

A Survey on Digital Rights Management in Distance Education

Ajit Kumar Singh^{1*}, Sunil Karforma², Sripati Mukhopadhyay³

^{1,2,3}Department of Computer Science, The University of Burdwan

*Corresponding Author: ajit.argh@gmail.com, Tel.: +91-9474882471

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Abstract: The basic purpose of Distance Education (DE) is to provide quality education regardless of time and space for those who do not continue his/her education in traditional mode due to several reasons. In the digital era, DE uses Digital Rights Management (DRM) to promote quality teaching for all. DRM manages and protects any digital creation, in the education domain, it is used to protect and manage Intellectual Property Rights (IPR). There are many distance education system running around the globe and spreading the essence of quality teaching. In our survey we try to focus on DE, DRM, needs of DRM in DE and discuss some pioneer DE systems that use DRM worldwide and also propose a model DRMSDE for Distance Education system using DRM.

Keywords: Distance Education (DE), Digital Rights Management (DRM), Intellectual Property Rights (IPR)

I. INTRODUCTION

Distance Education (DE) is the most demanding and popular education system parallel to traditional education around the globe. The reason behind the popularity of DE is flexibility in time and place. In DE the learner can learn in different places at the same time (education through telecommunication) or can learn in different places at the different time (e-learning, virtual university) [1]. First correspondence course run by Eminent Historian Febreick Turner for the University of Wisconsin in the late 1800s. The University of Chicago, the University of Wisconsin and the University of Iowa was a pioneer in correspondence education in the later years of 19th and early in the 20th century [1]. In India, DE started in 1962 with the establishment of Correspondence Course in Delhi University [2].

Technological growth was also improving the mode of communication between experts and learners as well as the quality of DE. Thomas Edison predicted use of motion pictures for learning in 1922. In WWII US Army use videotape to train an employee [3]. In 1940s satellites are used in DE. US Army uses the internet for sharing of scientific and technological information. The table below represents milestones in DE.

Table 1. Milestones in Distance Education

Name of Country	Country	Year of Establishment
National Higher Distance Education Program	China	Late 1970 and early 1980
The National University of Distance Education	Spain	1972
Anadolu University*	Turkey	1981
Indira Gandhi National Open University	India	1985
Open University of Hong Kong	China	1989

*Largest University on Earth

Now it is clear that the demand for DE increases day by day, but the major obstacle towards the development of DE is maintaining Intellectual Property Rights (IPR) protection [2]. IPR are the rights given to people over the creations of their minds (WTO, 2003) [4]. For the protection of IPR copyrights act are introduced and violation of this is a punishable offense in many countries. But now in the digital era, it is very easy to violate copyrights act, so amendments in copyrights act towards digital creation are heavily required. Some of the major steps taken toward the betterment of copyrights for digital materials are[5,6,7]:

- World Intellectual Property Organization (WIPO) copyright treaty adopted in Geneva in 1996.
- WIPO is implemented in the US by the Digital Copyright Millennium Act (DCMA) in 1998.
- The European Union passed the EU Copyright Directive in 2001.

- Rights to information networks Protection Ordinance implemented in China in 2006.
- India bringing Indian copyright law into compliance with WIPO in 2012.

Making a law for the protection of intellectual property is not enough. We need some technological support. Digital Rights Management (DRM) is the technological control and protection of IPR for any digital creation. It allows the authorized user to use digital content according to their rights and restrict the unauthorized user. DRM covers description, identification, transaction protection, tracking of digital creation.

DRM is a vast domain that covers all digital creations. In DE domain some specific demand on it. In DE all teaching institutions, colleges, universities, companies, and schools are independently working to provide their own Digital Contents (DC) and promote a cost-effective exchange of DC. Learners participate in the learning process and reuse the DC. Each institution has its own policy regarding distribution of DC and protections of rights of different users of DE. DRM can easily cope up with every single policy and enhance the quality of DE. The earliest application of DRM appears in 1980 for software protection.

II. NEEDS OF DIGITAL RIGHTS MANAGEMENT IN DISTANCE EDUCATION

In DE, DRM used to protect DC and Digital Library (DL) and control their use for different users of the system. It allows authorized user to access digital assets as per their access rights and restrict unauthorized user access. The main objective of DRM is to protect the content creator regardless of the final user [6]. It is clear that DRM is very much needed in DE to advocate this we raised the following points:

A) Copyrights Protection

DC that includes lecture notes, audio tutorial, video tutorial, assignments, reference books, journals etc. are the assets of DE that used by learners and other users for different purposes. This DC is governed by copyright rules. One of the major factors on which success of DE dependent is the management of copyrights rules. The rights management of DE need:

- DC can be viewed by learners according to their course. Learner of one course cannot view DC of other courses.
- DC can be downloaded and for a pre-agreed quantity to be printed with watermark [8].
- DC cannot be updated by the learner.

B) Copy Protection:

Copy protection is a little bit difficult for non-digital documents in comparison with digital documents because

for the print document we have to compromise with quantity and invest some amount of time and money for duplication. But in the case of digital documents without investing time and money, we create multiple copies of the same quality. In the case of DE, DC can be copied with perfect quality and these copies can easily be transmitted to hundreds or thousands of others [9]. Making the law for protection is not enough for digital documents. Hence a technology-based protection work to protect digital works [10].

C) Usage Tracking

Non-digital documents' movements from source to end users are easily tracked due to physical nature [9]. But for digital material, such tracking is not available. In the digital world, one can distribute huge digital content by just sitting at their desk. So, it is very essential for digital content to prevent unauthorized use and distribution [9].

D) Digital Library Protection: Digital Library (DL) is the backbone of DE. DL can provide a simple and fast method for the learner to use DC. Protection of DL is an important issue. Due to lack of effective rights definition, several authors hesitate to digitize their work. Learners and all the users of DE must be aware of the conditions for using, reusing and modifying content in DL [9]. DE authority needs to take big steps towards usage rights for the learner and other users of DE.

III. SOME DISTANCE EDUCATION SYSTEMS WITH DIGITAL RIGHTS MANAGEMENT

From the previous section, it is clear that DRM is essential components for the success of DE. Now in this section, we are going to discuss some DRM based education system.

- *JORUM:* The dictionary meaning of 'jorum' is a large vessel here it represents large digital repository. The Joint Information Systems Committee (JISC) is designed an e-Learning repository for staff in UK Universities and colleges to share, reuse and repurpose e-learning and teaching resources (JORUM). Teaching and supporting staff create the repository and used it for preparing the lesson plan for students. A part of this repository is using DRM for security. Some materials of JORUM are free but some are not free [9]. After successful service of 13 year JORUM stopped on 30th September 2016 [www.jisc.ac.uk].
- *CeLeBraTe:* The Context e-Learning with Broadband Technologies is an initiative taken by European Commission's Information Society Technologies for enhancing teaching and learning among 500 schools across Europe. Some of the major partners of this projects are European Ministries of Education, Hachette Multimedia (France), GiuntiLabs(Italy), Sanoma WSOY(Finland), Sun Microsystems and Digital Brain(UK). CeLeBraTe is the support system of

European Learning Networking(ELN). It provides options to ELN that either to publish metadata to the central repository or store it locally [11]. CeLeBraTe supports exchange of learning objects through a secure and controlled environment [9] for this a sophisticated DRM technology is implemented. It includes right expression language and rights management protocols and uses MPEG21 and XrML[12].

- eduSource*: This is a project by Canadian public-private partnership for the network of learning objects in French and English language and accessible to all Canadians. For DRM implementation in eduSource New Brunswick Distance Education Network(NBDEN) one of the partners of eduSource play led role[12]. eduSource is designed to support multiple DRM models, including free access, co-operative sharing, fee-based, subscription-based and other models[9]. In eduSource Open Digital Rights Language(ODRL) and XML are used in implementing DRM.
- COLIS*: The COLIS(Collaborative Online Learning and Information System) is a distributed online learning project incorporated with DRM and funded by the Australian Federal Government Department of Education Science and Training(DEST) in the year 2002 [9]. In COLIS project learner enters into the system with login id and password and session length. After successfully login, the learners see their names on the title and select course under courses the learner choose DC for access but before access, the content an "End User License Agreement and Copyright notice" displayed that show some copyrights related terms and conditions. If the learner has the access right then he or she uses it. Otherwise, Digital Right Error will occur [13].
- Creative Commons*: Creative Common(CC) is an American non-profit organization founded in 2001. The main purpose of this organization is to promote common people creativity by CC licenses free of charge and share it legally into the public domain. CC licenses do not replace copyright but are based upon it. CC licenses are expressed in three forms- human, machine and lawyer *readable* according to user choice [9].

VI. PROPOSED MODEL

In our proposed system a Digital Rights Management System for Distance Education(DRMSDE), the Distance Education Authority(DEA) instruct Course Designers(CD)[15][16] for designing courses. The CD design course structures and send to the Content Writer (CW)[7][8] for digitalization. The CW digitized the courses

and submits to the DRM server[16] for protection of Digital Data. DRM Server imposed different Rights specified by DEA for protection of Digital Content (DC). A student registers himself or herself into the course and has access to DC according to their rights. Teachers also communicate with the DRM Server to support.

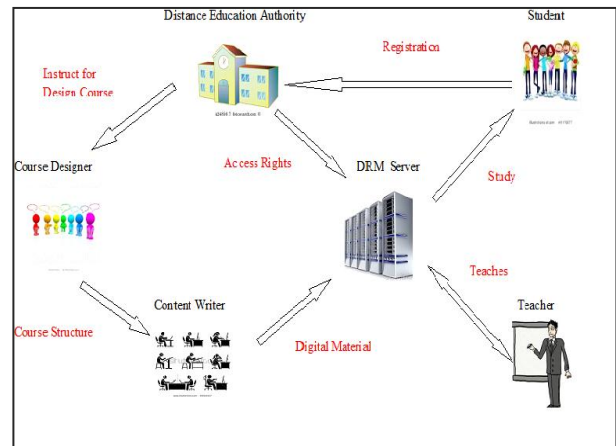


Figure 1: DRMSDE

The main objective of DRMSDE is to provide a secure environment in which students, teachers, and other users feel secure and disclose their personal as well as research related information[17]. The DRMSDE guides students of every corner of the country[18]. In our Model authorized students are free to access their notes, tutorial, assignments etc. and documents like Admit Car, Mark sheet, Registration Certificate, Pass Certificate etc. at their convenient time.

V. CONCLUSION

In DE repetitive use of DC is very obvious, but if the Distance Education Authority does not monitor and control the re-use of DC, then it will be problematic for copyright enforcement. For the effective and sustainable development of Distance Education System, a flexible and robust DRM will be required. The main challenge behind the development of DRM for DE is that policies adopted by different institutions are not exactly the same and these policies are locally managed. In spite of that here we find several effective DRM solutions for the education domain. In the future, we try to develop our model DRMSDE using Multi-Agent-based technology JADE. In which intelligent agents are responsible for the management of digital rights.

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Author Profile

Mr. A. K. Singh pursued Bachelor of Computer Application from Mankar College under the University of Burdwan, in 2003 and Master of Computer Application from the same University in year 2006. He is currently pursuing Ph.D. and currently working as Assistant Professor in Department of Computer Sciences and Applications, Netaji Mahavidyalaya, Arambagh since 2010. He has published 08 research papers in reputed national, international journals. His main research work focuses on Distance Education , e-Learning , Digital Library , Digital Rights Management and Cryptography. He has 8 years of teaching experience and 5 years of Research Experience.



prof. Sunil Karforma has completed B.E and M.E from Jadavpur University. He has completed Ph. D. in the field of Cryptography . He is presently holding the post of professor and head of the Department in the Department of Computer Science, The University of Burdwan. Network Security , e-Commerce , e- Learning and cryptography are his fields of interest in research area.



Prof Sripati Mukhopadhyay, M. Tech , Phd. is a former professor and head of Department of Computer Science, University of Burdwan. He has served North Bengal University , Vidyasagar University , Visva-Bharti etc. He has 33 years of teaching and research experience. His research interests include Computational Intelligence, Software Engineering and Data Base Systems.

