

Open access repositories on open educational resources: feasibility of adopting the Japanese model for academic libraries

URL	http://weko.wou.edu.my/?action=repository_uri&item_id=531
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OPEN ACCESS REPOSITORIES ON OPEN EDUCATIONAL RESOURCES : FEASIBILITY OF ADOPTING THE JAPANESE MODEL FOR ACADEMIC LIBRARIES

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Abstract

The increasing proliferation of technological strategies including open sources and commercial licence softwares, are causing librarians to take a bold step in redefining their professional roles in this information and communications technology (ICT) savvy society. Triggered by the advancement of ICT, open access repositories (a variant of digital libraries) is one of the important changes impacting library services. While most institutional repositories' content is scholarly and intellectual, the degree of openness provided to the wider community to access their resources forms an entry point to open knowledge.

It is in this context that Wawasan Open University Library initiated a research project to build open access repositories on open educational resources (ROER). Open educational resources (OER) is an area of a multifaceted open movement in education. The purpose of this paper is to show how two web portal repositories on OER materials were developed adopting a Japanese open source software, called WEKO. The design approach is based on a pull to push strategy whereby metadata of scholarly open access materials kept within the institution and network communities digital databases were harvested using the Open Archives Initiatives Protocol for Metadata Harvesting (OAI-PMH) method into another open knowledge platform for discovery by other users. Positive results emanating from the University open access repositories development showed how it strengthen the role of the librarian as manager of institutional assets and successfully making the content freely available from this open knowledge platform for reuse in learning and teaching for the institutional benefit and network communities of practice in OER.

This paper also describes future collaboration work with local and regional institutions in sharing their open access resources, hence creating knowledge sharing across institutions even though it is just metadata sharing. In conclusion, this paper provides insight for academic libraries on how open access repositories development and metadata analysis can enhance new professional challenges for information professionals in the field of data management, data quality and intricacies of supporting data repositories and build new open models of collaboration across institutions and libraries.

Keywords : Academic library; Repository; Open Educational Resources; Open source software; OAI-PMH interoperability; WEKO

Introduction

The sharing of knowledge and information, particularly through information and communications technology (ICT) have a significant impact on people's lives. According to UNESCO (UNESCO, n.d., para. 2), open access, open data and crowdsourcing [this is not an open source production but a problem-solving model, opens to an online community through the Internet] platforms, and open educational resources [*also referred to as OER*] enable information to be freely and legally shared, providing strategic cross-cutting opportunities to improve the quality of decision-making as well as facilitate policy dialogue, knowledge sharing and capacity building.

The concept of OER movement emerged in the late 20th century with the development of open and distance learning amidst a culture of open knowledge, open source, free sharing and peer collaboration (Karunanayaka & Naidu, 2014). OER as defined by UNESCO (UNESCO, n.d., para. 3), provides teachers and learners with high quality teaching and learning materials that allow for free use, adaptation, and distribution. With the advancement of ICT, it has reshaped the landscape of academic libraries as well, thus libraries really have to redefine their functions, roles and services in order to stay relevant in this new landscape of the future (Liau, 2011). Such development can be perceived as a threat whereby the traditional libraries can become redundant amid the new emergence of technologies or an opportunity to improve and fulfil users' information needs. The major impact of the advancement of ICT in this open knowledge movement has also opened up users to the world of freeware and open source software easily available from everywhere. Today, many libraries rely on freeware and open source software to manage many of the daily operations work (Corbly, 2014).

Institutional repositories can be seen as a species of digital libraries and it is also an aspect of a trend where librarians are moving into publishing to offset what is perceived as their shrinking conventional role (Adolphus, 2014). Institutional repositories is a strategic move for libraries to support educators in searching, sharing, reusing of existing contents and creating additional resources through collaboration with other institutions in a structured way

This paper discusses the development and experience of building repositories on OER (ROER), a research project carried out by the Wawasan Open University (WOU) Library in February 2014, in collaboration with the National Institute of Informatics, Japan and the Open University of Japan. The research, which was a part of the University's Open Educational Research Initiatives which started in year 2012, focused on the involvement of the Library as an organizational unit, and of individual librarians and other information technology staff to set up two web portal repositories using the Japanese open source software, called *WEKO*. The outcome of this research project contributes to the current repositories called WOU OER Repository (<http://weko.wou.edu.my>) and OER@AsiaHub (<http://oerasia-repository.wou.edu.my>).

Being the first non-Japanese user of this open source software, the paper aims to share the experiences gained from conducting the research project. The repositories developed are far from an ideal implementation of institutional repositories, as more effort is needed to promote awareness and generate interest from prospective stakeholders in the community to contribute their institutionally produced open educational teaching or learning contents and disseminate open knowledge resources.

Current analysis of open access repositories in Asia

*OpenDOAR*¹, an authoritative directory of open access repositories, developed by University of Nottingham, United Kingdom, shows the contribution of top five continents worldwide from a total of 2,958 repositories (as at 31 August 2015). This is depicted in *Table 1*.

Table 1. Repositories distribution by continent

No	Region	No. of repositories	%
1	Europe	1,304	44.1
2	Asia	595	20.1
3	North America	571	19.3
4	South America	260	8.8
5	Africa	128	4.3

Repositories by region

In terms of number of repositories, the results revealed that Asia, shared second ranking having 595 repositories. A research study on open access repositories carried out by Fayaz (2014), stated that during that period Asia region share of repositories was 400 repositories out of total 2,299 and this number has increased to another 195 (49%).

Repositories by country

In comparison of repositories by countries in the Asia region, *Table 2* below shows that Japan contributed the highest number of repositories (189, 31.8%), followed by India (70, 11.8%) and thirdly Turkey (62, 10.4%). The Japanese institutional repositories can be accessed both individually or collectively through a single web portal called JAIRO (Japanese Institutional Repositories Online), using JAIRO Cloud² computing facility. The number could be higher (Adachi, n.d.). as many of the institutional repositories in Japan have not registered with *OpenDOAR*. According to Yamaji (2014), current number of institutional repositories in Japan is 478, whereby 184 (38%) are using JAIRO Cloud, and 294 (62%) are by university own development.

Table 2. Repositories by country in Asia (595)

No	Country	No. of repositories	%
1	Japan	189	31.8
2	India	70	11.8
3	Turkey	62	10.4
4	Taiwan	58	9.7
5	Indonesia	46	7.7
6	China	40	6.7
7	Korea, Republic of	28	4.7
8	Malaysia	21	3.5
9	Others	81	13.6

¹ *OpenDOAR* – Directory of Open Access Repositories. Retrieved from <http://opendoar.org/>

² JAIRO Cloud – Retrieved from <https://community.repo.nii.ac.jp/>

Repositories by software used

The open access repositories movement has created three main players of open source software. They are *Dspace* (Massachusetts Institute of Technology and Hewlett Packard), *Eprints* (University of Southampton) and *Fedora* (Cornell University) (Adolphus, 2014). The most popular software being used to design and manage their contents is *Dspace* (367, 61.7%), *Eprints* (82, 13.8%) and *WEKO* (39, 6.6%), as shown in *Table 3*.

Table 3. Softwares used in Asian repositories (595)

No	Software	No. of repositories	%
1	DSpace	367	61.7
2	Eprints	82	13.8
3	WEKO	39	6.6
4	Others	82	13.8
5	Unknown	25	4.2

Due to the great strides made by the open access movement, Malaysia is also becoming an active contributor establishing institutional repositories and open access archives for use of academic and research communities. However the movement and visibility can be considered low. From the 21 repositories (*Table 2*) where Malaysia is ranked at the eighth position (3.5%), 15 are using *Eprints* software (71.4%), followed by *DSpace* (4, 19.0%), *Greenstone* (1, 4.8%), and *unknown software* (1, 4.8%). Currently there is no contributor in Malaysia using the Japanese open source software, *WEKO*.

Table 4. Open source softwares usage in Malaysia (21)

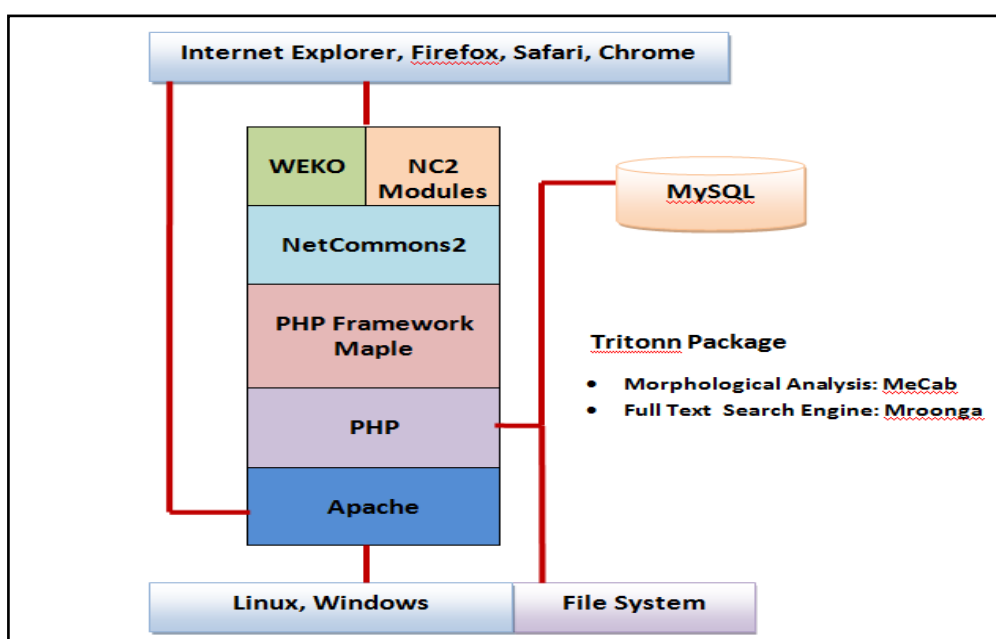
No	Software	No. of repositories	%
1	Eprints	15	71.4
2	DSpace	4	19.0
3	Greenstone	1	4.8
4	Unknown	1	4.8

Open source software WEKO infrastructure

Spurred by the progress made by repositories on open educational resources (ROER), developed from worldwide repository initiatives, and the realisation that the University needs to embrace open educational practices, the WOU Library initiated its own ROER development project adopting the Japanese open source software, called *WEKO* (a Swahili word meaning repository) as the platform. The creation of the OER institutional repository and the other offshoot, which function as a federated repository for OER Asia network community are aimed at promoting awareness, creation, reuse and sharing of OER among educators in the local and regional institutions, especially for institutions who do not have a repository system.

WEKO platform uses an AJAX-oriented content management system called NetCommons (NC) for effective repository web design. *Figure 1* depicts the system architecture of NetCommons and *WEKO* components. The NetCommons was developed by the National Institute of Informatics in Japan for use by educators. According to Yamaji, Aoyama and Takeda (2009), *WEKO* is an open source software under the New BSD (Berkeley Software Distribution) license. The system is written in PHP scripting language, rendering it OS-independent.

Figure 1. NetCommons and WEKO system architecture (Adapted from Yamaji, 2014)



The NetCommons2 is an information sharing system which acts as a Content Management System, Learning Management System and Groupware. MySQL is used as a relational database backend for storing data from NetCommons and also WEKO. The operating system used can be Linux or Windows and for WOU, Linux CentOS platform is being used.

The following Table 5 depicts the minimum hardware specifications required in order to run the WEKO application. The installation information related to WEKO software can be accessible from the following website developed by the National Institute of Informatics, Japan - <https://meatwiki.nii.ac.jp/confluence/display/WEKO/Installation>

Table 5. Hardware minimum requirements

Operating system	CentOS 6.5
Memory	2 GB
CPU Processor	1 x
Hard disk	50 GB

From the above Figure 1, WEKO stored contents are found in the MySQL and the tools available will create and process the stored content including via metadata harvesting complying to the Open Archives Initiatives Protocol for Metadata Harvesting (OAI-PMH). The content is the heart of WEKO repository in the overall architecture. Other end user services such as searching, repository access allow users and applications to access the stored content.

WEKO other core functions and features include the mechanism to define tree-structure indexes, identify, store, retrieve, import and export digital objects. The search engines, web report statistics analysis and language utilities are also supported. The web modules allow interface customization according to user needs by using the NetCommons2 add-ons modules. The administrative menu provides other general settings and allows single and harvesting multiple deposits of objects. Another useful feature is it supports and is able to translate repository's interface headings labels into ten

languages such as Bahasa Melayu, Cantonese, English, Japanese, Chinese, Hindi, Indonesia, Tagalog, Thai and Vietnamese.

Development of WEKO-based repositories of OER

Chadwell and Sutton (2014) stated that since the 1990s, the development of institutional repositories throughout the world have been monopolised by academic libraries. Among the benefits of having institutional repositories are centralised storage of scholarly output of the University, maximises visibility of output, immediate access to full-text resources, long term archiving and preservation, convenient and easy access to materials, as highlighted by Raseroka and Mutula (2012, p.140).

The following pages of this paper briefly describe the two WEKO-based repositories of OER developed by the Library.

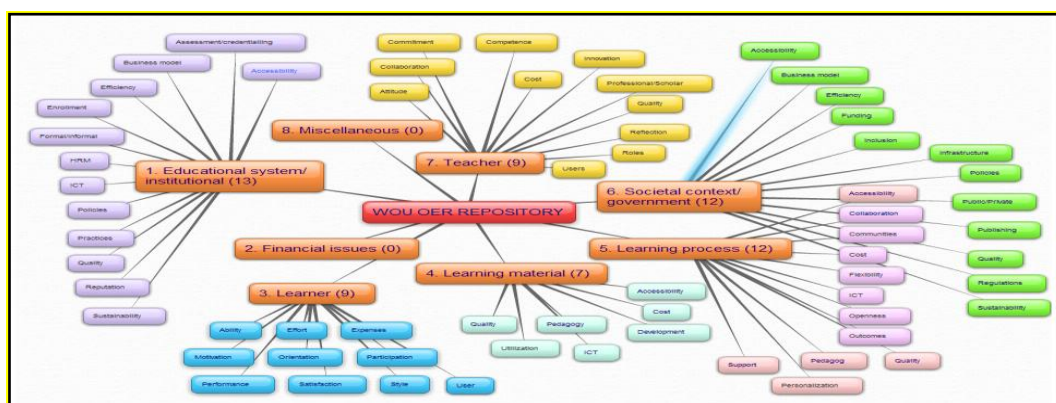
i. WOU OER institutional repository

The approach used to build the content of WOU institutional repository (<http://weko.wou.edu.my>) (*Appendix-Figure 4*) is based on a pull to push strategy whereby metadata information from other open access repositories are collected using the OAI-PMH method into another open knowledge platform for easy retrieval by other users. In compliance with OAI- PMH, this repository supports the interoperability issues. The URL *weko.wou.edu.my* provides information about the University's OER collection, learning objects metadata and other learning materials outputs. Many of the records consist of full-text materials including accompanying images to make the resources more informative and interesting. This repository not only provides an archival function for University's OER outputs but also reflects the University support and contribution to OER movement. Abiding by the University's Open Licence Policy (WOU, 2012. p.3), the repository scope of content is narrowed to Schools and departmental scholarly output such as course materials and research papers. This includes corporate and personal authorship. The open licence model adopted is the *Attribution-Non-Commercial-ShareAlike* (CC BY-NC-SA)³, which means that this licence allows others to remix, tweak, and build upon our work for non-commercial purpose, as long as they credit the author and licence their new creations under the identical terms.

The URL *weko.wou.edu.my* categorised its content according to several subject classification themes (parent tree) and sub-themes (child tree) to facilitate searching and retrieval of records, as shown in *Figure 2*. Record category tagging is done in line with the University library data classification requirement.

³ Creative Commons licenses – Retrieved from <http://creativecommons.org/licenses/>

Figure 2. WOU OER repository collections mapping by themes



Based from the *WEKO* webreport usage statistics tool in the repository’s learning objects, it has showed a significant contribution that the Library has made on the Internet “marketing” to increase University’s visibility.

ii. Federated repository OER@AsiaHub

Another important aspect of institutional repository, which is often overlooked is its potential to function as a collaborative platform (Liauw, 2011) for open educational or open access communities. Clifford Lynch (2003), a pioneer in institutional repositories matter defines institutional repository as :

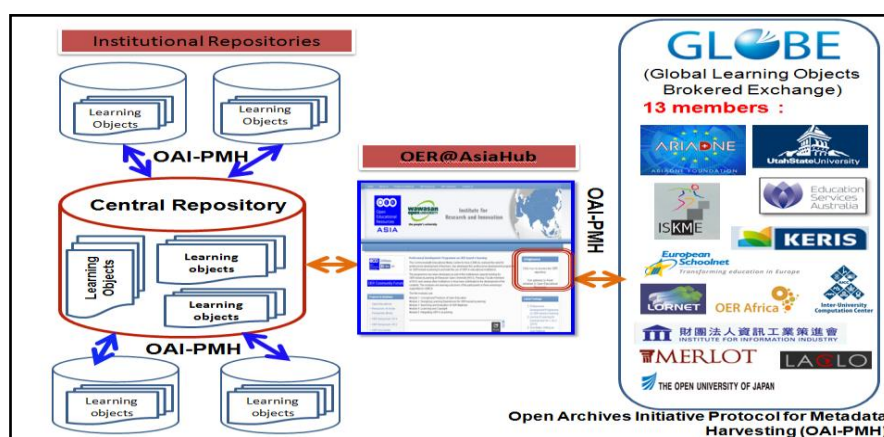
*“a university-based institutional repository is a **set of services** that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members. It is most essentially an organizational commitment to the stewardship of these digital materials, including long term preservation where appropriate, as well as organization and access or distribution”* (Lynch, 2003, p.2).

Thus, the “set of services” allows the library to expand this *WEKO* functionality and its boundary to facilitate collaborations with other communities of practice in open access or OER both locally and regionally by collecting varieties of contents from different communities.

The set up of OER Asia (<http://www.oerasia.org>), an Asian Forum to share information, views and opinion, research studies and knowledge resources about OER was primarily the work of a small group of Asian Association of Open Universities members. The network has organised workshops, training programmes, seminars, symposiums on OER and completed mapping exercise of OER activities in a few countries in the continent. The network hopes to embark on its next task of collaboration with the Global Learning Objects Brokered Exchange (GLOBE) (<http://www.globe-info.org>), in creating a federation of metadata repositories. The aim is to provide members open access to metadata description of records in member’s repositories. GLOBE is a one-stop-shop for learning resource broker organisations, each of them managing and/or federating one or more learning object repositories (Dhanarajan, 2013).

With this in mind and moving towards GLOBE collaboration, the set up of another federated repository network, called OER@AsiaHub (<http://oerasia-repository.wou.edu.my>) (*Appendix-Figure 5*) for the OER Asia communities was developed. It aimed to generate wider participation from the open access communities in contributing and making their open access resources in various academic disciplines available for sharing and reusing. *Figure 3* depicts the network concept model of OER@AsiaHub repository.

Figure 3. OER@AsiaHub network concept (Kamsiah, Chew & Ch'ng, 2014)



The WOU librarians are actively promoting this repository and encouraging contributions from other network institutions. Universiti Putra Malaysia and the Open University of Japan learning objects are available in this repository. It is hope that the access to this open knowledge platform will support a greater exchange of content for members.

Facilitating challenges in building OER repositories using WEKO

Undoubtedly, the team faced many challenges in trying to develop the OER repositories. The main building blocks are being the library's infrastructure and expertise to fully understand the *WEKO* infrastructure components.

Application technical challenge

The creation of OER repositories initially was hampered by the team members' lack of knowledge of the *WEKO* system. This was mainly due to the lack of technical documentations in English language to enable the team to gain a better understanding of the content management system. Being the first academic library outside of Japan to use the *WEKO* application, the Library was unable to turn to any community of practice. Nevertheless, many technical problems were sorted out via the use of media communication with the technical expertise from Japan. The English version of the user manual (Version 2.1 dated August 2014) [Yamaji(b), 2014] has since been published and made available online.

Content recruitment and sustainability

As for the content recruitment aspect of OER, the process of building the content started from scratch by manual depositing and harvesting existing learning objects from another open source repository using Eprints. The work involved were identifying suitable material, digitizing into PDF format and applying appropriate Creative Commons license as per University's open license policy. To increase content recruitment, authors have also been provided a simple way to self deposit through a simple registration. An electronic copy of user guidelines is available on the web portal to facilitate easy indexing and ensure consistency of data input.

Standardised metadata interoperability

According to Sharma (2012, p.334), OAI-PMH protocol has been used to support interoperability with other repositories to harvest bibliographic data and it is the major technological innovation of this period. Spurred by the open access movement, the interoperability of metadata level has been the most active area in digital repositories development (Aschenbrenner et al, 2008). Domain specific that support the OAI-PMH protocol to enable exchange or cross-reference of metadata must be traced correctly. Hence, OER@AsiaHub contents also relies on the OAI-PMH compliant metadata exchange acquired from other institution's existing metadata repositories. It is automatically generated from the WEKO harvesting environment using OAI-PMH baseURL using appropriate metadata schema such as Dublin Core or Learning Object. Network connection problem can be a bottleneck at times during metadata harvesting. The existing default Japanese metadata schema for Dublin Core or Learning Object required further review and modifications to cater for the local needs and retain as much metadata as possible, without compromising on the value of the learning objects. Nevertheless, the Library has continued to initiate efforts to establish cooperative institutional metadata exchange programme with local libraries and comply the metadata values accordingly.

Quality assurance

Quality assurance in repositories is a necessary prerequisite for its success. According to Atenas and Havemann (2013), repositories should have certain characteristics in the aspect of social and technical values. Aware of the importance to maintain quality standards, the WOU team has implemented quality assurance indicators such as theme classification, searching tools, authorship, keywords, metadata info and usage statistics.

Copyright licenses

According to Kleymeer, Kleinman and Hanss (2010), academic librarians somehow have been acknowledged as de factor arbiters for copyright matters where librarians help to address policy challenges. However, not many librarians are knowledgeable on copyright licenses status of the documents deposited and the uncertainty of the copyright status is still a major concern to libraries and librarians. In order to alleviate potential copyright problems, librarians provide advisory guidelines to authors to supply copyright statement, if available, though it may be ambiguous and still does not address the copyright of the item. One of the guidelines adopted by institutional repositories librarian is that, as a matter of policy, all works created and/or developed by staff in the course of carrying out his or her work will automatically belong to the University and must be shared with others. Such work will be made open access and indexed in the institutional repository to allow other interested readers to cite the work. The rationale being the easy accessibility of a work will enable more people to cite the work, contact the author(s) and create discussion opportunities with other researchers. Such visibility will help the staff to build up his/her profile and increased the University's reputation in the international circle.

The institutional repositories librarian will normally advise staff that have signed-over the copyright of the material to a publisher not to submit those materials to the repository.

Discussion and future directions

Given the usefulness of *WEKO*, this paper has summarised the following important aspects of the *WEKO* infrastructure which has given four primary contributions in the development of the medium-scale ROERs:

- Managed repository and content development
- Easy website development using varieties of add-ons
- Metadata harvesting with OAI-PMH compliant
- Learning objects reporting usage analysis

Creating open access repositories platform is one good effort but academic libraries must go beyond their roles of just populating their repositories content. Academic libraries do play a significant role in managing OER contents as they possess the expertise in handling activities strongly related to information science field such as system analysis, conforming to metadata standards, indexing and classification records curation, dissemination and retrieval. Despite the constraints faced, there are specific goals which the Library would like to achieve over the next few years. The immediate goal is to add as much open access objects metadata from other institutions to the OER@AsiaHub federated repository and participate into the GLOBE collaboration network.

Conclusion

In summary, this research project has showed that using the Japanese open source model, *WEKO* indeed can be adopted by other institution libraries as it can fulfil the library's requirements, cost saving, easy to install, develop and maintain, does not require the person to be IT savvy to develop the content management system. Moving forward, being the first non-Japanese user of *WEKO* and based from the experience gained, *WEKO* is useful and comparable with other open source applications. Moreover, *WEKO* can serve as a model for future opportunities for cross-campus digitization projects in the University.

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Appendix

Figure 4. WOU OER Institutional Repository (<http://weko.wou.edu.my>)

The screenshot displays the WOU OER Institutional Repository homepage. At the top, the Wawasan Open University logo and the OER REPOSITORY title are visible. Below the header, the main content area features a search bar, a language dropdown (set to English), and a subject classification tree. A list of items is displayed, including titles like "101 Open Educational Resources Works" and "Comparative study on the usage of...". A callout box labeled "1. WEKO modules – Search engine, Index trees, Item list, Language, Results display, LO metadata, Ranking" points to these elements. Another callout box labeled "2. Webpages modules - Header, Side-bar, Footer" points to the top navigation and right sidebar areas.

(367 records as at 31 August 2015)

Figure 5. Federated repository OER@AsiaHub (<http://oerasia-repository.wou.edu.my>)

The screenshot shows the OER@AsiaHub federated repository interface. A large banner at the top reads "OER@AsiaHub Your gateway to Asian initiatives in educational resources for learning and online teaching". Below the banner, there is a search bar, a language dropdown (set to English), and an input center section. A list of items is displayed, including titles like "Morale" Guru-Guru Sekolah Rendah and "The Synthesis And Biologi Calactivity of Some Estragole Analogues Towards Oil Palm Pollinating Weevils". The interface includes a menu, links, and contact information on the right side.

(20,694 records as at 31 August 2015)