Design and Implementation of a Web directory for Medical Education (WDME): a Tool to Facilitate Research in Medical Education

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Background: Access to the medical resources on the web is one of the current challenges for researchers and medical science educators. The purpose of the current project was to design and implement a comprehensive and specific subject/web directory of medical education.

Methods: First, the categories to be incorporated in the directory were defined through reviewing related directories and obtaining medical education experts’ opinions in a focus group. Then, number of sources such as (Meta) search engines, subject directories, databases and library catalogs searched/browsed for selecting and collecting high quality resources. Finally, the website was designed and the resources were entered into the directory.

Results: The main categories incorporating WDME resources are: Journals, Organizations, Best Evidence in Medical Education, and Textbooks. Each category is divided into sub-categories and related resources of each category are described shortly within it. The resources in this directory could be accessed both by browsing and keyword searching. WDME is accessible on http://medirec-tory.org.

Conclusions: The innovative Web Directory for Medical Education (WDME) presented in this paper, is more comprehensive than other existing directories, and expandable through user suggestions. It may help medical educators to find their desirable resources more quickly and easily; hence have more informed decisions in education.

Key words: medical education, web directory, resources, research, metadirectory, knowledge base.

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1. INTRODUCTION

Medical educators are expected to look for the best educational interventions based on the current evidence, to improve student’s competency as well as patient care and community health (1,2). In recent decades enormous numbers of researches have been published in the field of medical education and “The educational community is becoming aware of the importance of evidence in educational decision making” (3). Access to these researches and other scientific resources is one of current challenges for researchers and medical science educators. Core bibliographic databases like MEDLINE, EMBASE and CINAHL as biomedical databases, ERIC and BEI as educational databases, and PsycINFO as a psychology database, have covered medical education evidences to some extent. But, none of them have covered medical education evidences in a special and comprehensive way (4). Therefore, one should use different databases to find evidences.

In addition to the above mentioned databases, there are few keyword databases in databases in medical education, among them “Research and Development Resource Base (RDRB)” is the most important. This database, hosted at the University of Toronto, includes a collection of literature for 3 distinct yet inter-related fields: Continuing Education & Knowledge Translation, Inter-professional Literature and Faculty Development (5). Another database is “Medical Education Citation Database” that contains the records for 6000+ reprints of journal articles, newsletters, book excerpts, and conference proceedings dealing with all aspects of medical education (6). Like core bibliographic databases, these databases are not comprehensive.

There are also other useful resources in the field of medical education on the World Wide Web where the researchers and medical science educators should have access to them. But, like in other scientific field, being informed about the existence and address of these resources matters to most audiences, as by using general search engines (like Google), many incorrect and irrelevant information may be retrieved. These two problems bring challenges in retrieval of relevant and reliable resources on the Web (7). Generally, three main tools are used to find and access resources on the web:
Search engines, Meta-search engines and Subject directories (8). Search engines and Meta-search engines are the most important tools to access the Web resources (9). Since indexing process in these tools is performed by Spider software and without human intervention, the resource quality is not controlled (10); consequently, the irrelevant and unqualified records could be retrieved.

Subject or Web directories are another tools to find and access the information on the Web. A subject directory is a collection of sites and webpages that is selected and categorized by human/experts (11). “Subject directories are smaller than other searchable databases, because of the human involvement required to classify documents by subject” (12). The resources in the subject directories could be accessed by means of two methods of browsing and keyword searching.

Subject directories are divided into two general and specific categories. Two of the famous general subject directories are "Open Directory Project" (http://www.dmoz.org/) and "Yahoo! Directory" (http://dir.yahoo.com/) which have introduced few medical education resources (13, 14). There is another type of evaluated subject directories known as “internet libraries” that is better than DMOZ and Yahoo Directory from the aspect of selection criteria and information accessibility. INFOMINE (http://infomine.ucr.edu/) and IPL (http://www.ipl.org/) are two famous of them that cover few medical education resources. Specific subject directories just focus on one aspect of human knowledge or expertise such as Medical Matrix (http://www.medmatrix.org/) which provides ranked, peer-reviewed, annotated and updated clinical medicine resources. We discovered that there is no subject directory of medical education on the Web according to our comprehensive search, although there are some projects and organizational websites that provide limited lists of medical education resources:

Foundation for Advancement of International Medical Education and Research (FAIMER): this foundation has collected useful resources in the field of medical education for researchers in “Useful Link” menu. These resources are organized in following categories: Associations and Organizations, Global Health, Resources for Health Professions Educators, Health Workforce and Migration, Journals and Meetings (15).

Association for Medical Education in Europe (AMEE): this association as an international association for medical education has listed some useful resources in the section of "LINKS & RESOURCES" (16).

MedEdCentral: it is unique international database in medical education that is developed in Wiki principle and collaborative authorship. Medical education resources are divided into some categories such as Assessment, curriculum planning and evaluation, teaching and learning, and Evidence-based Teaching (17).

MedEdWorld: as a global online medical education community provides a gateway for sharing of information, identifying good practice, accessing learning resources and providing international collaborative learning opportunities for students and faculty (18).

Related associations and other medical education centers also try to collect some useful resources in medical education (19, 20, 21, 22).

As mentioned above, a comprehensive and specific subject directory in medical education has not developed yet, so the purpose of current project was to design and implement a comprehensive and specific subject/web directory of medical education. In this paper, its design and implementation is explained and the product is described.

### TABLE 1. Five main categories and their sub-categories in Web Directory of Medical Education

<table>
<thead>
<tr>
<th>Main categories</th>
<th>Sub-categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journals</td>
<td>Medical and Health Science Education</td>
</tr>
<tr>
<td></td>
<td>General Nursing &amp;Midwifery Special Disciplines</td>
</tr>
<tr>
<td></td>
<td>Dental Pharmacy &amp; Pharmacology</td>
</tr>
<tr>
<td>Higher Education</td>
<td>Assessment</td>
</tr>
<tr>
<td></td>
<td>Curriculum Planning and Development</td>
</tr>
<tr>
<td></td>
<td>Learning and Teaching General</td>
</tr>
<tr>
<td></td>
<td>IT in Education</td>
</tr>
<tr>
<td></td>
<td>Other Journals</td>
</tr>
<tr>
<td>Organizations</td>
<td>Medical Education Organizations</td>
</tr>
<tr>
<td></td>
<td>Assessment and Evaluation</td>
</tr>
<tr>
<td></td>
<td>American Board of Medical Specialties</td>
</tr>
<tr>
<td></td>
<td>Others</td>
</tr>
<tr>
<td>Textbooks</td>
<td>General Assessment and Evaluation</td>
</tr>
<tr>
<td></td>
<td>Curriculum Studies</td>
</tr>
<tr>
<td></td>
<td>Learning and Teaching Others</td>
</tr>
<tr>
<td></td>
<td>Others</td>
</tr>
<tr>
<td>Best Evidence in Medical Education</td>
<td>About BEME Assessment Teaching and Learning Methods Inter-professional Education Continuing Medical Education Communication skills Others</td>
</tr>
<tr>
<td>Medical Education in Iran</td>
<td>Directory of Universities Organizations Databases EDCs Books Journals</td>
</tr>
</tbody>
</table>

### 2. METHODS

At first step, the categories to be incorporated in the directory were defined through focus group with medical education experts and other directories review. The second step included searching, collecting and selecting of resources. For searching resource, we typically used six categories of sources:

A) Search engines: 1. General search engines (Google, Yahoo and Bing), 2) Scientific search engines (Google Scholar and Scirus),

B) Meta-search engines (Mamma and Dogpile),

C) Subject directories: 1. General subject directories (DMOZ, Yahoo Directory, INFOMINE and IPL), 2. Specific subject directories (Medical Matrix),

D) Databases: 1. Core bibliographic databases (PubMed/MEDLINE, ERIC
and BEI), 2. Keyword databases (RDRB),
E) Library catalogs (Library of congress cat-
alog, National library of medicine (NLM) and National Library of Iran),
F) Professional organizations (AMEE, SDRME, FAIMER, IIME ...),
G) Periodicals directories (UlrichWeb and Journal Seek) and
H) Other (Amazon and Google Books).
These sources searched by using fol-
lowing keyword or com-
bination of them: medical education, assess-
ment/evaluation/measurement, learning, teaching, courses, asso-
ciation, curriculum.
The third step, de-
sign of website, was per-
fomed by web designer and researchers. In this step two appropriate do-
main (medirectory.org/ medirectory.ir), host-
ing and content manage-
system (CMS) were selected. Then, the resources were entered into the directory.

3. RESULTS
The web directory of medical education or-
ganized in the following 11 categories: Journals, Organizations, Degree Programs and Courses on Medical Education, Assessment and Evaluation, Textbooks, Data-
bases and Directories, Best Evidence in Medical Education, Conferences and Meetings, Learning and Teaching Centers/Medical Education Centers, Glossary of Terms, and Medical Education in Iran. Each of these categories is divided into sub-cat-
egories (Table 1). For example the sub-
categories of “Textbooks” are General,
Assessment and Evaluation, Curricu-
um Studies, Learning and Teaching and Others.
Related resources of each category are described shortly within it, for ex-
ample the description for “Journal of Nursing Education” is presented in Figure 1.
The resources in this directory
could be accessed by means of two
methods of browsing and keyword
searching. Both simple and advanced
searches can be performed (Figure 2).
It is possible to Submit a useful re-
sources by users thorough “Suggest a
Resources” form as is shown in Figure 3.
Other sections of this directory are:
“References” (Sources that have been
used in the WDME), “Help” (Guide for
the use of WDME) and “About us” (In-
formation about the WDME and its de-
velopers)

4. DISCUSSION
The WDME with 10 categories and
more than 50 sub-categories tries to
collect and organize useful medical edu-
cation resources in a specialized and
comprehensive manner. In compari-
son with other directories and sources,
this directory has some differences. The
number of resources that introduced by
FAIMER is very less than the WDME, and also resources have not been de-
scribed (15). But, in our directory each
resource was described shortly for read-
ers. In AMEE (16), resources have not
been described, and these resources
collected under only three categories
(Associations, Journals and Useful da-
tabases and sites). Resources in MED-EDCENTRAL have been described but
are not comprehensive (17); therefore,
the WDME seems to be more com-
prehensive and more specific than all of
them.
In general, the highlighting advan-
tages of this directory are specificity
(this directory dedicated only to med-
cial education), comprehensiveness
(the resources covered in this directory
are more comprehensive than previous
sources), high accessibility (the re-
sources could be accessed by means of
two methods of browsing and keyword
searching), being user friendly (appear-
ance of the directory is simple and easy
to use) and descriptiveness (each re-
source in this directory is well-de-
scribed). Providing the opportunity for
users and visitors to suggest new sites
for addition in WDME will help it to re-
main live and developing.
The WDME has some limitations.
Most of these limitations go back to the
constitutional limitations of “Subject
Directories”: a) Database size of sub-

Figure 1. Description format of Journals

Figure 2. Advanced Search Box

Figure 3. “Suggest a Resource” Form
ject directories is very small in comparison to search engines; b) Indexed sites and resources in subject directories are usually updated with delays; c) Because these directories are collected by human, there may be potentially useful yet ignored sites and resources and d) Maintenance and updating costs are high.

The other limitation for WDME is less flexible programming that is due to using pre-designed scripts as software of the directory. Of course the data base of WDME has the capacity to be transferred to a dedicated and special software, if it received enough support for programming. Continuous evaluation and feedback from users is essential for further development of WDME, as more researches could provide better evidences for its effectiveness, specificity and utility in the real application.

5. CONCLUSION

The innovative Web Directory for Medical Education (WDME) presented in this paper may help medical educators to find their desirable resources more quickly and easily; hence have more informed decisions in education. Its further development could be facilitated by continuous feed back and research as well as scientific and logistics support from related organizations.

Conflict of interest: none declared.

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