Organizing and Systematizing Knowledge Management through an Automated University-based Research Portal

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Abstract –*Grounded on the need for higher education institutions to promote and practice knowledge management and research culture through technology, the present study reports the development of a web-based research portal in one government-owned university. To address the objectives of designing, developing, and evaluating the research portal, the study implemented three phases: Phase 1 focused on the planning and designing of the research portal; phase 2 involved the development and try-out of the research portal; and phase 3 refers to the evaluation of the research portal. The output of the design and development phases is a web-based research portal that has automated features on research procedures, publication processes, database management, and research dissemination and utilization. The results of the quantitative part of the evaluation phase indicate that the research portal has high to excellent quality in terms of the following features: construction and features; design and aesthetics; completeness; accuracy; functionality; usefulness; and user-friendliness. The high to excellent rating may be sourced from the novelty of the program, but the platform's user-friendly features encouraged users of all ages, to make their research activities more manageable and more efficient. Qualitative comments from the evaluation of the portal supported the quantitative results although certain limitations were identified for the enhancement of the research portal. Researchers recommend that the web-based research portal be fully operational and be made accessible to various stakeholders while continually monitoring, evaluating, and enhancing its design and features.*

Keywords –*database, knowledge management, learning management system, open journal system, research management system.*

INTRODUCTION

Knowledge-based society or economy seems to drive better economic growth, reduce poverty index, and provide better global indices for countries. In fact, the Asian Development Bank [1] reported that building such economies is the most suitable way of ensuring strong and long-term growth which, however, requires quality and accessible higher education, sound information infrastructure, strong research and development, and persistent innovation to support it all. These contentions place a vital role in higher institutions to implement a quality educative process. Accordingly, Eid [2] argued that higher education plays a crucial role in the society by creating new knowledge, transmitting this knowledge to students, and fostering innovation. In this quest, knowledge becomes the major product of each education institutions in the country, which as claimed by several authors [3]-[6] should be properly managed to: 1) generate more knowledge; 2) access valuable knowledge from outside sources; 3) use accessible knowledge in decision making; 4) embed knowledge in process, products and/or services; 5) represent knowledge in documents, database, and softwares; 6) facilitate knowledge growth through culture and incentives; 7) transfer existing knowledge into other parts of the organization; and 8) measure the value of knowledge assets and/or impact of knowledge management.

Seemingly, in a knowledge-based society [7], higher education institutions predominantly spell out knowledge management as a productive tool for knowledge creation, innovation, and sustainability [8]-[10]; knowledge flow and transfer [9]; and technical information systems [9] through their respective research centers. Admittedly, research centers of

higher education institutions serve as "knowledge reservoir," which is much more than the sum of individual knowledge of employees, but capitalized through information products (e.g. documents, databases, softwares) or by knowledge exchange which are codified in records (e.g. publications, reports, documents, etc.). Thus, there is a dire need for knowledge management for better organized knowledge with the aid of technology.

Knowledge Management

In the world of research and development; knowledge, data and information are indispensable, but are very variedly defined commodities. Distinctly, Dalkir [11] described each of these domains in an attempt to rationalize management practices in organizations. As defined, data refers to contents that are directly observable or verifiable such as a "fact" while information is content that represents analyzed data. While these domains seem to appear tangible and concrete, knowledge is considered as typically subjective that depends on experiences, values, and perceptions of individuals. Other authors [12],[13] considered three categories with the use of the word, "knowledge:" 1) state of knowing – know about; 2) capacity for action – know how; and 3) codified, captured and accumulated facts, methods, principles, techniques and so on. Data and information fit in the third category, existing apart from people [14] leading to the concept of "working knowledge," in which Nickols[13] defined knowledge as:

> *"a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms."(p.5)*

With the intense and immense scope of knowledge, management of this commodity focus on organizing an organization's information and knowledge better known as knowledge management by many emerging researchers. The term surfaced just two decades ago with the basic definition of process capturing, distributing, and effectively using knowledge. Nickols[13] further defined knowledge management as a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise's information assets which may include databases, documents, creation, and experiences of individuals in an organization. Operationally, knowledge management is the process of making the organization's data and information available to the members of the organization through portals and other technology-enhanced system better termed as content management that requires three major stages of development: 1) information technology; 2) human resource and corporate culture; and 3) taxonomy and content retrieval [13].

In the academic world, knowledge management theories and practices govern the concepts, culture, and tradition of research, development and publication [15]. Research management activities, according to Avon Primary Care Research Collaborative [16] cover the wide-ranging support that the research and development team offers to researchers throughout the research process. This assistance ranges from help with search for funding opportunities, ideas for collaboration; sign posting to people who can help with methodological choices, and case for support. Usually, these activities are managed by research managers who have direct responsibility but probably not supervisory authority for research in universities. Managing a research group or faculty is an increasingly challenging task. Though competent research managers will maximize the research productivity in the University, the blend of capacitated work force and concrete content management will make waves for research and publication [17]. Consequently, publication management activities cover the production of print and online publications [18]. Those activities are often managed by publication or journal managers that are responsible for the creation of technical documents, proposals, and a wide variety of written materials (Hogue-Davies, 2016).

Research and Journal Management (traditional/manual and online)

Though international and high impact journal publication use technology-based journal system, local journals in different Asian countries still manage research publication through the traditional method. This way of research publications includes the use of printed materials such as books and journals usually distributed by different publishing houses and printing companies [19]. However, with the bulk of data and information needed and received by journals and

publishers, content management protocols set in to maintain availability, creation, and sharing of knowledge through online research publication. Tomlinson [20] even welcomed the digital media as an excellent addition to the market research tool box and created new ways to conduct research, providing complementary approaches to the more traditional forms. Programs like ScholarOne are already designed and are already used by prominent publishers likeTaylor and Francis and Springer [21].

With this dire need of an online system to provide complete management of research and publication, the University of British Columbia in Vancouver, Canada collaborated with Simon Fraser University Library; the Canadian Center for Studies in Publishing; and Standford University programmed the Open Journal System (OJS)—an online journal management and publishing platform and was first launched in 2002 [22]. The system, according to Willinsky [23] was designed to manage the journal's workflow, from manuscript submission through review to editorial work and then publication, offering a ready and cost-effective means of publishing online editions of journals and providing better means of managing the journal's operating costs. Accordingly, OJS was developed within the climate of concern among journal editors and staff over the cost and means of moving from print to the online edition and the viability of open access models. In fact, Lorimer, Lynch & Provencal [24] argued that the aforementioned concerns continuously affect social science and humanities journals published by small groups of scholars and societies.

Open Journal System

Open Journal System (OJS) is an open-source software primarily produced and serviced by the Public Knowledge Project. This project, in collaboration with prominent publishers, library, and university revolutionized content management system; distribution medium; support to Open Access (OA) publishing for better visibility locally and globally.

As defined, PKP operationally described OJS as a journal management and publishing through its federally funded efforts to expand and improve access to research. OJS has eight features: (1) OJS is installed locally and locally controlled; (2) editors configure requirements, sections, review process, etc.; (3) online submission and management of all content; (4) subscription module with delayed open access options; (5) comprehensive indexing of content part of global system; (6) reading tools for content, based on field and editors' choice; (7) email notification and commenting ability for readers; and (8) complete context-sensitive online Help support (Public Knowledge Project, 2014). Accordingly, Botsford and Haggerty [25] claimed that OJS supports several people-job models such as: many people for many jobs or one person for many jobs with a capability of maintaining record keeping in one place accessible in the web. In addition, the system incorporated several key roles for the whole publishing system: 1) journal manager, 2) editor, 3) author, and 4) reader.

PKP's project features the Open Journal Systems 2.4.5.0, which is open source journal management and publishing software developed, supported, and freely distributed by the Public Knowledge Project under the GNU General Public License. Publishing, content and information management were made easy and accessible for knowledge sharing and creation using the system. As an open source system, traditional budgetary constraints of content management and publishing activities are addressed and knowledge are made available or open access leading to better local, international and global visibility of research and development. With these attributes of the OJS, the current study delved into using this open source to manage not just the journal processes and data system, but also research and information system of a research center.

In sum, technology-enhance knowledge management system may enhance knowledge generation, creation, dissemination and sustainability. With the presence of open source systems, this field may provide local universities opportunities to enhance research and publication activities and be of help in the country's quest for quality and mark in the global era.

Framework of the Study

The Association of Commonwealth Universities [26] claimed that research projects should be managed with an increased level of professionalism, transparency, and accountability. As such, an effective and efficient research management function is quickly becoming crucial for universities across the world – and robust systems and approaches are both considered as necessities. Furthermore, the association stressed that research management embraces anything that universities can do to maximize the impact of their research activity. Figure 1 describes the framework of the study that presents all the featured principles and concepts of an automated research

management system deemed necessary to deliver an effective and efficient research management system in the University.

As there are very few available literatureson e-research management systems (eRMS), most of the concepts and theories identified in this section are on e-Learning management systems (eLMS) which is closely related to the former. E-Learning Guild Research [30] identified several aspects of the Learning Management System that are most rated by users. These LMS features may also be adopted to present an appropriate University Research Management System (RMS): 1) applicability of the automated system, 2) usability and ubiquity, 3) mobility, 4) being user-friendly, and 5) with featured add-ons such as social media (blogs, communities, and discussions) and search capabilities. Achieving such versatility of RMS may require a special program dedicated to RMS. Since literature dictates that there are yet no available open sources for such system, the present study utilized and customized OJS to suit the requirements of an automated RMS to achieve most of the identified features of RMS as presented in the figure.

In the same vein, Philippine higher education institutions aspire for the same goal—knowledge-reservoir. However, to enhance the Philippine R & D and contribute to the nation's economic growth, quality knowledge management may be instituted in Universities through their research centers. This scenariois also realized in teacher education institutions if they intend to continue being part of quality education in the country. In fact, Vasquez [27] stresses that research is a big help in the improvement of teaching and learning processes. Teachers who engage in research gain wider perspective and become more knowledgeable in solving their own problems related to teaching and learning processes in their own context. Additionally, since teachers are privileged to have access to first-hand information on student needs, learning styles, and other first-hand information, they are at the best situation to engage in activities that would possibly bring change and enhancement in teaching and learning processes and improve student achievement leading to quality education. Equally, Healy [28] claimed that students are likely to gain the most benefit from research in terms of depth of learning and understanding.

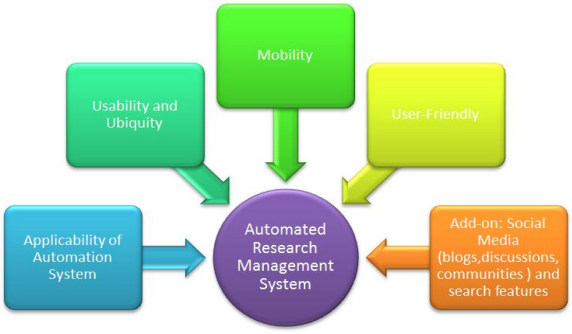

Figure 1: Graphical Framework

Thus, as a pioneering project, the country's National Center for Teacher Education (NCTE) instituted the development of a research portal, which this study presents, to initiate knowledge organization with the aid of technology to fully automate research procedures, publication processes, database management, and research dissemination and utilization.

OBJECTIVES OF THE STUDY

Generally, the study aimed to promote a web-based research management system through designing and developing the University research portal. Specifically, the objectives are as follows: design a web-based research portal; develop the system and try-out of the web-based research portal; and evaluate the extent to which the developed portal has the qualities of a desirable web-based research portal.

METHODS

The study implemented three phases of methods to completely attain the objectives. Phase 1 focused on planning and designing of the University research portal which included inputs from end users, section editors, and research desk managers. Phase 2 featured the development and try-out of the web-based research portal and phase 3 worked on the evaluation phase.

The Participants

Convenient sampling of participants dominated the sampling procedure of the proposed study with a total of 33 participants. End-users: section editors, programmers, and University officials completed the list of participants in the 1st phase of the study. For the second phase, selected full professors and sections editors formed the list of participants in the try-out of the web-based research portal. For the last phase IT experts, administrative staff, section editors, managing editor/director, selected full professors, and selected junior and senior faculty engaged in project-based research grants completed the list of participants.

Invited external evaluators who are article reviewers, IT experts, data-base handlers and journal managers steered the processes in the last phase of the study.

Research Design Phase

Developmental research directed the flow of the study to achieve the objectives. The use of quantitative (using an evaluation rubric) and qualitative (interview and focus-group-discussion [FGD]) approaches extracted pertinent data for the completion of the study.

Research instruments

The following research instruments used deduced all important data in the different phases of the study:

Focus-Group-Discussion Protocol. This is a tool that included open ended questions grouped into: engagement questions, elaboration questions and exit questions deemed necessary to capture all the aspects of research portal development.

OJS System (descriptions and user's quick guide) [29]. The study depended on the open source application developed by Public Knowledge Project with the following features: 1) installed locally and locally controlled; 2) Editors configure requirements, sections, review process and others; 3) online submission and management of all contents; 4) subscription module with open access options; 5) comprehensive indexing of content part of global system; 6) reading tools for content, based on field and editor' choice; 7) email notification and commenting ability for readers; and 8) complete context-sensitive on line Help support. It also comes with a complete set of user's manual and a quick guide as guide for programmers in setting up and customizing the system.

Other applications such as the word press, an open source application maneuvered the content management, adobe photoshop for the design, adobe dreamweaver and PHP platform for the programming section of the system, and MySQL for database.

Scoring rubric is an assessment form for Research Portal in two parts. Part 1 adopted the rubric format with indicators such as: 1) construction and features; 2) design and aesthetics; 3) completeness; 4) accuracy; 5) functionality; 6) usefulness; and 7) user-friendliness. Part two included open-ended questions for qualitative responses of the evaluators.

Procedure

Planning and Designing the Web-Based Research Portal

This phase commenced with the determination of inputs necessary in the design and development of the web-based research portal. Focus-group discussions with IT experts in the University gathered their experiences linked to developing an automated knowledge management system. End-users, section editors, and research desk managers also participated in Focus-Group Discussions (FGD) and interviews to extract the existing processes in the research and publication management which is the focus of the automation process. Document analysis identified the different policies and protocols on research and publication management were featured the web-based research portal.

Inclusive in the planning stage, the proponents and the IT experts did the interface design considering the initial plan for the following: visual appearance, design and site maps, links, menu, sub-menu and content. Word press—an open source application directed the design of the content management system, adobe photoshop directed the design and visuals, adobe dreamweaver and PHP platform delve into the programming of the system and MySQL for the database system.

The proponents conducted six sessions of focus group discussions (FGDs) in phase 1 of the study. The section heads (publication, database, proposal development, monitoring and evaluation, capability building and research ethics) and the IT experts served as the respondents as facilitated by the assigned researcher from the team. All the section heads affirmed their "first time" involvement in a research-based development of a research portal. Each of the section heads provided the detailed processes in every transaction of their working "desks."

Developing and Pilot Testing the Web-Based Research Portal

Development phase showcased a close coordination of the researchers with IT experts, programmers, and selected end-users. Section editors and managing editor or director together with the researchers determined the different sections, parts, and write-up for the different sections of the portal. Data deduced from document analysis identified the write up and features of the research portal. Try-out of the initial designs determined the usability, accessibility, user-friendliness of the portal before evaluation, and validation phase.

Evaluating the Research Portal

Evaluation of the research portal included both descriptive and quantitative methods by IT experts, faculty researchers and staff, and other stakeholders

The initial evaluation results of the web-based research portal were utilized to improve the program or
system. Continuous evaluation in a desired period was conducted to maintain the research management system using Google form to have more reach.

Data Analysis

The third phase of the study calls for the quantitative analysis of data in terms of averages of the ratings gathered through the use of scoring rubrics to determine the extent that the developed portal has the qualities of a desirable web-based resource portal. Indicators for evaluation by the stakeholders were focused on the following: construction and features; design and aesthetics; completeness; accuracy; functionality; usefulness; and user-friendliness. Qualitative data generated from the comments and suggestions were summarized to support the results of quantitative analysis.

RESULTS AND DISCUSSION

Planning and Designing the Web-Based Research Portal

The planning phase of the research portal is anchored to the following directions provided by the University's research domain: 1) developing and maintaining innovative research policies; 2) incentivizing research and publication activities; 3) cultivating culture and excellence in research; 4) transitioning to a research-oriented teacher education university; and 5) moving towards globalization and internationalization. It was envisioned that the portal serves as the University's virtual research arena; an e-assistance to researchers through its database; and a pioneering system that uses a globally-used and accepted system (Open Journal System [OJS]) manage research compliance and grants and research publications. As preliminary for such goals, the use of themes deduced from the focus-group-discussion presented below provided the initial plans and design of the research portal.

The six sessions conducted in phase 1 deduced the major themes that should form the section headings and site map of the research portal as: 1) information about the institution as a research university; 2) research policies in the university; 3) policies on teacher education and education in the country; 4) efforts on research capability building for the faculty and staff; research awards and incentives; 5) policies and procedure on ethics review; 6) gallery of research activities; 7) research management system; 8) archives including faculty and student researches; and 9) resources and links.

After the initial identification of the major menus, all the section heads submitted pertinent documents (in soft copy) like existing policies and procedures, pictures, lists of researches, abstracts of researches and other documents related to their sections from which the experts based their design of the prototype of the portal.

It is worthy to note that the prototype "research portal" served as a reservoir of useful information for researchers. Consequently, the automated parts termed as research management system only include *submission* and *review of proposals* for internal funding and the research compliance by full professors and faculty members at the graduate level. Simulating the said review process adapted the *Open Journal System* platform with some modifications on the contents of each menu sub-sections. Furthermore, the design provided a separate section – Publication Office – to which all tasks related to publication of research articles are linked. Substantially, the OJS application automated the entire publication process.

The information generated from the FGD sessions support the claim of APCRC[16] that research management activities indeed cover the wide-ranging support that a research center or development team offers researchers throughout the research process. With the automation of the research services, such assistance will be able to facilitate better research collaboration and faster production of research products.

The research portal features content management of research and articles; and the publishing system. Holistically, the open journal system as a software provided the complete and concrete merging of the different journals managed by the University for an enhanced and efficient publishing system, and cost effective printing and distribution. With the open access capability, better visibility, readership, citation maybe achieved [30]. Consequently, the same system and program electronically structured the research management of the University research compliance and grants making the software more versatile to

engulf not just publishing and printing but also research management, highlighting its complete capability of content and knowledge management, knowledge creation and dissemination locally and even globally. When fully institutionalized, the web-based research portal addressed what Eid [2] emphasized for higher education to create new knowledge, transmitting this to the stakeholders and to foster innovation.

Developing and Pilot Testing the Web-Based Research Portal

The development of the research portal heavily depended on several items: themes engendered from the focus-group-discussions with the developers and the end-users; the site map generated from the discussions;capability of both the developers and the versatility as well as stability of the program or software (Figure 2).

Figure 2. The Research Portal

Research management and online publishing and submission system of the three in-house journals of the university(Figure 2) depended on the program or software known as the Open Journal System 2.4.5.0is a featured project of PKP, which is an open source journal management and publishing software developed, supported, and freely distributed by the Public Knowledge Project under the GNU General Public License [31].The OJS's publishing flow dictated the customization of journal publishing flow of all the journals. Installation of OJS as dictated by the program used the following systems and procedures:

1. The programmer created a new MySQL database for the OJS installation with the following modules: database called ojs22, the database user called pkpuser, and the password is pw.
2. The programmer also downloaded the OJS/OCS installation package from the PKP website (http://pkp.sfu.ca) [30] and unpacked the archive into the web server's root directory which created a directory ojs-2.2 containing the installation files.
3. The programmer also created a directory for OJS to store its files in. This directory was *not* a subdirectory of the web root. Otherwise it may be possible for private files to be accessed via the web server.
4. The new directory granted file permissions that allowed the web server to administer the public and cachesub-directories of the OJS installation path, the files path created and the config.inc.phpconfiguration file. The specifics of this step also depended on your web serverconfiguration, i.e. whether PHP scripts run SetUID.

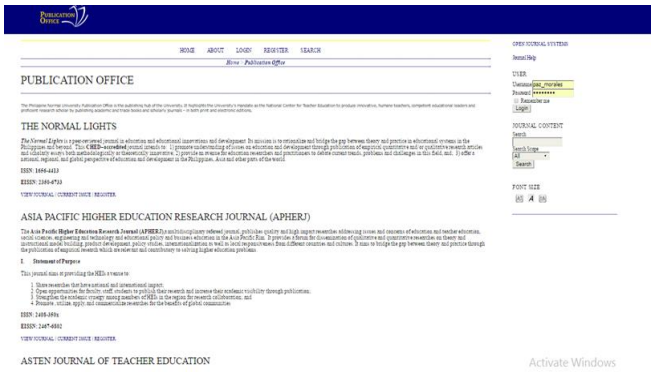

Figure 3. University's Journal Online System

The design and delivery of the intended product—Research Portal—depended heavily on the correspondence and collaboration of the visual designer, the concept designer, the end-users, and the programmers. Although the site map particularly helped out in the programming design, the success of the outcome of the project depended on the continuous and regular communication of the aforementioned key persons. Benchmarking also helped in the development of the research portal. The key persons visited research websites of local and international universities to determine which elements are usually included in the website to serve well the intentions of the research portal. The insights from the benchmarking activities were documented and communicated to the IT group by the key persons. In most cases, the concept designer screenshots online

sites of journals run by OJS, which are presented to the visual designers and programmers as samples and models. Quick run and rapid assessment were done by the concept designer after every step to check if the design and program conform to site map and intended plan.

As the prototype of the research portal was developed, corrections and revisions were spontaneously executed to provide a comprehensive and functionalportalthat can address the need for knowledge management through a portal [12]. The research portal was built with content and features that can facilitateknowledge flow and transfer [9] that is an important aspect of knowledge management in higher education institutions. More importantly, the developed research portal uses the OJS for the content and processes of academic journals published by and through the university. This system addresses the need for concrete content management that is essential in cultivating research and publication [18]. After researchers have agreed on the prototyped version of the research portal, preparation for its presentation and evaluation to stakeholders was conducted.

Categorically, a highlight part of this portal is the automization of OJS to fit the research management system of the university to provide effective and efficient research management which may lead for better research productivity in the University.

Evaluating the Research Portal

First Level Evaluation

Purposively selected (based ontheir work as faculty or staff from the different research centers of the university) faculty and staff respondents evaluated the portal. As can be observed in Table 1, these respondents rated all seven quality indicators as "*high quality*" as the mean rating scores that ranged from 4.00 to 4.43 with an overall mean rating score of 4.26. These results suggest that the respondents have high and positive evaluation of the developed research portal. Interestingly, the highest rating was on the *accuracy* of the portal which suggests that the respondents view the portal as a resource system that provides accurate information. This quality is important as the portal primarily was designed to provide a wide-range of research and research-related information that are useful to researchers and other stakeholders in the university. Apparently, the *design and aesthetics* of the portal obtained the lowest rating. Although this specific indicator was rated "*highly*," this result seems to suggest that the portal may significantly benefit from enhancing its visual.

Table 1. First level evaluation results (N = 15).

Quality Indicators	Mean	Interpretation
Construction and Features	4.29	High Quality
Design and Aesthetics	4.00	High Quality
Completeness	4.29	High Quality
Accuracy	4.43	High Quality
Functionality	4.29	High Quality
Usefulness	4.36	High Quality
User-friendliness	4.14	High Quality
Overall	4.26	High Quality

Poor Quality: 1.00-1.50; Low Quality: 1.51-2.00; Average Quality: 2.51-3.50; High Quality: 3.51-4.50; Excellent Quality: 4.51-5.00

Consistently, the evaluation results matched the qualitative comments of the respondents who evaluated the portal as a good source of helpful and accurate information (e.g. "Presents an integrated resource hub and system for various research activities use a widely-adopted system (OJS) as foundation."; "Very helpful for students, faculty and other stakeholders."; "The portal is exhaustive, useful/helpful."). Some respondents provided positive comments on other quality indicators such as functionality and user-friendliness (e.g. "Pages are categorized well in the navigation bar."; Elements on the pages functions as desired."; "Easy to use and navigate - user friendly.").

Though the respondents rated the portal as "high quality" across all indicators, they observed certain limitations on the portal. Central to these limitations is the need to enhance the features and content of the portal which is understandable given that the respondents evaluated the portal during its initial stage of development (e.g. "Other features need to be added."; "Limited introduction and content."; "Needs education data; mimic the monitoring of on-going research.").

Second Level Evaluation

In the second level evaluation, randomly selected 16 faculty and staff respondents, two IT experts, and administrators rated the research portal. As observed in Table 2, the respondents rated six of sevenquality indicators "high quality"with mean rating scores ranging from 3.88 to 4.50, whereas they rated one quality indicator "excellent quality" (M = 4.67) for an overall mean rating score of 4.35. Similarly, these results suggest that the respondents have high and

positive evaluation of the developed research portal from which we can infer that these participants see the portal as something useful for them in their research undertakings.

Interestingly, the ratings for five of the seven quality indicators were relatively higher compared to the ratings for the same indicators in the first level evaluation. Expectedly, these results seem to suggest that the proponents instituted the changed deduced from the first level of evaluation as evidenced by the enhanced research portal. Respondent rated "usefulness" as highest which may be inferred that they seem reflect on the resource portal as a useful and valuable resource material for them. Similarly, the lowest rating was on the design and aesthetics of the portal. While this specific indicator was still rated highly, its mean rating was relatively lower compared to the mean rating on the same indicator in the first level evaluation. This result suggests that the portal still requires significant enhancement on its design and aesthetics.

Table 2. Second Level Evaluation Results (N = 18).

Indicators	Mean	Interpretation
Construction and Features	4.33	High Quality
Design and Aesthetics	3.88	High Quality
Completeness	4.28	High Quality
Accuracy	4.44	High Quality
Functionality	4.50	High Quality
Usefulness	4.67	Excellent Quality
User-friendliness	4.33	High Quality
Overall	**4.35**	**High Quality**

Poor Quality: 1.00-1.50; Low Quality: 1.51-2.00; Average Quality: 2.51-3.50; High Quality: 3.51-4.50, Excellent Quality: 4.51-5.00

Consistently, the evaluation results matched the qualitative comments of the respondents who highlighted the strengths of the web-based portal. For some of the respondents, the portal is evaluated as functional, useful and user-friendly (e.g. "*The portal is very useful and practical."; "Almost complete features/component related to research, links, forms and other parts are helpful."; The research portal can be easily navigated. Most of the information is present."; "All information needed are seen in the research portal; user-friendly."; "Information are complete and presented comprehensively, forms are already available for download, other external links about research are also available (e.g. DepEd policies, CHED policies)."*

While the respondents gave generally positively feedback and high ratings, they noted certain limitations on the research portal. Consistent with the results of the evaluation rating using the scoring rubric, the respondents emphasized design and aesthetics as the portal's limitation (e.g. *"Maybe its font does not fit its design. It will be better to have blue as the font color but without highlight.", "We can also include the PNU logo on the header."; "Not attractive, looks too basic."; "The menu-ribbon is too long to be viewed in just one screen."; "Bigger font please!"; "Many pages can be merged. Too many pages can make browsing look like going through a maze."; "Very simple design, maybe we can hire a web designer for more improvement of the portal."; "The design and aesthetics of the website should be within the international standards."*

CONCLUSION AND RECOMMENDATION

The University's concerted efforts geared toward its transformation into a research- oriented teacher education university to keep up with the challenges and demands of knowledge generation and international competitiveness are partly captured through this research project. Specifically, the web-based research portal developed and evaluated through this internally-funded project is an initial step in providing fast, systematic, and organized research management system that will keep record and track all research activities in the university. It further addresses the needs of the researchers for a reservoir of information that could assist them from conceptualization to completion of researches on teacher education or education in general to publication. The portal presents an accessible research management system which offers automated replies to research submissions, self-tracking system, faculty research organization and reviewers' system organization.

The results of the evaluation suggest that the web-based research portal is a functional, useful, and user-friendly resource portal with construction and features capable of providing complete and accurate information and other research-related resources. The portal also has good design and aesthetics but the evaluation results point to the need for enhancement in this area. As a whole, the portal is deemed to have high quality and has useful features that are important for end-users, especially among researchers and prospective authors in the journals managed by the university. While certain limitations were identified,

the portal has strong potential for further improvement across the various quality indicators. Thus, the web-based research portal should begin to be fully operational and be accessible to the various stakeholders of the university and beyond.

It is recommended that the portal be publicized to the best extent possible to allow more stakeholders to use and benefit from the features of the portal. When it begins to become fully operational, mechanisms for enhancement, monitoring and evaluation, and maintenance and sustainability should be in place to ascertain that the portal would continue to operate the way it was envisioned and designed. One important feature that should be prioritized is the development of a program for the automation of the monitoring system of all the research production in the university. Another feature that should be incorporated in future enhancement of the portal is to make the portal more interactive by providing a program that would allow real time interaction among users. As web-based and digital technologies continue to make progress, the management of the portal should keep abreast to such progress.

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