

IDENTIFYING NETWORKING EDUCATION PORTAL

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ABSTRACT

With the increase in popularity of online learning, portals have become a common medium to disseminate learning materials. Thus, a good education portal is now an essential tool for instruction and communication among learners and instructors. However, many teachers and web developers are not aware of the different types of education portals available. They may not even realise the differences between portals and web sites. We discuss the above points in relation to some popular education portals for secondary schools in Malaysia. The focus of the study is on networking portals. Four main characteristics necessary for such portals were identified. A few education portals were studied based on those characteristics. An analysis of the results obtained forms the basis of our recommendations to improve the portals studied.

INTRODUCTION

Widespread use of the Internet has seen the number of education portals on the Web growing rapidly. There are quite a number of organisations hosting and providing education portals for various education levels. However, in this paper, we focus on the Malaysian secondary education level. Looking at the existing education portals, there do not seem to be any common criteria of what constitute an education portal. To address this problem, the characteristics of web portals and its framework are identified and then applied to the education portals. There are six important elements that make up a portal. These elements form the heuristics for reviewing four existing education portals in Malaysia. The results of the review are used to derive the requirements for building *EduPortal*, a prototype with a generic framework for networking education portals.

WEB PORTALS

The main task of a web portal is to unify content and services into one area easy access. There is no unique definition of a web portal as yet. However, based on some existing approaches in defining web portals, three salient characteristics of web portals are identified. They are;

- Gateway to information
- User-centric and community based
- Multiple services

Based on these characteristics, a web portal may be defined as a gateway to searchable and personalised information on the web, which also functions as a communication centre for its target users. Additionally, a web portal provides personal and content-related services to support the community it serves. A portal framework consists of three levels and each level can be mapped to the three salient characteristics of web portals as shown in Table 1. The authentication level includes features such as, login and security features. The authorisation level incorporates customisation features, such as role-based access to manage permissions and access rights to the content. The presentation level includes searching facilities, content personalisation, community communication features and assistance. There are two main types of web portals: horizontal and vertical portals. Horizontal portals are also known as consumer portals that offer a broad range of services to users. Vertical portals are very focussed. They may be classified as enterprise information portals, knowledge portals and intranet portals. Education portal is a subset of knowledge portal.

Table 1: Relationship between Portal Framework and Characteristics

Framework	Characteristic	Relationship
Authentication level	Portals as a gateway to information	Authentication is important in web portals as this process creates a "doorway" in the portal for users to log in to reach their desired information.
Authorisation level	Portals are community-based	This level helps the portal recognize the logged-in user and tailor the information and services provided according to that users predefined needs or rights.
Presentation level	Portals offer multiple services	Many features are integrated in the portal to present information and services in a usable manner to the community it serves.

Education Web Portals

Education portals, as knowledge portals, refer to portals that provide educational services to their users. Such portals consist of three main components: a community of practice, a body of knowledge, and services to maintain the body of knowledge [2]. There are three types of education portals [3];

- **Networking Education Portal**
This portal provides users a point of access to various educational tools and facilities. It functions as a center of communication for the different types of users, thus forming a network among them.
- **Organisational Education Portal**
This portal is constructed for organizations whose core business is to deliver educational material. It contains background information about the organisation, its philosophy, fund providers and members of the staff. Projects and research areas of the organisation are also highlighted. Examples of such portals are university or campus portals.
- **Resource-based Education Portals**
A resource-based portal provides access to various educational resources online. Generally, these types of portals contain adequate search facilities, links to other relevant organisations or institutions as well as subscription services. They usually offer three types of resources:
 - Generic resources that consist of teaching and learning tools for educators and learners, as well as managers and administrators around certain topics and themes.
 - Subject specific resources that are specifically suited to teachers and learners of a specific domain.
 - Links to other education related resources.

Networking Education Portals

In most networking education portal, the common sections available are;

- **References** – e.g. online dictionary, online thesaurus and atlas facility
- **Resources** – includes generic, subject-specific or grade-specific resources such as lesson plans, online books, library catalogues and educational software.
- **Links** – provides access to relevant websites.
- **Functional Navigation Menu** – the menu is dedicated for browsing educational content available in the portal. For example, it may have links to sections that provide online notes, subject discussion forums and other related information that deals with the main function of the portal.
- **Member Area** – this relates to the authentication and authorization features of web portals. In most education portals, these features are implemented by providing a login system that differentiates its audience as students, teachers or parents. The users have to obtain membership, which may involve fees, before they are granted access to various services.

Elements of Networking Education Portals

Based on our research on portals for education, we propose six basic elements for a networking education portal, as follows:

1. **Portal Characteristics** - A networking education portal has to have the three salient characteristics of a generic portal, i.e., gateway to information, community-based, contains multiple services for its community. This portal has to be constructed by keeping the three levels of the portal framework (authentication, authorisation and presentation) intact.
2. **Features of Networking Education Portals** - A networking education portal has to have the common features for this category of portals such as a member area, a functional navigation menu, resources and references (as described earlier). By having these features, a networking education portal becomes more recognizable.
3. **Presentation and Navigability of Information** - A networking education portal is expected to serve demographically different groups of users in the education field, such as teachers, parents and students.

Therefore, its content is presented differently to each of these groups to ensure successful interaction between the users and the system. The main aspects involved in this element are;

- Quantity of information presented
A well designed education portal use techniques like minimalist visual design, information customisation and information personalisation to ensure that the large quantity of information belonging to the portal is displayed in an organised manner for users.
 - Grouping and highlighting of information
Similar information need to be grouped in order to avoid clutter and confusion. Most portals accomplish this by having different channels of information such as news and sports. Grouping helps to improve readability and can highlight relationships between different groups of data.
 - Screen display standardization
A consistent format is used across the design of a portal. The familiarity created by this reduces the time needed by a user to reach the information needed. Important information that needs attention is usually displayed at a prominent place. Information that is redundant is only displayed if it facilitates user's ability to process the information at the point of interaction.
 - Usage of multimedia elements
Multimedia elements such as pictures, diagrams, video and sound complement any textual information available in a portal. However, usage of multimedia options must be carefully planned. Too many of such elements can deteriorate the speed of downloading pages of the portal.
 - Navigability
The important thing in designing a useful navigation system in a networking education portal is that it must be intuitive and easy to use. Most networking education portals have functional and standard menus. The former is related to the content and is usually placed at a prominent place whereas the latter includes general links like *Home*, *Contact Us* and *About Us*.
4. Educational Effectiveness - Education portals usually dedicate a whole section to online learning or other instructional material for their target students. The effectiveness of this method is based on methods below:
- Explanation
The topics covered must provide a detailed explanation in the form of overview, learning aims and outcomes that are useful to learners.
 - Online learning content
The Commonwealth of Learning described the following criteria to view effectiveness of the online learning content provided:
 - Summaries and revision exercises included at frequent intervals.
 - Skills for learning are appropriate to the outcomes of the course and integrated into the materials.
 - ICT skills are deliberately developed as appropriate.
 - Learning process
A learning process includes learning activities in a learning environment that builds knowledge in students. According to Hawryskiewicz (2002), the way learning proceeds through this process requires different interaction and media at different learning activities. These are often determined by two other dimensions:
 - Support is based on codification, where information is stored and tools are provided for learners to learn, or personalisation, where learning occurs at a more personal level.
 - Learning is objectivist and constructivist. In objectivist leaning, a learner studies concepts and needs to find ways to understand them. In the constructivist approach, the emphasis is on process or the best way to do things. Web-based systems that support the latter approach encourage free exploration of the learning material and enable greater interactivity.
 - Language level
In an education portal, new concepts and terms must be explained simply and indicated clearly in the text. The language should be friendly, informal, welcoming, accessible and interactive.
5. Interaction and Feedback - Interaction in learning is a necessary and fundamental mechanism for knowledge acquisition and the development of both cognitive and physical skills. It goes hand in hand with feedback. Feedback is defined as the sending back of information to the user about what action has been done and what result has been accomplished. Examples of implementations are, discussion forums and chat channels, menus and navigation and search facilities.
6. Technical Aspects - Networking education portals have to consider technical aspects as;
- Speed, reliability, availability
Loading time for all pages must be fast. This is to save the valuable time of students in searching for learning material. Multimedia elements should be used sparingly to avoid slowness.

- **Security**
In networking education portals, the different types of users usually access the content using the single sign-on identification. In order to prevent misuse of access, it is important to implement some security features in the authentication and authorization processes.

REVIEW OF EXISTING EDUCATION PORTALS

An Internet search on networking education portals in Malaysia returns a number of sites. However, only a handful of these qualify as networking education portals based on the definition in this research. This leads to the main part of this research where selected existing education portals in Malaysia are reviewed against the six important elements. The secondary level education is chosen as the focus area. However, due to the scarcity of existing education portals that focus solely on this education level, the samples are based on those closest to the secondary education level. After some searching on the Internet, four portals were finalised as samples of Malaysian education portals that are closest to the definition of networking education portals, and cater for the secondary education community, for the review against the six important elements of networking education portals. They are:

- *Cikgu.net*
This portal caters mainly for teachers. However, it includes educational content on public examinations for students. This content is offered in two languages, Bahasa Melayu and English.
- *Kakak Tua*
This portal is targeted at primary and secondary school students. It is equipped with revision questions and study materials. There is a paid member section where users get more valuable educational services. This portal is also offered in both Bahasa Melayu and English.
- *Tutor.com*
This portal is targeted at all primary, secondary and pre-university students. Apart from providing educational content it also provides news and discussion forums.
- *Student.com*
This portal is purely focused on communication tools. It does not target any specific group of students. It has features like news, entertainment, and discussion forums. However, it does not have specific instructional material for examination purpose.

Review Results

The four portals above were reviewed against the six important elements of networking education portals described above. For each element that is found in the portal, the portal is given 1 point. The total points gathered determines how close the sample match the criteria of a networking education portal. The results of the review in the form of percentage scored against the important elements of networking education portals are shown in Table 2;

Table 2: Relationship

Sample	Percentage of adherence (%)
Cikgu.net	73.08
Kakak Tua	90.38
Tutor.com	50.00
Student.com	50.00

Analysis of Results

From the review, it is clear that the samples have not fulfill the criteria of a networking education portal satisfactorily. Only the *Kakak Tua* portal come close enough to be accepted as a networking education portals. The low level of adherence among the other samples can be attributed to the lack of understanding about portals and its features among Malaysians. Many are still finding it difficult to differentiate a portal from a web site. In terms of portal characteristics, all four samples achieved good adherence points. They have large amounts of information in one location and are created for the student community. However, in terms of the portal framework, only *Kakak Tua* shows the three levels of the framework in its architecture. The common features of networking education portals are seen in all samples but the important features like membership management, customisation and personalization are not clearly seen in most of the samples.

For the presentation, *Tutor.com* and *Student.com* do not have the required standard look and feel in their pages design. This causes difficulty in finding information needed. On a positive note, it all samples implemented some type of grouping and highlighting of information in their portals. All samples have limited usage of multimedia content except for *Tutor.com*. This is an important consideration for secondary education communities as not many students may be privileged to have high-speed internet connections to access resources from such portals. With too many graphics and multimedia elements, the slowness in downloading and viewing the heavy content over low-end connections will be a barrier for them to benefit from a networking education portal. The element of navigation could

be clearly seen in most samples except in Student.com which had five different groups of navigation menus. Having this number of menus in specialized portals like networking education portals is considered bad practice that can confuse users and make information look cluttered. The other samples had two types of menus; content-related and provider-related.

As education portals, the Kakak Tua and Cikgu.net provide sections dedicated to learning materials. This is not seen in the other two samples. These two samples use the constructivist learning method that emphasises on interactivity which is the best way to utilize the web environment for learning. In terms of language support and clarity of instructions and explanations, all four samples adhered to the review requirements satisfactorily. All four portals provided some form of interaction and feedback features such as discussion forums, online assessments, online feedback and many more. Thus, in this area, all samples fulfilled the requirements of a networking education portal. In terms of speed, all samples had a short loading time of their main pages (between 2 – 5 seconds) except for some pages in Tutor.com. As for content reliability and availability only the Kakak Tua portal had content that is always updated. The same was noted for login security features. It was only observed in the Kakak Tua sample. Thus, security can be considered as a major weakness across all samples.

Problems and Limitations

The review highlighted some problems and limitations in the existing education portals samples in Malaysia as follows:

- Absence of the basic three-level portal framework in most samples.
- Non-standardised layout and screen design
- Online learning material not based on suitable learning processes
- Low content availability and maintenance

Some general problems in terms of the level of advancements in the field of networking education portals were also noted, as follows:

- Portal solutions available only for Enterprise Information Portals type
- No education portal solely for the secondary education level
- Lack of internationalisation

EDUPORTAL – A PROTOTYPE

EduPortal is a prototype of a networking education portal for secondary education communities in Malaysia. The design and implementation of this prototype is based on the six important elements of networking education portals and attempts to solve the problems highlighted through the review of existing networking education portals in Malaysia. Features included in *EduPortal* in relations to the six important elements are as follows:

- **Portal characteristics**
The gateway to information in *EduPortal* is depicted by its login and registration features. Registered users are divided by types (students or teachers) and they can access content based on their privileges. Its target community is formed by students and teachers of the secondary education level. Thus, the portal offers services to this community such as online notes, discussion forums, membership management and many more. The login (sign-in) feature is shown in Figure 1. The portal framework is clearly seen in this prototype. The authentication layer is at the login feature. The authorization layer is based on the membership type the user selects during registration (student or teacher). Based on this membership, the content users access in the discussion forums section and learning zone section is determined. The presentation level is the final level the user sees after a successful login and contains the complete networking education portal features.
- **Networking Education Portal Characteristics**
EduPortal provides educational material through its Learning Zone and Knowledge Sharing features. It allows the secondary education communities to communicate with each other through the discussion forums. The features are shown in Figure II.
- **Presentation and Navigability of Information**
In terms of quantity of information presented, *EduPortal* provides only the necessary information with regards to services it provides. There is no additional promotional or irrelevant advertorial information. The design of the pages in *EduPortal* is very balanced. The vital information is presented in the left, center and top of the pages. The complementary information is presented at the right and bottom of the pages. All pages follow a standard structure and the color scheme has also been standardized. This makes content-browsing an organized experience for users. There is minimal usage of graphics. There are three main navigation menus. The functional menu is the main point of access for educational tools and information is on the left of every page,

considered the most prominent location. The standard links are on the top whereas the complementary information menu is on the right.

- **Educational Effectiveness**

The “Learning Zone” section in *EduPortal* provides a personalised experience for users to access the online notes relevant to their level of privileges as specified during registration. The constructivist learning process is used with focus on interactivity to help facilitate a form of teaching and learning over the web.

- *Interaction and Feedback*

Interaction and feedback features are included in the *EduPortal* prototype. The *Discussion Forum* includes the search feature that will return forum titles and posts based on the search criteria entered. The *Learning Zone* section displays online notes based on user’s selected education level. The personalisation feature for the *Welcome* page uses users input to present the layout of the welcoming page they see immediately after successful login. Users are free to change the layout options when they like. The feedback form is present for users to submit valuable comments or to report problems on the offerings and design of *EduPortal* for the knowledge and action by the providers.

- *Technical Aspects*

All pages of *EduPortal* can be accessed in less than about 4 seconds on a connection of 52.0 Kbps. Security-wise, non-members and non-authenticated users are not allowed to use the educational features and functions of the portal. This is controlled by the login feature and usage of session management in the portal. This is not meant as a hindrance to potential users from using the portal but merely to expose them to special portal features like customisation and personalisation through the layers of the portal framework.



Figure 1: Main Page



Figure 2: Common Features of a Networking Education Portal

EVALUATION OF EDUPORTAL

An evaluation was performed on the prototype developed. This evaluation was conducted using a questionnaire with closed questions, which used the six elements of networking education portals as its heuristics. It was an expert evaluation as the 12 evaluators chosen were experts from both the information and communications technology (ICT) field and the education field. Through the questionnaire, the users opinions were collected to determine if *EduPortal* indeed solved the problems highlighted in the review of existing portals and to see if it successfully fulfills the six elements of networking education portals which is the focus of this research. The results of the evaluation reveal that:

- *EduPortal* fulfilled the definition of a web portal
- It has the three salient characteristics of web portals.
- The three layers of portal framework are clearly seen in it.
- The common features and services of networking education portals exist in it.
- In terms of presentation and navigability, this portal has achieved the necessary standards.
- Interaction and feedback features are included in the portal.
- It is technically sound in ensuring good performance in servicing its users.

Based on the above, it is concluded that *EduPortal* is successful in achieving its objective as a generic networking education portal prototype.

CONCLUSION

This research is about networking education portals. We have analysed in great depth the word *portals* and *education portals* in general, and specifically the phrase *networking education portals*. It is an attempt to clarify the differences between a portal and web site and also to identify the different types of portals available for the education purpose. It can be concluded that networking education portals are a gateway to educational information and services specifically targeted at a certain community. The community has the privileges of being regular users of the portal by being able to interact, communicate and learn through the portal. By using networking education portals for secondary education communities as a focus point, this research managed to highlight the current level of education portal development in Malaysia. Based on this information, a useful prototype of a networking education portal was developed in an attempt to introduce a generic template of networking education portals design that is hoped to be a useful guideline for developing such portals in the future. We believe that this portal can help to eliminate much confusion regarding the concept of education portals.

REFERENCES

- Bartlet, A., Lamersdoft, W., Weinreich, H. & Zirpins, C. (2001). Advanced concepts for next generation portals. *12th International Workshop on Database and Expert Systems Applications*, pp. 501-503.
- Hawryszkiewicz, I.T. (2002). Customizable knowledge portals for teaching. *Informing Science and IT Education Conferenc*, pp. 705-713.
- The Commonwealth of Learning. *Best Practice in Education Portals*. Vancouver: The Commonwealth of Learning, 2002.
- Benyon, D., Davies, G., Keller, L., Preece, J. & Rogers, Y. (1993). *A Guide to Usability: Human Factors in Computing*. United Kingdom: Addison-Wesley.
- Khalifa, M., Lam, R. "Web-Based Learning: Effects on Learning Process and Outcome." *IEEE Transactions on Education*, 45(4), pp. 350-356, 2002.