Management of Self-directed E-learning from Open Access Journals in Science Education

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Abstract. At present, Open Access (OA) becomes a widely recognized format for publishing scholarly articles and these materials are useful for self-directed E-learning. However, the potential of utilizing OA journals as studying material remains underexplored and efficient management of this process is difficult. Considering the fast expansion of OA articles, it is meaningful to discuss the topic in details from all related aspects, especially from the perspective of science education. This paper expresses authors’ perspectives for current understanding on the impacts of OA on society and education, the pros and cons of OA for self-directed E-learning. Meanwhile, the paper outlined three basic characteristics of self-directed E-learning. Furthermore, the work proposed several key processes for efficient management of self-directed E-learning from OA journals from their teaching practices and discussed many other considerations regarding this studying strategy with the aim of promoting modern science education.

Introduction

Self-directed learning is a process of learning independently without the assistance of others. The studying process includes taking initiatives, diagnosing needs, formulating goals, finding resources, choosing strategies, and evaluating outcomes. During self-directed learning, learners decide not just what to learn, but also where to start, as well as how to handle, even when to stop. In any given circumstance, no matters learn alone or in-group, learners manage the total learning process by themselves unlike traditional process which is teachers driving [1].

In terms of E-learning, it is also well known as digital learning or online learning, which matures along with the development of the internet and information technology (IT). This method increases the utilization of resources and improves long distance communication and collaboration [2]. Nowadays, E-learning becomes popular as the internet can supply tons of resources and experts give guidance far away. Along with the maturation of IT, self-directed E-learning can be more effective and efficient [3]. Comparing to traditional teaching, E-learning can disseminate knowledge through video, picture, and in combination with all kinds of media, which are more attractive to learners. By human-computer interaction, restrictions on time and location can be broken during this kind of schooling. By self-directed e-learning, learners choose their own learning method, learning content, and control learning process [4].

1. Characteristics of Self-directed E-learning

1.1 Time and location flexible

Based on the website and computer, it is very flexible on time and location for learners to conduct E-learning. Anywhere, anytime, learners can learn on various data-storage apparatus. They
may be either personal computer (PC) or mobile phone, no matter online or offline by themselves. Although discussion or communication can be only available when both sides (lecturer and learner) are surfing on line at the same time, there is no requirement to meet each other at the same place. This is much appealing for those who are frequently moving outside.

1.2 Persistent learning

Along with the fast development of IT, tons of studying materials can be permanently stored in a tiny card. This made persistent learning become technically possible. In fact, nowadays more and more learners begin to record, maintain their learning process digitally. They can repeatedly use these materials without limitation, and can cite freely. Even more, learners can ask they concerned questions from authors anytime and they can save answers from others, either peers or experts, as long as they need. Unlike traditional textbook, digital studying materials can be recorded on videos or tiny disks easily, and these portable devices can be used for learning during jogging or excising.

1.3 Hardware and software dependent

E-learning is based on the running of hardware and software. Implementation of connection and interaction between learners and studying materials can be possible unless these criteria achieved. For example, science learning process needs both searching literature and analyzing data. Therefore, a higher performance central processing unit (CPU) and much smart software are undoubtedly facilitating self-directed E-learning. Meanwhile, the superiority of the hardware and software also has much impact on the efficiency of the learning process.

2. Open Access Journals as New Studying Resources in Science

Open access (OA) journals are scholarly journals that are available online to the reader without barriers (e.g. subscription, licensing fees, copyright and licensing restrictions) [5]. They publish digital articles online quickly and spread knowledge worldwide within seconds. In September 2016, there were 9203 OA journals listed in the Directory of Open Access Journals, publishing 2,309,483 articles, ranging from 129 countries (https://doaj.org/oainfo). In science education, gold OA is particularly appealing to self-directed learners [6]. For authors who are self-directed learners themselves, OA gives them a worldwide audience, significantly improves the visibility and impact of their work. After rigorous peer review, quality of OA articles is considerably assured. As new emerging studying resources, readers can reprint, use, and distribute these articles freely in any form under the copyright license. OA makes them access to the literature free of barriers, unconstrained by the budgets. Gratis online literature facilitates full-text searching, mining, summarizing, querying, linking, alerting, and other forms of processing and analyzing.

3. Impacts of Open Access on Society and Education

OA does not just benefit academics, but also has wider influences on ordinary citizens [7]. It makes research accessible to anyone and supports sustainable lifelong learning. In theory, OA affects anyone who uses the internet for learning, and makes knowledge can be used in different ways. In a broad sense, OA means open science, which makes science more efficient, transparent and interdisciplinary. Open data is one part of open science. Open data is critical to scientific progress and reproducibility. Recently, together with OA text, open data become a universal requirement for publication (e.g., PLOS, http://journals.plos.org/plosone/s/data-availability). Except open article and open data, open evaluation pledges to address the problems of the current assessment systems [8]. All these diverse methods changed the interaction between science and society, and enable broader impact on society and education, as well as innovation. There are several beneficial impacts of OA on human education. For instance, publicly available materials can be used to stimulate innovations, such as development of new concepts or methods. Articles and data stored on the website enable repeated utilizing and opening up novel avenues of self-directed E-learning. Analyzing immense volumes of unprotected data can yield novel and perhaps surprising...
findings [9]. Moreover, OA provides a digital backup for datasets, protecting valuable scientific resources.

4. Pros and Cons of E-learning from OA Journals

With the help of IT, the self-directed and inquiry-based method has incomparable advantages contrasting to traditional method. At first, subjective positions leave to learners when they are sitting in front of computers. Relative to any machine, learners are masters. Once any tasks or studying materials assigned, the initial impression of learners is they have to deal it by themselves. Secondly, learners have free choice to select the subject they have an interest in and learn with any method at any pace, as tons of studying materials are easily obtainable. Thirdly, there is no restriction on age of learners. Learners are not required to worry about numerous social problems and self-learning protects them from peers’ pressure. Fourthly, E-learning of OA journals is helpful in the development of independence. In the absence of teachers, learners can learn more critically and more glad to post questions [10]. During self-learning of OA articles, learners can easily abstract important information, search related topics, and compare different results. All these activities are beneficial for the understanding and digesting of knowledge. Inevitably, there are a few disadvantages for E-learning from OA journals. For instance, without the guidance of lecturers, learners may ignore the logical consequence and omit many essential preconditions, thereby resulting in incorrect conclusions. Furthermore, self-directed E-learning from OA journals needs relatively strong cognition and discrimination ability, which is generally incompatible in adolescents. Therefore, this method can be more effective when learners had accepted higher education.

5. Practices for Efficient Management of Self-directed E-learning

To be efficiently managing self-directed E-learning from OA journals, four processes are developed. Generally, they are the selection of resources, reading exercise, development of plan and analysis of support information, and posting as well as answering questions [11].

5.1 Selection of resources

The goal of this step was to get learners identify suitable resources for self-directed learning. Learners need to examine the relevance and usefulness of OA articles from unlimited online resources before using them as studying materials. Firstly, they usually find related topics by searching with keywords. Therefore, quality of corresponding results after searching is largely determined by appropriate keywords. If possible, they should use concrete and concise keywords. Meanwhile, learners should perform searching within a professional database, like PubMed (https://www.ncbi.nlm.nih.gov/pubmed/). Secondly, after get a long list of all related papers, learners have to browse the title of these articles quickly. Learners have to identify the reliability of sources, and rate each source in terms of relevance and significance. After a primary screen, it is convenient to glance over the basic information of all OA articles, including the paper title, journal names, and date for publication. Generally, the title of a paper suffices to attract readers’ attention. Subsequently, thoroughly skimming of the immaterial can confirm whether these resources deserve careful selection. The criteria for including or excluding particular journals are equally depends on the reputation and quality.

5.2 Reading exercise

Exercise of reading helps the learners optimize their journal-reading time and habits. It was found that learners prefer reading journals to all other educational activities [12]. That is because learners can benefit more from reading of journals if they were given the opportunity and formed the habit to select the most interesting articles. Reading exercise does not single reading, but also understands a variety of techniques like planning, scanning, surveying, and abstracting. These exercises teach learners how to scan potentially relevant articles, how to read the most influential literature.
intensively. The purpose of intensive reading is reading for a high degree of comprehension and retention over a long period. These materials will need to be understood and remembered. To obtain detailed comprehension and long retention, some basic principles of intensive reading must be persisted, such as over-reviewing, line-to-line reading, summarizing, and understanding. Reading strategies are changed between library-reading and textbook-based home-reading and self-directed E-reading when learners using journals as the primary source.

5.3 Development of plan and analysis of support information

The dynamic nature of knowledge and the need for maintaining professional competence reinforces the importance of life-long learning. To complete the learning task using OA journals as studying materials, learners need to develop a realistic and specific offensive plan for accomplishment of their goals. Learners must be mindful about the amount of content online as there are oceans of literatures. At the same time, the whole studying process should be considered as one continuous learning experience. Therefore, learners should consider at least four steps to establish a successful plan, including gathering information, making a draft plan, evaluation of the practicability of the plan, and formation of the plan for adoption. For example, to accomplish the self-directed work sessions effectively, learners can plan to read five pieces of OA articles each week, and spend approximately 2-hours on one piece of worthy articles every day. When papers were available in OA journals, it was customary to put ample data as supplementary information for briefness. Sometimes, it is also essential to analyze these support information. Analysis of support information is exclusively helpful for extensive online learning regarding a specific topic.

5.4 Posting as well as answering questions

At this step, one aspect, learners practice posting questions before or after reading of OA articles. Questions can guide learners to pay more attention to the corresponding content, which links to the problems they once confused about ahead of reading of OA journals. Posting questions after reading can enhance understanding and inspire new ideas. Thereby, these questions urge learners read more literature to explain to a specific topic. During this process, learners can address, consider, and format a plenty of questions relating to the design of the experiment, the analysis of the result, and statement of the conclusion. While, answering question is an indication of the comprehension levels. Only they can correctly answer questions posted before reading of OA articles, the learning process is effectual and fruitful [13].

6. Other Considerations during Management of Self-directed E-learning

Though learners can obtain digital information quickly, this online information does not equal knowledge. The knowledge needs a process of digestion and absorption. The difference between information and knowledge reminds learners focus on cognition, understanding, and transformation of information during online learning [14]. This process requires the learners to consider, analysis, and judgment. Online learning is not simply reading online, or downloading the information on the package. More crucial is to convert information into knowledge and transform it into the learner’s wealth.

Only under right judgment, knowledge can guide appropriate behaviour. From this opinion, improved information processing ability of self-directed learners is of major importance [15]. In contrast, during E-learning, many learners are inclined to fill their head with information like containers. They like find answers online without independent thinking at first. Even more, some learners are superstitious to online materials. Meanwhile, self-directed E-learning is not individual learning without communication. It is also compatible with collective learning. Network enhanced the dynamics and diversity of knowledge [16]. If one neglected the social feature of network learning, he will lose more abundant, diverse learning resources, and will not be able to balance the little effort of individual and intense effort of the community. In addition, he will be unable to fully enjoy the power of the Internet.
The essence of the network is resource sharing. During self-directed E-learning, learners should focus on exchanges and cooperation. Learners should properly express their opinions; absorb ideas of others; communicate with peers to share their outcomes. Despite the fact that we can make full use of information technology, virtual network cannot replace the actual environment. E-learners must be skilled at self-adjustment. Even they become the master during information collection and in the virtual life; they should alarm to overwhelmed information or indulgence in virtual life.

References

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