setiap operasi pengesanan'* and tool used to detect the pulse '*alat pemancar'*. *MatchApp* too can be used as a tool for computer assisted instruction (CAI). CAI is an approach used in the classroom to integrate technology into the teaching-learning process to make it more effective. CAI has been shown to be popular amongst teachers as it is relatively easy to use and is an effective tool in attracting students' attention (Munir Badioze Zaman dan Halimah Badioze Zaman 2000).

The search result above showcases output for terms with detailed explanation of the concept related to the term searched. However, for terms that have not been provided detailed explanation by DBP, the search output will only result in an existing match. For example, for a search on *antisticking agent*, the match found is '*agen antirekat'*. For terms that already have existing matches in Malay, it is highly recommended that the existing terms are used. This is to avoid the coinage of new terms unnecessarily, and to avoid deviations from attempts to standardise terminologies (as intended by our project). The search will result in the following, as shown in Diagram 5:

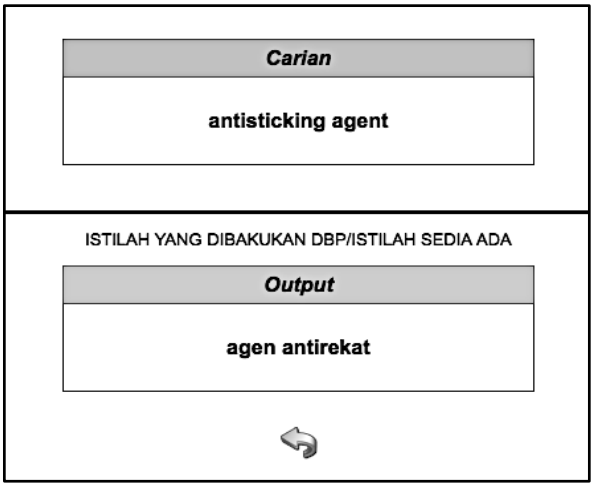


DIAGRAM 5. Search result that does not include concept explanation

For cases such as these, the matching result does not come with explanation of the concept. However, users would be able to identify the intended concept by the clues provided from the terms in Malay. This is especially so for users whose first language is Malay. The terms are usually made up from a number of words, each with its own meaning. Thus, by invoking concepts related to the individual word which they already have existing in their cognition (i.e., the clue), the user would be able to make sense of the new concept that has emerged from the new term they have sourced. By doing so, they would get a better understanding of the source word that they have had to use. For example, for the source term *antisticking agent* in Diagram 5, the match found is *agen antirekat*. From his/her existing knowledge repository, the user would be able to discern that *agen* relates to the concept of "something (person, thing, tool, etc.) that takes certain action", while *rekat* carries the concept of 'sticky or not easily removable or come undone". The user would also know from his/her language experience that *anti* carries the concept of "the opposite". From this processing, which is made possible from the user's existing knowledge, s/he is able to capture the concept for *agen antirekat* and *antisticking agent.*

The *MatchApp* system also allows for multiple matches of a single source term. In cases such as

these, the user has the opportunity to choose the most appropriate term that fits in with the concept intended. But the question is, how would the user know which to choose from if the detailed explanation of the concept is not available? This is again where the user's existing linguistic knowledge of Malay, or his/her first language becomes a very useful source of reference. Take the example in Diagram 6, where the source term entered is *attenuation*. The match yielded three different terms that exist in the DBP original database, which are *pelemahan* (weakening), *pengecilan* (decrease in size) and *pemerosotan* (deterioration). The user has these three words at his/her disposal for choice.

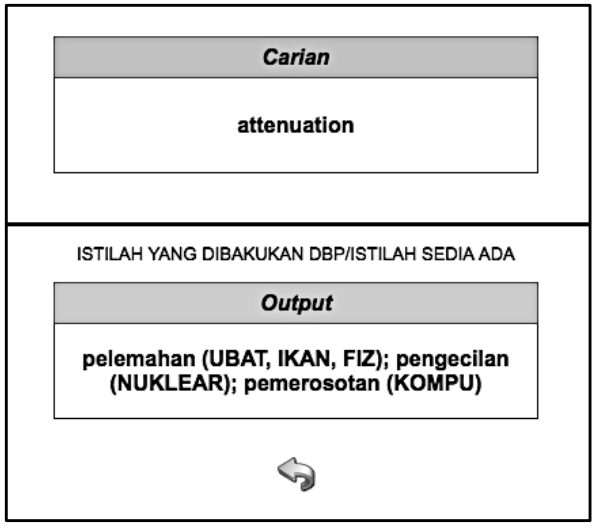


DIAGRAM 6. Search result for source term *attenuation*

Although the detailed explanation for the concept is not provided, the user is able to gather clues from the root words of the Malay single-word terms in order to figure out the concepts intended. The root words *lemah*, *kecil* and *merosot* are words that are encountered on regular basis and thus users would not have any problem in understanding concepts related to them. In addition, the DBP database actually provides the field in which the different matching terms would be usually used (see Output in Diagram 6; e.g., Nuclear (*Nuklear*), Computer (*Kompu*). Thus armed with the context of use, it is relatively easy for the user to decide which corresponding term they should opt for.

However, the task of choosing gets slightly more complicated in one of the two situations: i) when the terms are not in the DBP database; or ii) when multiword source terms are searched for. Take for example, the term *rain attenuation*, which is not in the DBP database, and therefore readily available matches are not available. When *rain attenuation* is entered into the search domain, the *MatchApp* system finds matches for the two items of *rain* and *attenuation* from the science, technology and engineering corpus that we have cleaned. The search yields result as shown in Diagram 7. There is one match to *rain*, and two matches to *attenuation*. While the match to *rain* does not pose a problem (as there is only one match - *hujan*), the user will have to decide which of the two matches of *pelemahan* and *pengecilan* will be more suitable to reflect the source term. In addition to providing the possible matches, the *MatchApp* system also converts the phrase structure to that of the Malay structure. The term *rain attenuation* has been formed pertaining to the English noun phrase structure of head-initial, compared to the Malay structure that takes the form of head-final (which in English becomes *attenuation rain)*. As such, the system then yields the possible terminology matches of *pelemahan hujan* and *pengecilan hujan*. With the provision of possible terminology matches, the user has a more substantial base for his/her choice. Falling back on the context of use of the source terminology, the user would have known that [3]attenuation refers to the weakening of a radio signal (*pelemahan*), rather than a decrease in size (*pengecilan*). The user's existing knowledge of the world will also inform him that radio signals can weaken but they cannot decrease or be decreased in size. While *attenuation* does nothing to the rain, the concepts referred to by the combined words will give a clue to the user as to the best matching term to be chosen, which is *pelemahan hujan*. The choice of the two alternatives, thus, adhere to the General Guideline on the Coinage of Malay Terminology (*Pedoman Umum Pembentukan Istilah* (PUPIBM)), which emphasises on the need to enhance the use of existing terms first (as mentioned in an earlier example).

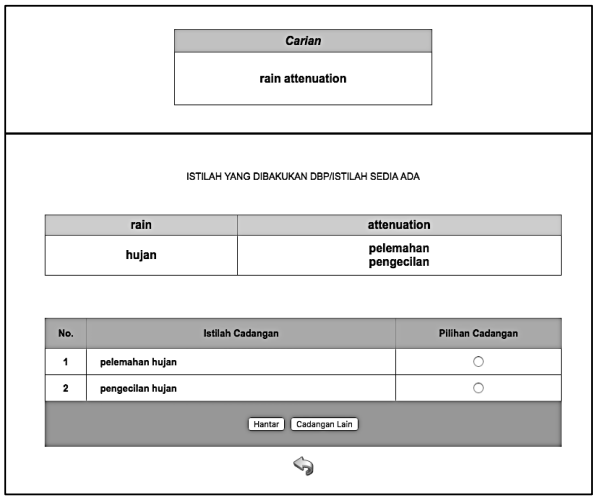


DIAGRAM 7. Search result for source term *rain attenuation*

Nonetheless, should the user feel that neither the options offered by *MatchApp* is suitable for the context that user is working within (or for indeed any other reason), *MatchApp* allows the user to put forth a suggestion for another term. For example, let us assume that the user thinks a more apt term to refer to *rain attenuation* is *penyusutan hujan* (*rain decrease*), or *atenuasi hujan* (*rain attenuation*), then user will need to fill in the necessary information required in the spaces provided, as in Diagram 8[4]:

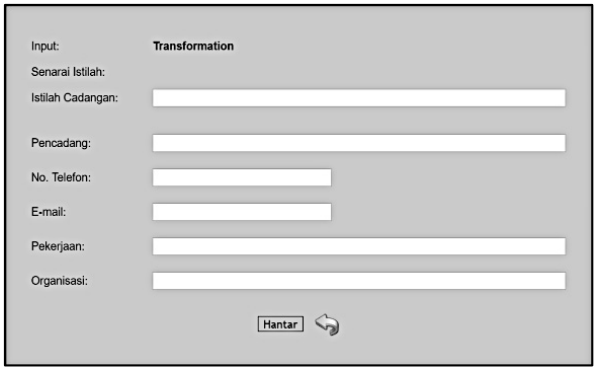


DIAGRAM 8. Screenshot of form for the suggestion of terms

Before the suggested term is allowed to be used, it has to be endorsed by DBP as the body of authority that ensures the standardisation of terms before it is disseminated for use by the general public. Once DBP has endorsed the term (subject to agreement on its suitability), the term will be input into the DBP database, and will thus appear as an option for matches in the next user search. The important point here is that by providing an option for the suggestion of new terms, *MatchApp* forces the user to think carefully about the suitability of the options that user is originally presented with (by default) in the system. Knowing that there is an option of suggestion allows the user to critically evaluate if the concepts as conveyed by the source term are reflected in the matched options, knowing that there is another option if none of the choices given are suitable. This provides learning opportunity for the user.

CONCLUSION

MatchApp is an innovative web-based system that has been developed primarily to assist users who use English terminology to "match" the terms with their appropriate Malay equivalence. However, we have noticed the possibility of its use to assist users in further understanding concepts conveyed by the terms in English. Given that English is not the first language for many students who study STEM, and that the English they would be familiar with is the everyday English for communicative purposes, STEM terminologies would pose a challenge to them in their understanding of concepts conveyed by the terms. Literature has shown that the inability for students to understand concepts can lead to lack of its functional understanding, which in turn would be meaningless.

We have shown how *MatchApp* can be used as a tool to facilitate students, especially, in their understanding of concepts conveyed in science, technology and engineering terminologies. To recap, *MatchApp* assists the student in three ways: firstly, in the simplest way, it serves as an online reference for students of STEM. This is especially in cases where the source terminology is matched with existing Malay equivalences that come with explanation of concepts. Secondly, the matching process forces the user to be conscious of the intended concept. To do this, the user will have to refer to the source context and refer to his/her existing knowledge repository in order to decide on an appropriate match. Finally, for the user whose first language is Malay, the translated terms provide clues on concepts intended by the source language. Again, this is done by the user having to draw upon to his/her existing knowledge repository and mental models.

In short, while *MatchApp* on its own does not provide explanation of concepts (except where definitions are already provided), it "forces" the user to go through a cognitive process to arrive

at a suitable choice, rather than feeds the learner with ready-made solution. This, we feel, provides a platform for a very engaging learning process, contributing to both linguistic and cognitive maturity in learners.

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NOTA

[1] Dewan Bahasa dan Pustaka (DBP) (Institute of Language and Literature Malaysia) is the government body in Malaysia which has been given responsibility of co-ordinating the use of the Malay language and literature in Malaysia. DBP is "a statutory body through the Dewan Bahasa dan Pustaka Ordinance 1959. This granted DBP autonomous power to: (i) formulate specific policies; (ii) organise language and literature construction and development programmes; and (iii) undertake the publishing and sale of books on a competitive basis according to the principles and practices of business and publishing." *(http://laman.dbp.gov.my/lamandbpi/main.php)*.

[2] Translation *Sistem Pemadanan Istilah Cadangan Bahasa* Melayu: Proposed Malay Terminology Matching System. Translation *Carian*: Search.

[3] *Rain attenuation* refers to "the weakening of a radio signal caused by water droplets (rain or fog) in the air" *(http://glossary.westnetlearning.com/)*.

[4] The user fills his/her suggestion in the space "*Istilah Cadangan*" (*Suggested terms*). Other domains require information such as the name of person who suggests the term, his/her contact details and organisational details.

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