# Evaluating E-portfolio System Use within Educational Context

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Abstract—This paper presents a new approach for setting criteria towards evaluating e-portfolio use within educational context. The urge for considering e-portfolio systems in current educational context is becoming more vivid, as many systems are developed to address the need for gathering artifact used within educational context. The wide development of web 2.0 technologies has given the opportunities for many e-portfolio systems to emerge and provide different services and functionalities that are used for different aims and objectives that are not related to educational use. The need for differentiating the offered services and functionalities is becoming necessity as different educational establishments have been found using e-portfolios that are not designed for educational purposes. This study, managed to present six different e-portfolio systems that are found suitable for educational purposes, and have set the criteria for differentiations that will present the most suitable e-portfolio system within educational context. Those same criteria can be used with any newly designed e-portfolio system, and they can be looked at as a guide map for selecting the most appropriate e-portfolio system.

Keywords-component; e-portfolio; educational systems; evaluation; Multi Adaptive Educational Hypermedia.

## I. INTRODUCTION

The continuous developments towards information and communication technologies have resulted in many services for educational technologies. Such services provided wide diversity towards pedagogical approaches used within educational context. The educational processes have been developed by the continuous enhancements through providing new processes and methodologies towards sharing and delivering information [1]. Due to such enhancement, universities have adopted such services and applications within their curricula. Many of the adopted solutions were found lacking some major features that are necessary for educational purposes as many of the developed e-portfolio systems were created for business purposes and not considering the educational services and features [2]. The benefits of using portfolios in education are well acknowledged in different research studies, and the use of e-portfolio is considered an extension to the information and communication technologies development in the field of educational services and features [3] ,[4]. It was found that the use of e-portfolio addresses the existing and rising needs of different users to have a dedicated setting through which they can interact and share their digital contents. According to [5], the e-portfolio can be classified under three main categories that are:

- A tool for assessing development and proficiency.

- A tool used to encourage philosophy and profound education

- Serve as a platform for showing skills and accomplishment

This study is focusing on evaluating and exploring the needed requirements for six major web tools that have been used in Higher Education establishments for providing e-portfolio services [6]. The case for defining the e-portfolio system requirements is based on evaluation that considers the following technical issues that are: the added value to student education, ownership of the artifacts, user-support required, ease of use, maintenance and support costs, and maintenance and upgrade costs, and infrastructure costs, choice of back-end technology, setup, portability and interoperability issues. The six selected e-portfolio systems were identified based on the following criteria:

- Their provided operation towards educational institutions

- Their popularity in Higher Educational establishments

- Their accomplishment of compatibility principles

The following list shows the selected e-portfolio systems that are going to be discussed in this study:

1- Mahara

2- Giunti

 3- Premier IT

4- PET

5- Moodle+Exabis

## II. CHOOSING THE APPROPRIATE CRITERIA

There are different programs and tools that are used for enabling e-portfolio services and functionalities, ranging from commercial to open source solutions [4]. This study is interested in the type of e-portfolios that are provided through the web. In order to define the suitable e-portfolio system, the literature provides various evaluation methods for software products [7] , [8]. The selected methodology for this study is (Criteria checklists) methodology as the choice of the desired e-portfolio systems was based on technical evaluation features and considerations that have been published and tested by College London in similar research, which identified the evaluation tool suitable for this research study based on providing a comprehensive checklist of different features [13]. The reasons for choosing those criteria are for their similarity of objective in defining the suitable e-portfolio system, their simplicity and comprehensiveness towards the defined e-portfolio's criteria [9].  The criteria have been modified and altered to fit the context of this study.

The used criteria are:

- Value-added to learning.
- The required cost
- Infrastructure costs: addition, durability
- Setup, repairs and improvement costs
- User friendly and being able of uploading grades to different LMS
- Support of different provided technologies and tools.
- Possession of the artifacts.
- Data management and user support.

The evaluation has also considered the availability of the different range of artifacts that can be used in the e-portfolio systems. These include:

- The ability to present students' marks/grades
- The ability to include collaborative and communicative work.
- The ability to present accomplishment.
- The ability to represent teachers and students work along with their comments and opinions.
- Providing evaluation for combined development.
- Providing teachers response and opinion towards any of the previous mentioned points.

From this point it was necessary to include methodical assessment for the e-portfolio systems that are used in this research, and therefore a prerequisite list was developed for all the previous key points that are needed from e-portfolio system to be used within an educational context [10]. With respect to the survey designed by Imperial College of London, the criteria were divided into ten different sections and the questions were altered and modified to serve the context of this study:

### A. Curriculum related features

This section will be responsible for collecting responses that are related to users' reflections, tagging of information for easier discovery, categorization for learning activities and objects and providing the ability for linking with learning objectives, enabling the upload process of files with different formats, providing blogging services, setting up deadlines, providing notifications, enabling print and exporting facilities etc.

### B. Career Opportunities

This section will be related to teachers' opportunities for recording training activities, their grades and marks acquired, presentation related to achievements, and the ability to provide all the mentioned points in a form of profile or CV and the opportunities to customize CV output.

### C. Assessment

This section will explore the ability to provide feedback on each artifact as a form of validation process from more than one tutor.

### D. Publish/Share

This section will explore the permissions related towards users access (internal, external), and the permissions of sharing artifacts, the permissions of management of user control over their e-portfolios giving users control over who may view their artifacts. The ability of a single user to belong to more than one group, the ability of providing different customizable views, the ability of creating group work, the ability of providing multiple portfolios creation for the same user account, the ability of providing search facilities and syndication options.

### E. Analysis Tool

This section will concentrate on tracking aspects, such as the ability of generating an activity log, general overview and summary of activities, and privacy security issues.

### F. Access

This section will explore any restrictions related towards accessibility in terms of systems infrastructure implemented.

### G. Customization

This section is oriented towards exploring different levels of customization available.

### H. Technical Information

This section will explore technical information that is related towards special servers and operating systems requirements considerations, user interface used, database details, the available opportunities for integration with other Virtual Learning Environments (VLEs), interoperability and exporting facilities, possibility of integrating feeds to and from college systems such as Student Management Systems for grades and assessment, portability of the e-portfolios, single sign on system, browser compatibility, accessibility

conformance with (W3C standards), storage management options and backups [12].

*I. Staffing requirements*

This section will explore the availability of training options and the required technical support available or required.

*J. Costs*

This section explores the costing issues related to each product.

After identifying the needed features and considerations for the software requirements, they were distributed into ten different sections with a total of 57 different criteria.

III.    EVALUATING E-PORTFOLIO SYSTEMS

Following the defined criteria and distributing them into sections and questions, the list of e-portfolio systems were surveyed and the data was gathered and categorized with respect to each e-portfolio system. The following table shows the criteria used for this evaluation, and it shows the availability of each system's functionality with respect to the defined criteria. The heading numbers displayed in the table represents e-portfolio systems as (1.pebble, 2.Mahara,3. Giunti Labs-eXact,4. Premier IT,5. e-PET,6. Moodle + Exabis). In terms of features availabilities, the following definitions have been set:

A. Function Partially Available
B. Bespoke Development Required
C. Function Not Available
D. Not Known
E. Function Fully Available

*A. Categories and Criteria*

  *1)  Curriculum related features*

   *a)    The system supports tagging: detailed tabulation of practical skills/training*

   *b)    The system supports reflection: on curriculum and extra curriculum activities*

   *c)    The system supports categorizing:*

   *d)    The system supports internal linking*

   *e)    The system supports external linking*

   *f)    The system supports file upload of different types*

   *g)    The system supports blogging*

   *h)    The system supports goal setting*

   *i)    The system supports setting up deadlines on each artifact*

   *j)    The system provides notifications/alerts by emails or messages*

   *k)    Provide users with different search abilities on the files used within the system.*

   *l)    Providing users with the ability to make notes on used files*

   *m)    Users should be able to sort items in a portfolio by any of several criteria, which may include: learning outcomes; date created/updated/etc.; course; status of work. Other criteria may be desired*

   *n)    The system provides validation processes (tutor able to approve work online)*

   *o)    The system supports changing and customizing templates*

   *p)    The system supports exporting/printing each artifact separately*

   *q)    Providing users with different procedures for transferring the site content to different format or medium.*

  *2)  b. Careers*

   *a)    Having the ability for recording training*

   *b)    The ability for producing grades and marks*

   *c)    Providing the ability to present achievements*

   *d)    Generating associations with different published artifact*

   *e)    Providing the ability to produce Curriculum Vitae*

   *f)    Providing customizable CV output functionality that can be used for different requirements.*

  *3)  c. Assessment*

   *a)    It is important to be able to provide feedback on each artifact from selected peers or different faculty members.*

  *4)  Publish/Share*

   *a)    The system provides different access permissions (internal and external)*

   *b)    The ability to share artifacts on the Web (for any Web User)*

   *c)    Providing the ability to control the view of any produced portfolio parts*

   *d)    Providing the flexibility for users to be part of different groups.*

   *e)    The ability to provide different customizable views*

   *f)    The ability to create dedicated work groups that can be used for specific purposes by the selected or defined group*

   *g)    The ability to produce multiple portfolios within same user account*

   *h)    The ability to search for files or different folder within e-portfolios*

   *i)    being able to provide association with  internal and external contents.*

  *5)  nalysis Tool*

a) *The system provides activity logs*

b) *The system provides summarizing (like My Dashboard)*

c) *The system provides the ability for making comparisons*

d) *The system provides digital rights acknowledgement*

e) *The system provides privacy/security*

6) *Access*

a) *The system is accessible internally*

b) *The system is accessible externally*

7) *Customizing the Product*

a) *The system support customizability*

b) *The system provides different level of users that have different authorities to update and change the system as required.*

c) *The system supports producing different types of reports in different formats.*

8) *Technical Information*

a) *The system is Server and Operating System (OS) independent*

b) *The system provides a special user interface (area)*

c) *The system can be integrated with VLE so that feeds can be used and displayed*

d) *The system requires single sign-on*

e) *The system is considered browser compatible*

f) *The system supports accessibility standards (W3C, Section 508 standards)*

g) *The system supports special storage requirements as allocating more storage for specific users.*

9) *Staffing Requirements*

a) *The system needs orientation/training/help*

b) *The system needs technical support*

c) *The system needs professional services*

10) *Costs*

a) *Installation (the ability for internal hosting features)*

b) *Providing different licensing options as per user, per site or permanent license*

c) *Providing different options for including repairs, upgrades and different needed necessities*

The next section will present an overview of the different products evaluated under the specified requirements defined earlier for this research study.

## IV. THE CRITERIA OUTPUT FOR E-PORTFOLIO SYSTEMS

Based on the matching criteria for each question with respect to the selected e-portfolio systems, the following tables will present the output of each category for the all the used options towards available functionality.

TABLE I.        CURRICULUM RELATED FEATURES

| Curriculum related features | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 18% | 0% | 24% | 24% | 12% |
| Bespoke Development Required | 0% | 0% | 18% | 0% | 0% |
| Function Not Available | 0% | 6% | 0% | 0% | 0% |
| Not Known | 0% | 0% | 0% | 12% | 0% |
| Function Fully Available | 82% | 94% | 59% | 65% | 88% |
| Total | 100% | 100% | 100% | 100% | 100% |

In terms of the fully available functionalities for this category the best product to use if the curriculum related features are to be the major category is (Guinti Labs-eXact, Moodle +Exabis).

TABLE II.        CAREERS

| Careers | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 0% | 0% | 17% | 0% | 0% |
| Bespoke Development Required | 0% | 0% | 17% | 0% | 0% |
| Function Not Available | 0% | 0% | 0% | 0% | 0% |
| Not Known | 0% | 0% | 0% | 17% | 0% |
| Function Fully Available | 100% | 100% | 67% | 83% | 100% |
| Total | 100% | 100% | 100% | 100% | 100% |

This table shows that if the e-portfolio is going to be used for carrier presentation and showing achievements, then the best e-portfolio system to be used are (Premier IT,e-PET).

TABLE III.        ASSESSMENT.

| Assessment | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 0% | 0% | 0% | 0% | 0% |
| Bespoke Development Required | 0% | 0% | 0% | 0% | 0% |
| Function Not Available | 0% | 0% | 0% | 0% | 0% |
| Not Known | 0% | 0% | 0% | 100% | 0% |
| Function Fully Available | 100% | 100% | 100% | 0% | 100% |
| Total | 100% | 100% | 100% | 100% | 100% |

This table shows the best e-portfolio system to be used if the need for e-portfolio is to perform assessment, and all the products have the same value for assessment.

TABLE IV.    PUBLISH / SHARE

| Publish/Share | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 0% | 11% | 22% | 0% | 0% |
| Bespoke Development Required | 0% | 0% | 33% | 0% | 11% |
| Function Not Available | 0% | 33% | 0% | 0% | 0% |
| Not Known | 0% | 0% | 0% | 33% | 0% |
| Function Fully Available | 100% | 56% | 44% | 67% | 89% |
| Total | 100% | 100% | 100% | 100% | 100% |

This table shows that the best e-portfolio system to be used in case the needed functionality is to publish and share are (Moodle+Exabis , e-PET).

TABLE V.    ANALYSIS TOOL

| Analysis Tool | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 0% | 0% | 0% | 0% | 0% |
| Bespoke Development Required | 20% | 20% | 20% | 0% | 20% |
| Function Not Available | 20% | 20% | 20% | 20% | 20% |
| Not Known | 0% | 0% | 0% | 80% | 0% |
| Function Fully Available | 60% | 60% | 60% | 0% | 60% |
| Total | 100% | 100% | 100% | 100% | 100% |

This table shows that the best e-portfolio system to use in the case of providing analysis tools is for (all the systems) except for e-PET.

TABLE VI.    ACCESS

| Access | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 0% | 0% | 0% | 0% | 0% |
| Bespoke Development Required | 0% | 0% | 0% | 0% | 0% |
| Function Not Available | 0% | 0% | 0% | 0% | 0% |
| Not Known | 0% | 0% | 0% | 0% | 0% |
| Function Fully Available | 100% | 100% | 100% | 100% | 100% |
| Total | 100% | 100% | 100% | 100% | 100% |

This tables shows that all the provided system can be used online through the web or by using intranet.

TABLE VII.    CUSTOMIZING THE PRODUCT.

| Customizing the Product | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 0% | 0% | 33% | 0% | 0% |
| Bespoke Development Required | 0% | 0% | 0% | 0% | 0% |
| Function Not Available | 0% | 0% | 0% | 0% | 0% |
| Not Known | 0% | 0% | 0% | 67% | 0% |
| Function Fully Available | 100% | 100% | 67% | 33% | 100% |
| Total | 100% | 100% | 100% | 100% | 100% |

If the e-portfolio system is needed to be customized for different purposes other than the educational the best system to be used are for (Premier IT, e-PET).

TABLE VIII.    TECHNICAL INFORMATION

| Technical Information | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 14% | 14% | 0% | 0% | 0% |
| Bespoke Development Required | 0% | 14% | 14% | 14% | 0% |
| Function Not Available | 0% | 0% | 0% | 0% | 0% |
| Not Known | 0% | 0% | 0% | 29% | 0% |
| Function Fully Available | 86% | 71% | 86% | 57% | 100% |
| Total | 100% | 100% | 100% | 100% | 100% |

In terms of having the needed technical information the best system to be used is (Moodle +Exabis)

TABLE IX.    STAFFING REQUIREMENTS.

| Staffing Requirements | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 0% | 0% | 0% | 0% | 0% |
| Bespoke Development Required | 0% | 0% | 0% | 0% | 0% |
| Function Not Available | 0% | 100% | 100% | 100% | 0% |
| Not Known | 0% | 0% | 0% | 0% | 0% |
| Function Fully Available | 100% | 0% | 0% | 0% | 100% |
| Total | 100% | 100% | 100% | 100% | 100% |

This table presents the staffing requirement for e-portfolio system and the best system for this category is (Moodle+Exibis and Mahara).

TABLE X.    COST

| Costs | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Function Partially Available | 0% | 0% | 0% | 0% | 0% |
| Bespoke Development Required | 0% | 0% | 0% | 0% | 0% |
| Function Not Available | 25% | 50% | 50% | 75% | 25% |
| Not Known | 0% | 25% | 25% | 25% | 0% |
| Function Fully Available | 75% | 25% | 25% | 0% | 75% |
| Total | 100% | 100% | 100% | 100% | 100% |

This table shows that in terms of cost features, the best features are found to be for (Moodle+Exabis and Mahara).

By showing all available categories that are specifically grouped for educational purposes, the following table grouped the results from the previous categories in order to outline the best system that can be used for educational purposes. The results are shown in the following table.

TABLE XI.    GROUPED CATEGORIES EVALUATION.

| Categories | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Curriculum related features | 82% | 94% | 59% | 65% | 88% |
| Careers | 100% | 100% | 67% | 83% | 100% |
| Assessment | 100% | 100% | 100% | 0% | 100% |
| Publish/Share | 100% | 56% | 44% | 67% | 89% |
| Analysis Tool | 60% | 60% | 60% | 0% | 60% |
| Access | 100% | 100% | 100% | 100% | 100% |
| Customizing the Product | 100% | 100% | 67% | 33% | 100% |
| Technical Information | 86% | 71% | 86% | 57% | 100% |
| Staffing Requirements | 100% | 0% | 0% | 0% | 100% |
| Costs | 75% | 25% | 25% | 0% | 75% |
| Total | 903% | 706% | 607% | 405% | 912% |
| Average | 90% | 71% | 61% | 41% | 91% |
| Standard Deviation | 0.14 | 0.36 | 0.32 | 0.39 | 0.14 |

From the results shown in this table it is obvious that the highest values are for (Moodle+Exabis, Mahara). It was found that (Moodle+Exabis and Mahara), provided and supported the criteria that are presented in this research study. From this result it is obvious that they are the best two choices for e-portfolio systems to be considered within educational establishments.

A. *"Moodle+Exabis"*

Achieved the best results in terms of availability and taking into considerations their open source nature. However, there are few requirements that are partially available, or needs bespoke development or not available such as: user's ability to sort items based on different criteria. Other criteria may be desired are partially available in Moodle+Exibis. In terms of Syndicate (RSS/External Content, it needs bespoke

development, and it could be included in future editions of "Moodle+Exibis". Also in terms of the system providing the ability for making comparisons in terms of setting learning outcomes, objectives, "Moodle+Exabis" needs bespoke development. Moreover, in terms of the system providing digital rights acknowledgement, it does not have this feature as it assumes that teachers or users are fully aware of the digital rights requirements. In terms of ability to export to different formats that can be used such in PDF or Word documents is not currently supported by Moodle+Exibis. In fact this requirement is still not supported by all the mentioned systems expect for Giunti Labs. However, using "Moodle+Exibis" can provide a feature to back-up entire course and its contents and be exported as SCORM e-learning standard, or saved to flash disk or shared.

B. *Mahara*

Mahara supports wide range of functionalities requirements and it is in continuous development process. However, some functionality is still not present in current editions such as supporting activity log, supporting matching and assessing achievements of users with defined learning outcomes and objectives. But still Mahara is ranked in this work as the second best choice for educational purposes.

C. *Others*

The use of the other listed systems needs additional efforts for providing customization that is restricted in some cases by their vendors. Moreover, this research favored the system to be available with a minimum cost of support and implementation which is not the case in those systems. Also some systems can be provided only for institution that are currently in the UK and not provided elsewhere such as Premier IT.

V.    USING THE CRITERIA FOR OTHER PURPOSES

The defined criteria in this study are specifically for the use with educational establishment. However, the same criteria can be tailored to fit other disciplines and purposes and with other tools too. Thus for using criteria for different purposes you need to follow these steps:

A. *select the needed categories*

B. *select the list of tools to be evaluated*

C. *match the available functionalities and services*

D. *compute the total result for the (Function fully available)*

E. *compute for other needed functionalities*

Thus for example if the needed criteria are oriented towards the business and the needed categories have been defined as:

(Careers, Publish and Share, Analysis tools, Access, Customizing the product, cost)

Then the result will be: for the following systems

1.pebble , 3. Giunti Labs-eXact, 4. Premier IT

| Categories | 1 | 3 | 4 |
|---|---|---|---|
| Careers | 100% | 100% | 67% |
| Publish/Share | 100% | 56% | 44% |
| Analysis Tool | 60% | 60% | 60% |
| Access | 100% | 100% | 100% |
| Customizing the Product | 100% | 100% | 67% |
| Costs | 0% | 25% | 25% |
| **Total** | 460% | 441% | 363% |

The results show that the best e-portfolio system to be used among the selected cirteria is (Pebble). The same approach and method can be used with other e-portfolio systems in order to define to most appropriate system according to the selected criteria.

## VI. BENEFITS OF USING CRITERIA CHECKLIST

Many systems are available for providing different services and benefits for e-portfolio [11]. The use of these criteria is believed to bring the following benefits:

A. *A better systematic approach for identifying the most appropriate e-portfolio system to be used.*

B. *The criteria can be tailored to be used with different systems that are providing their services for educational purposes*

C. *The categories selection and criteria can be selected to fit the selection of e-portfolio system used in other context that is not related to educational purposes.*

## VII. CONCLUSION

The availability of different e-portfolio system has created the need for defining a systematic approach for choosing the most appropriate e-portfolio system for educational purposes. Those criteria have set a map for choosing the needed e-portfolio system by providing different categories for evaluation. The chosen criteria are based on different research studies that serve the same purpose. The current evaluation methodology for the chosen e-portfolio systems was based on Content Analysis Approach [9],[10]. The results showed that Moodle+exabis and Mahara are the best two choices for choosing e-portfolio system within educational context. Those systems reached the highest percent for most of the categories defined by the checklist. However, it is believed that the same categories and define criteria can be used for different e-portfolio systems that are used with other scopes that are different from educational purposes.

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