

Online Portal Requirements for Computer Science Researchers in Kenya

Stephen Kimani and Daniel Gitahi

Abstract: Computer science research is an expensive undertaking which often requires procurement or availability of expensive state-of-the-art specialized research tools, facilities and forums, which are not readily available in developing countries due to limited financial resources. In addition to this, the available initiatives and portals to address this issue do not provide enough resources and opportunities that are directly relevant to researchers in computer science. They are also not designed with contextual needs and preferences of computer science researchers from developing countries. This research work, therefore, describes a study, in which online portal user requirements of computer science researchers from Kenya, one of the developing countries, are analyzed taking into account their contextual needs and preferences. The study majorly sought the challenges encountered by the aforementioned researchers. In addition, it looked into features and services desirable for Computer Science researchers as well as the most important design characteristics that should be incorporated in an online portal to overcome reported challenges by Kenyan computer science researchers. Building on the findings of this study, we intend to design and develop an online portal that will provide a consolidated or integrated channel to computer science resources and opportunities for active and potential computer science researchers from a developing country, Kenya.

Keywords: Online user requirements, online portals, Computer Science, researchers, developing countries.

I. INTRODUCTION

Research materials meant for computer science researchers such as books and journals, and forums such as conferences and workshops, are normally expensive. This is especially the case for potential computer science researchers from developing countries like Kenya. World Wide Web (WWW) holds a lot of resources offered freely or at nominal prices that can be of great help to researchers. However, these resources are usually scattered all over the WWW making it difficult for the computer science researcher to effectively and efficiently find, manage, and exploit them. Additionally, these researchers face numerous challenges such as limited internet access due to poor internet infrastructure. Other challenges include inconsistency and subscription fees needed in accessing these resources. To address these challenges, it is important to develop an online application or portal that provides a consolidated or integrated channel to all computer science research resources as well as opportunities that are relevant to all researchers including those from developing countries.

This paper describes requirements of an online portal for Computer Science researchers in Kenya. It puts into consideration the challenges they face, design features they would want incorporated in the portal and the specific services and features that the portal should provide.

II. RELATED WORKS

Over the past few decades, web portals have become gateways through which resources and information found online are accessed. This has risen following the emergence of Web 2.0 technologies and availability of large volume of content found online. As indicated by Arthur[2], a web portal can be seen as an all-in-one website that provide access to other websites and services of guiding and directing users to relevant content, thus shielding users against chaos of the internet. In respect to research- oriented perspective, there exist several initiatives and portals that provide access to career and literature resources. They include: Science Careers (SC) that provides career resources for scientists as well as effective recruiting solutions for employers [6], Online Access to Research in the Environment (OARE) [5] that makes global scientific research in the field of environmental sciences available online to environmental scientists, researchers and policymakers in the developing world for free or at nominal cost, Health InterNetwork Access to Research Initiative (HINARI) [4] that enables developing countries to gain access to biomedical and health literature, Access to Global Online Research in Agriculture (AGORA) [1] that provides free or low cost access to major scientific journals in agriculture and related biological, environmental and social sciences to public institutions in developing countries, and the Global Development Network (GDN) [3] which supports multidisciplinary social science research in order to increase local and policy- relevant knowledge and make it easier for researchers and policymakers to share knowledge, thereby advancing development.

However, none of these portals provide resources and opportunities that are directly relevant to researchers in computer science. In addition to this, the design and structure of these portals do not address contextual needs and preferences of computer science researchers from developing countries.

Efforts, however, have been put by previous works, looking into different aspects related to portal development. In a research conducted by Chen et al. [8] that described the design of a contextual information portal, it is evident that informational portals are useful particularly for groups that experience poor network connectivity or lack internet access. They noted that in developed countries, good network and internet connectivity gives users luxury to use many search queries in a search engine, thus retrieving particular information of interest from the World Wide Web. They contrast this with developing countries and

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note that users in rural areas lack this luxury due to poor network infrastructure and low bandwidth connections. Addressing the same concerns, Chen et al. [8] pointed out that a contextual information portal for developing countries should be low cost as well as scalable, and should be both searchable and browse-able in a fashion that is consistent to the appropriate context.

In a similar work by Sergeant et al. [9] that sought to gather user requirements needed for the development of a portal-based virtual research environment, focusing on Geography and Medicine research staffs, it is evident that users require an easy to use tool that is available even in areas with poor network and internet connectivity. According to the findings of their study, information finding, funding, collaborations, and research outputs are of great concern to users. According to Sergeant et al. [9], ease of information finding in a portal determines the audience gathered by a particular portal. In their study, respondents indicated that researchers need an easy to use tool through which they can search multiple data sets using advanced search mechanisms. The tool should also allow researchers create their own personalized search strategies. Addressing the funding concern, respondents in Sergeant et al. [9] study reported that a portal should additionally give alerts to new funding opportunities, view previously submitted works and should generally simplify grants management. For collaboration as a concern, respondents raised the need of email access via portal alongside working collaboratively on files and documents, and finding out expertise among themselves. Finally regarding research outputs, the study revealed the need for a place to access full-text publications

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The findings reported by Sergeant et al. [9] conforms to findings reported by Kimani et al. [7] in a study that entailed online portal requirements for Kenyan female university science & technology students, researchers in developing countries. The challenges echoed in these two studies show that portals are crucial tools in research-oriented groups. According to Kimani et al. [7], female science and technology students lack internet connectivity and adequate web resources to conduct their work. The study also reported user requirements for a portal that would address their concerns. The respondents in this study indicated that a portal that provides information about scholarships, job search, career advice, expert advice, technical support, and contests & awards would suit their needs.

Despite the fact that all these studies revolve around portal-based technology to address the issues pertinent to information needs in developing countries, none of them looked into the contextual needs of computer science researchers in respect to resources they need and challenges they face. For this purpose, this paper presents findings on user requirements for an online portal for Computer

Science researchers in Kenya.

III. STUDY SET UP

The main aim of this study was to determine the requirements for an online portal for Computer Science research resources and opportunities that are relevant to Computer Science researchers in Kenya. As our major primary data collection method, we designed and administered an online questionnaire that was distributed via email targeting computer science researchers in Kenya. The questionnaires were administered between June and September 2016. Out of the contacted target respondents, 63 responded and our analysis is based on the responses of these respondents. The questionnaire had questions on: demographics of computer science researcher respondents, internet access and usage, familiarity with existing portals and challenges faced while using them, and desirable requirements for an online portal for Computer Science research.

IV. INITIAL FINDINGS AND PRELIMINARY USER REQUIREMENTS

The respondents are computer science researchers, majority of who have research interests in Artificial Intelligence, Web Design, Computer Security, Computer networks, Data Mining and Warehousing, Human Computer Interaction, Software Engineering, Database Systems, and Mobile Computing. 34% of these respondents have conducted research in computer science for 1 year or less, 31% for over 1 year to 3 years, 22% for over 3 years to 5 year, while 13% have conducted research for over 5 years. As a major source of information in computer science research, 33% use online journals, 24% use conference papers, 22% use e-books, while 21% use web portals.

In order to understand the nature of an integrated and personalized portal that would primarily address the needs of computer science researchers, we sought the main challenges they face while using the existing portals, the design features they would want incorporated in the portal, and the specific services/features relevant to their research work and activities. The findings are as presented below.

A. MAIN CHALLENGES

Computer science researchers face a number of challenges. According to the study, out of the 63 respondents, 44 (70%) indicated that most of the content requires subscription/payment, 36 (57%) lack awareness about the existence of web-based resources for computer science research, 28 (44%) experience slow internet access, 24 (38%) lack web-based resources for computer science research and those available are inadequate, and scattered all over the world wide web. In addition, 23 (37%) respondents highlighted unreliable/intermittent internet access as a challenge while 20 (32%) said they lack internet access. Further, 18 (29%) respondents indicated that content and design of the few available resources is not relevant to the needs of researchers from developing countries while 16 (25%) raised concerns about their online privacy and trust. However, lack of time was not raised as a significant challenge since only 4 (6%) of the respondent lack time to conduct their research activities. These challenges can be seen in Fig. 1.

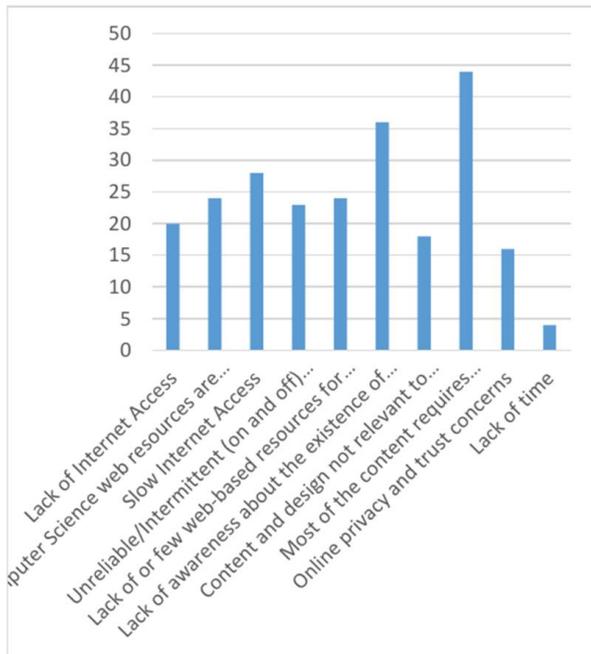


Fig.1. Challenges that Computer Science Researchers experience

B. Design Features

Computer science researchers also indicated the importance of design features they would want included in an online portal for their research activities. According to the study, 75% of the respondents reported efficiency and protection of user privacy as very important features, and 70% reported that provision of help facilities, response to user instructions and ease of navigation and access to items of interest are very important features to include in the portal. 68% highlighted ability to enable users recognize, diagnose and recover from errors as a very important feature. In addition, 67% reported that easy to reverse or cancel action, and easy to understand and use are very important features while 65% indicated that familiarity and metaphors, provision of error prevention mechanisms and keeping users informed about its current state are very important features too. Consistency and provision of all services/features user wants were also reported as very important features, taking 62% of the respondents. Further, it was reported as very important that the portal be visually appealing, provide more than one way of doing things, and be personalized to the specific needs or profile of users by 56%, 54% and 52 % of the respondents respectively as seen in Fig.2.

C. Desired specific services/features

In respect to the specific services/features relevant to their research activities, computer science researchers rated their importance as very important, important, slightly important and not important.

According to the study, accessibility of e-books, information on successful computer science researchers

from developing countries, journal publications, research grants, conference proceedings/publications, and research news/events, topped the list of the very important specific services/features reported by 84%, 83%, 79%, 78% ,76% and 73% of respondents respectively.

Following closely is accessibility of research jobs with 68% of respondents, and research career advice, academic scholarships & bursaries, research awards & prizes, research fellowships, and support of online discussions & forums each reported by 67% of respondents.

In addition, accessibility of research mentees and research mentors were also reported as very important services by 62% and 63% of the respondents respectively. All the other listed as specific service/feature were reported as very important as well but by less than 55% of the respondents as expounded by Fig. 3

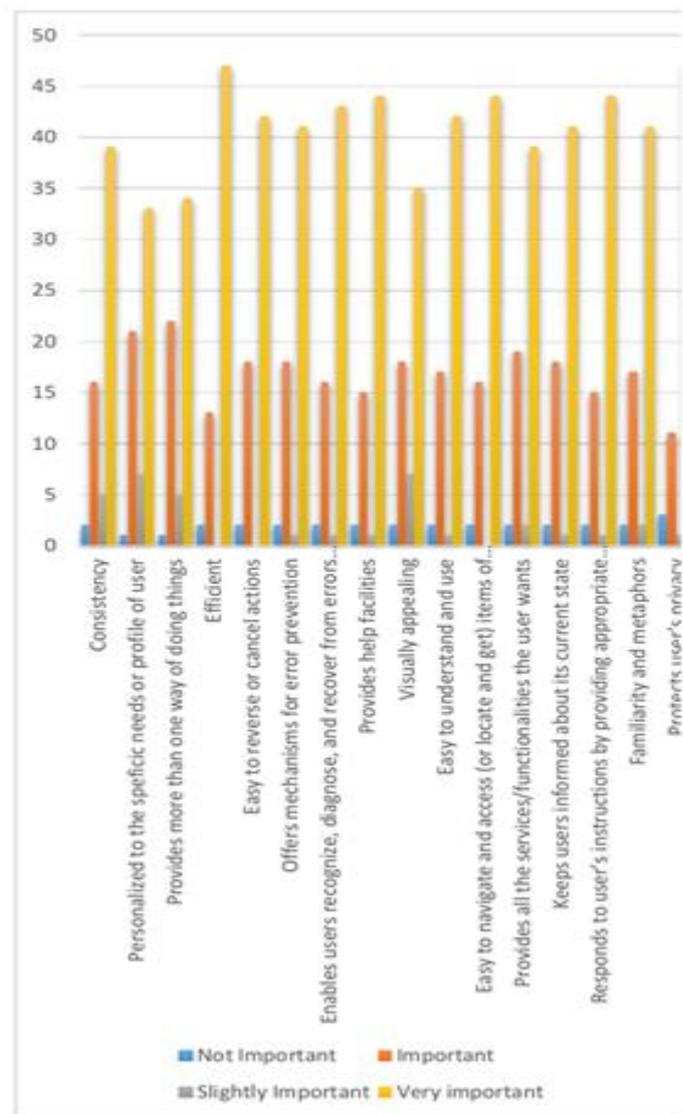


Fig.2. Design features for Computer science researchers' portal and their importance.

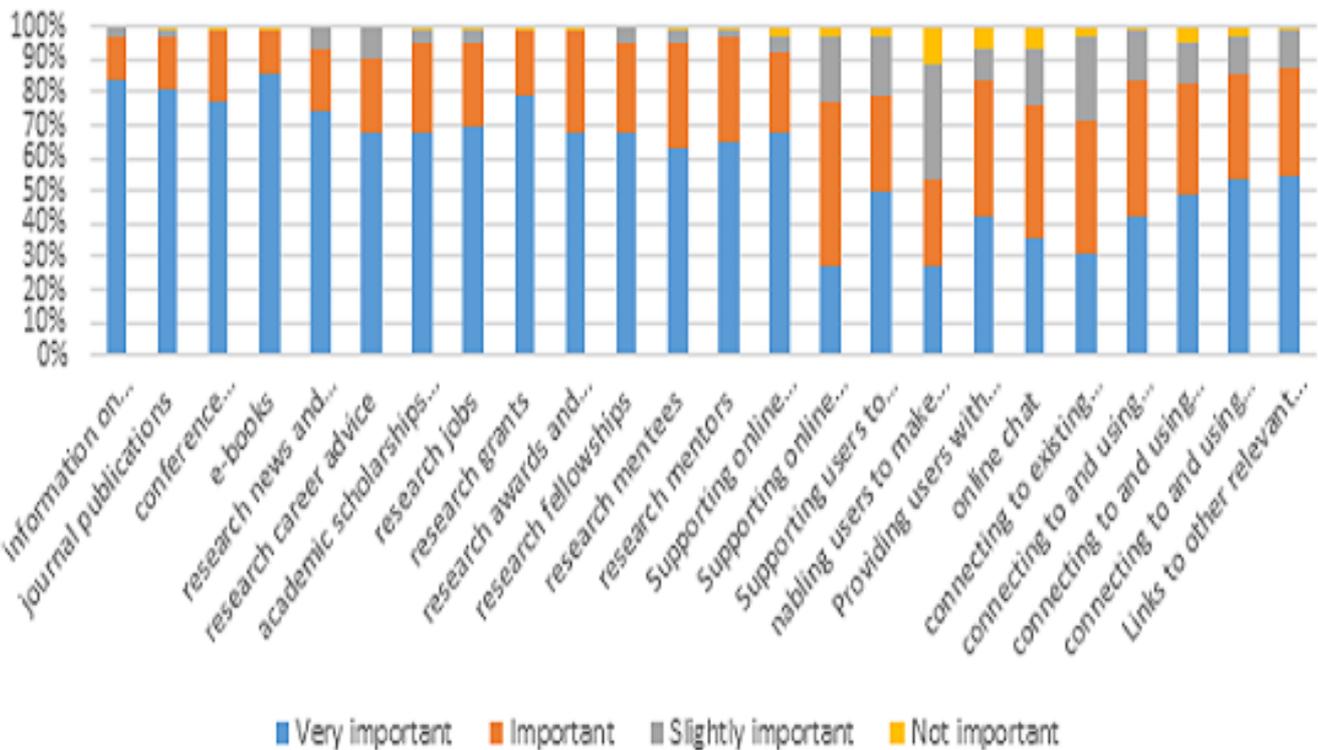


Fig.3. Desired specific services/features for a computer science research portal and their ratings

V. DISCUSSION

Among the key outputs of this study are main challenges faced by computer science researchers, design features that would be included in a portal to address the challenges identified and specific services/features relevant to computer science research activities. The main challenges highlighted by this study rhyme with the findings of Chen et al. [8], which recommended a portal with topic extraction, document classification, focused crawling, and information organization. These seek to address the challenge that contents are scattered all over the web. Chen et al. [8] also noted that provision of high bandwidth in developing regions is economically infeasible citing factors such as low demand and high cost of connectivity. This reflects the challenge of lack of internet/intermittent connectivity unveiled in this study, which directly relates to lack of awareness about existence of web resources. On the one hand Sergeant et al. [9] reported the need for information finding, funding, collaboration, and research outputs. This current study on Kenya on the other hand has reported the need for information about scholarships and bursaries, research grants, fellowships, online support for collaboration, and research mentors and mentees as a reflection of sharing expertise in science research resources and opportunities to active and potential computer science researchers in Kenya.

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