THE ROLE OF CONTENT MANAGEMENT IN E-LEARNING – AN EMPIRICAL STUDY IN WEST BENGAL

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ABSTRACT

E-learning is becoming an influential force in higher education today. Development of e-learning material or web-based training tools requires the collaboration of content writers, editors, experts, system designers, domain subject matter experts, and web developers. The present study discusses the role of content, its enhancements to a web-based training architecture to enable collaboration among these contributors and method of dissemination. The collaborative content development system aims at analysis and determination of the level of the content which is generated by multiple authors as well as knowledge of the students. With the evolution of Internet, it became apparent to developers that this medium could do a little more than give static information. Collaborative content creation tools are very much necessary for any e- Learning system, where the content plays a vital role. Practically everyone in the Internet believes that "content is king" and "you need a good content". But very few webmasters or content writers have taken it seriously. There are still too many sites around which have no real content or are simply monotonous. "The content is very important." The reason is quite simple; content is the thing that attracts viewers and retains their attention. Content is the backbone of any Learning Management System (LMS). And, perhaps the important aspect of collaborative content creation is that the content can be shared by all users in an interactive way. After brief review of the existing literatures available, it is clear that no structured study has yet been made on the collaborative development of content creation in smoothing up the e-learning process depending on the merit and reception capacity of the students. The present study is an attempt to determine the various components of content, the level of the student as also to determine the level of content to be provided to the user. To determine the role of different multimedia components behind Content creation a neat sampling design process is required. This paper presents criteria for evaluating the pedagogical usability of digital learning material. In practice the role of content is to give the learner a chance to choose the most suitable learning material possible for any learning situation.

Keywords : Content ; Collaborative content development ; domain, e-learning

INTRODUCTION

Time, distance and languages had always been hurdles in the formal education system. After the emergence of IT, the technological solutions like developments in information, communication and computing technologies have made available powerful tools to a large section of the population.

Video Conferencing, Satellite Applications, INTERNET and WWW etc started changing the life styles of modern population. Global connectivity must mean more than technology and commerce; it must lead to global learning, and the inculcation of values that set apart a civilized human being [1].

Shortage of skilled manpower, especially

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computer literate information professionals, is one of the basic problems as there are no courses available for training people in many areas. Very few people or personnel are available who strike a balance between content creation, organization and management. In a media organization, where the flow of information is enormous, it's difficult for a few people to organize and manage the content-both the online media and library. The management has to understand the need of digital media, as it is beneficial for the organization in future. Apart from this, there is a need to standardize the fonts for Content Creation and organization worldwide for the content to reach worldwide audience. There is also a need for query and retrieval, presentation of content in a standardized manner. [2]

The use of e-learning environment to support teaching and learning has had a great impact on the way content is developed and managed. In most cases, both teachers and students have had to re-adapt the way they prepare, access and engage with educational matter. [3]

Building and maintaining content collaboratively is difficult. The content is highly interdependent, is reused in modified form, changes rapidly, and there's a lot of it. Further, a small group of administrators is often responsible for managing a much larger pool of contributors. In order to scale, flexible content management capabilities are needed, along with high-level policies and techniques for using them effectively. This research work "Some Aspects of Collaborative Content Development, its Evaluation in E-Learning Environments" aims to determine the standard of content which can be developed collaboratively by a panel of content writers, editors and experts.

The present study discusses the role of Content and its enhancements to a web-based training architecture to enable collaboration among these contributors and method of dissemination.

THE PROBLEM

In the present study, the research problem, that has been identified, is to identify what we actually mean by "learning content", and to clarify the primary scope of content and its role in E-learning.

The challenge is to develop learning content. Are all contents used for learning, or are they more restrictive? In many cases, they are not helpful as they provide little restriction on both what learning content is, or how it would have to be managed. From this research the focus is specifically on the quality of content and its different components.

OBJECTIVES OF THE PRESENT STUDY

In the light of the above discussion, the present study aims to fulfill the following objectives:

- To highlight the basic issues relating to the Digital Learning Material.

- To find out the usefulness of Content in respect of information, overall presentation and multimedia components.

- To test different factors affecting the selection of content such as clarity, appearance, interactivity etc. in e-learning.

- To present a SWOT analysis of the various elements of Content.

- To study the standard e-Learning system.

- To design the web based server side program to upload the file into server and to store the content developed by experts into server database.

- To design collaborative content evaluation software and integrate with existing Learning management system.

- To analyse and investigate the methodology of Content Evaluation.

- To explore possibilities of determining the level of knowledge of a student and to provide him Content according to his standard.

BRIEF REVIEW OF THE AVAILABLE LITERATURE

After reviewing the available literature on the role of content and its development in e-learning, both in foreign and Indian context, the following literatures were found available which are presented in brief through the following lines:

Content Management Systems nowadays are used to manage complex publications far more often than some years ago. The basic principles are the separation of structure, content and presentation, an exactly defined workflow management and the management of content in the form of small units, so called assets. This leads to improved quality, better reusability and reduced costs. We focus on similarities of CMS-systems and e-learning systems and the possibility to transfer gained experiences from the field of CMS to e-learning systems.[6]

Collaborative content development systems are employed to handle large collections of written material concurrently generated by multiple authors.

A network based infrastructure allows members of a group to interactively and simultaneously create, review and edit product documentation, web content, or other interrelated documents on time and in real time. [7]

Collaboration begins with the unification of content. You need to figure out "what's going on with your content, how it's being used, how it's being managed, as well as the processes you use to create, publish and store it.

Then you need to perform a content audit. During a content audit, you look at your organization's content, analytically and critically, allowing you to identify opportunities for reuse and the type of reuse, what the best processes for creation are and how the use of collaborative technologies may expedite these processes. [8]

Content development plays a key role in e-learning. Designing of content with good interactivity is essential for an effective teaching and learning system. Development of such an interactive content is not an easy task for the instructors. It requires collaborative work among experts from various fields. **[9]**

Content refers to online training, that provides courseware, and knowledge management that provides informational databases and support tools (Rosenberg, 2001).

Successful e-learning countries have access to content including library materials, newspapers, corporate information, government databases etcetera, online, in their native language (EIU, 2003).

Developing e-learning content for a big heterogeneous group of people is greatly different from developing paper-based course material for a small group of known people (Tozman, 2004).

According to Grady Booch, "Collaboration has always been an essential part of the fabric of the Internet. E-Mail, instant messaging, content, chat, discussion groups, and Wikis are common collaborative elements that have matured over time. Collaboration among teams is already facilitated through the use of an increasing number of features embedded in standard desktop products such as office suites, shared document reviews, distribution of documents among teams and mechanism for performing common collaborative tasks (Booch 2005).

RESEARCH GAP AND RESEARCH QUESTIONS

The purpose of the current research is to understand the most important factors behind a *good-quality Content* and its effect. In addition to that collaborative development of software based on the factors extracted from survey and methods of dissemination is another important part of the research.

From the minute study of the literature available on the subject (as mentioned above), it becomes crystal clear that, no structured study has yet been made on the collaborative development of content creation to smooth the e-learning process among Indian students.

Therefore, the present study raises the above research issue by highlighting the following research questions:

- What is the significance of Content in e-learning?

- What are the important criteria behind good quality content?

- Is Content a deciding factor for e-learning?

- How to effectively judge the knowledge level of students?

- The answer to the question could lead to a better understanding of how to develop quality Content for e-learning and right method of dissemination among students.

- This research work aims to determine the standard of content which developed collaboratively by panel of content writers, editors and experts.

- In addition, it aims to determine the level of knowledge of students and their capability of gathering knowledge.

- Before studying content from the system some questions will be asked to a student.

- After getting student's answer the system will analyse his/her accessing power and level of merit.

- In this way the system will evaluate the student's knowledge and decide the level on which he/she has to be taught and accordingly that type of content will be supplied.

RESEARCH METHODOLOGY OF THE PRESENT STUDY

For convenience, the present study is sub-divided into two phases or stages.

In Phase 1, a sample survey was conducted on the effectiveness of the contents and their understanding among the students who use them.

In Phase 2, with the result of that survey I have tried to develop a Collaborative Content Development Software (CCDS) which takes input collaboratively from different persons and disseminates among students according to their standard.

NATURE OF DATA AND DATA SOURCE

The data is basically primary in nature. It is obtained from the Male and Female students of Computer Background of different Under Graduate and Post Graduate Colleges of West Bengal based on the official directory of colleges and universities published by the Department of Higher Education, Govt. of West Bengal, WBCUTA and different other relevant official websites.

DATA COLLECTION METHODS

The Communication approach is basically Structured Questioning, i.e. Personal Interview with the aid of Printed Questionnaires. Two sets of separate questionnaires have been prepared – one on the contents of CD-ROM and another on the contents of WEBSITE. Each set has 13 and 14 questions respectively.

METHOD OF SAMPLING AND SAMPLE SIZE

Here, for the purpose of study, random sampling technique is followed. Respondents Sample Size is at least 2000 students, 1000 students each for CD-Rom and Website presentation.

TECHNIQUES OF ANALYSIS

This research work comprises the following techniques - Principal Component analysis, Factor analysis and 10 point Multiple Regression. These tools are used for showing the impact of various factors on the contents of Digital Learning Material.

After collecting samples, Principal Component and Factor Analysis techniques have been applied for finding Individual co-relation of each factor of e-learning material and an attempt is to be made to find out which factors are the most important. Factor analysis can be considered as an extension of Principal Component analysis.

Evaluation in this research is a subjective judgment made by the users of digital learning material. Factor analysis has been done for showing the Visual elements of the Content of the Digital learning material. **The evaluation criteria are applied using a self-evaluation questionnaire that employs an interval scale and Likert scale. eg. 10-(Very Satisfied) ,8-(Satisfied), 6-(Neutral), 4-(Dissatisfied) and 2-(Very Dissatisfied).**

Though, most of the measurement scales used to measure Content's feature to depth by respondents on a scale of 1 to 10 can be treated as Interval scales. Multiple Regression tools have been used to find out the role of independent factor/factors over dependent factor. I have also used ANOVA, which is a well-known technique for examining the differences among means for two or more populations. This technique I have used to find cause-and-effect of one or more factors (Independent variables) on a single dependent variable.

DETAILED STATISTICAL ANALYSIS

Analysis in case of CD-ROM

From the available data, I have made the following Statistical Analysis in case of CD_ROM used by the users:

- Multiple Regression
- Analysis of Variance
- Principal Component Analysis
- Factor Analysis

The detailed analysis is presented below.

Results of the Regression Analysis

The output of the regression model is analysed below:

According to this a (intercept) = 4.111

$$B1 = .214$$
$$B2 = -.045$$
$$B3 = -.032$$
$$B4 = -.075$$
$$B5 = .116$$

It can be written as follows:

> **Satisfaction = 4.111+.214(Clarcont) +(-.045) (Visuappeal) +(-.0.32)(Qualinfo) + (-.075) (Colortypefont) +.116(Interactivity).**

Now, from the Statistical significance, R Square value and Beta value indicate that Clarity of Content, Interactivity and Colors Type and Font are significantly significant in the model. The other 2 independent variables are individually not significant and to prove this I have done Stepwise regression also and that clearly indicate the aforementioned observation. When I have added one by one variable then it shows the change of R , R square and Adjusted R square value. And it also indicates that the change is very significant in case of Clarity of Content, Interactivity and Colors Type and Font but not at all significant in case of Visual appeal and Quality of Information. So, at the time of developing e-learning Content expert and developers look at the relationship of Satisfaction with one of these variables or all variables.

Results of the Factor Analysis and Principal Component Analysis

The output of Factor Analysis is obtained by requesting Principal Component Analysis and specifying the rotation. For the Principal Component Analysis, we have taken 6 factors as a

part of the Content in CD-ROM as an e-learning tool. These factors are Subject Matter, Font Colour, Style, and Text size, Grammar, Background Voice and Information.

There are two stages in Factor analysis. Stage one, as we know, is Factor extraction process. As evident from the tables presented above, we have found (from cumulative % column), that, 2 factors extracted together account for 59% of the total variance.

In component 1, it is evident from Component Matrix that Grammar, Background voice and Information have the highest loading of. 741,. 698 and. 715 and this is reflected in Component plot in Rotated Space and Rotated Component Matrix also. This Factor consisting above three variables can be termed as *"Content Depth"*.

In component 2, it is evident from Component Matrix that Font color and style and Text size have the highest loading of. 627 and. 570 and this is reflected in Component plot in Rotated Space and Rotated Component Matrix also. This Factor consisting above two variables can be termed as *"Content Layout"*.

Analysis in Case of Website

Next we have analyzed the result of Website Survey. We have run two regression equations on Website. For the first case I have taken SATISFACTION as a Dependent variable and GOOD VISUAL, INTERACTIVITY, HIGH QUALITY DESIGN, EASY INTERACTIVITY, EASY LANGUAGE are independent variables.

In next regression we have tried to find Content is dependent on which variables the most. For the Second case I have taken CONTENT as a Dependent variable and VISUAL APPEAL, AESTHETICS, CLARITY, CONCISE and VISUAL CONTINUITY are independent variables.

From the available data, we have made the following Statistical analysis in case of WEBSITE used by the users:

1. Multiple Regressions
2. Principal Component Analysis
3. Factor Analysis
4. Analysis of Variance

This detailed analysis is presented below.

Factor Analysis:-

Component Matrix^a

	Component
	1
Colour scheme	.839
Image	.906
Animation	.914
navigation	.824
page Layout	.846
Relevance	.868
Readibility	.789
Font type	.825

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

There are two stages in Factor analysis. Stage one as we know is Factor extraction process. As evident from the above tables, I have found that (from Cumulative % column) 1 factor extracted which alone accounts for 72.64 of the total variance. It is evident that only one component has the Eigenvalue more than 1.

In component 1, it is evident from Component Matrix that all these attributes are highly loaded on the single factor. These attributes are highly co-related with each other. As they are of all in the same nature and highly interrelated. And that's why Component plot in Rotated Space can not be drawn. Therefore this Factor can be interpreted as *"Overall Presentation"*.

Results of the Regression Analysis

The outputs of the regression model are depicted in the tables presented in Appendix-II.

According to this a (CONSTANT) = 4.462

B1= -.028

B2= -.060

B3=. 350

B4= -.016

B5=. 122

It would be written as follows:

> **Satisfaction = 4.462 + (-.028) (Highqualitydesign)+(-.060) (Interactivity) +. 350 (Easy interface) + (-.016) (Easy language)+. 122(Good visual).**

Now, from the Statistical significance, R Square value and Beta value indicate that Easy Interface, Good Visual and Easy Language are significantly significant in the model. The other 2 independent variables are individually not significant and to

prove this I have done Stepwise regression also and that clearly indicates the aforementioned observation. When I have added one by one variable then it shows the change of R , R square and Adjusted R square value. And it also indicates that the change is very significant in case of Easy Interface, Good Visual and Easy Language but not at all significant in case of High quality design and Interactivity. Among these three, Easy Interface is the most important factor. So at the time of developing e-learning Content, Content expert and developers look at the relationship of Satisfaction with one of these variables or all variables.

Results of the Factor Analysis and Principal Component Analysis

The output of Factor Analysis is obtained by requesting Principal Component analysis and specifying the rotations. For the Principal Component analysis, I have taken 8 factors as a part of the Content in WEBSITE an e-learning tool.

These factors are:

Colour scheme, Image, Animation, Navigation, Page layout, Relevance, Readability and Font type.

There are two stages in Factor Analysis. Stage one as we know, is Factor extraction process. As evident from the APPENDICES, that (from Cumulative% column) 1 factor extracted which alone accounts for 72.64 of the total variance. It is evident that only one component has the Eigen value more than 1.

In component 1, it is evident from Component Matrix that all these attributes are highly loaded on the single factor. These attributes are highly co-related with each other. As they are of all in the same nature and highly interrelated. And that's why Component plot in Rotated Space cannot be drawn. Therefore this Factor can be interpreted as *"Overall Presentation".*

Graphical Analysis

Last but not the least, the following two Pie Charts will reflect another finding on the basis of which I have developed the software. The first Pie Chart shows that majority of students have previous experience and knowledge of Digital Content in any form because in the Questionnaire 65% says Yes and remaining 35% says No.

Diagram 1 : Experience in Digital Learning

No, 35%

Yes, 65%
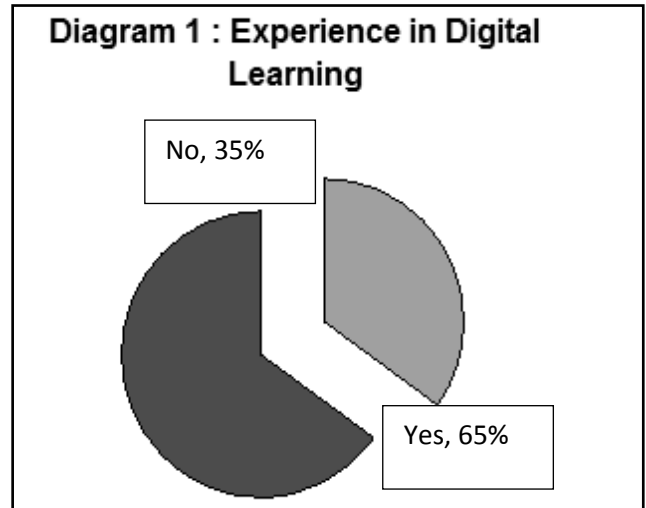
From the interviewers filling up of questionnaires, 38% have said that they have understood and 62% have opposed the point, which is shown through the following Pie Chart. The above chart shows that the majority of the students have previous experience of e-learning. In spite of that, majority of the students have failed to understand the Content of my presentation which is based on their known subject. That result is shown in the next Pie chart).

Diagram 2 : Percentage of interviewees who Understood Content

Not Understood, 62%
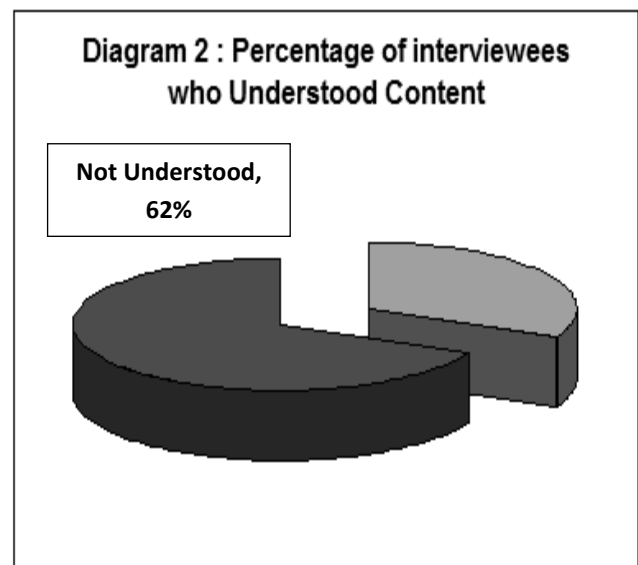
It reflects that students of different merit and standard demands different Content according to their level on the same subject. Seeing the above results, I feel there is a need for an alternative technique for demonstration.

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This study gives an idea about the important quality factors/parameters which are important for e-learning. More researchers in future will make the process of digital learning and its contents more meaningful by widening its working area. From the experience that we have gained from the above survey, we thought of developing, and, finally, developed, software, keeping in view the respondents' answers. We honestly believe that there are dependencies between teaching materials quality and e-learning. There are two parts collaborating with each other which are system developer and content provider. The former one provides an open and cross platform for teaching materials presentation. The latter one provides different teaching materials to let students and users to use and share.

PHASE – 2 OF THE STUDY

In this phase of the study, we have thought of developing software keeping in view the experience that I have gained from the above survey and also depending on the respondents' answers. This type of Software is not available in the market because here with the help of CCDS(the name of the software), we can develop different qualities of content for different level of students. Commonly available softwares are dealt with the Content level but this software simultaneously analyzes the level of the students. In addition to that it sends Content to students according to their standard unlike sending a static Content to each and every one.

In this software all marks that have been obtained in different tests will be stored in backend database. On the basis of the marks obtained in tests the system will calculate in database and generate the exact grade of the content. In addition to that, system will also generate the exact level of knowledge of student and according to the level of the student, contents of the same type will be supplied by LMS. After analyzing primary data using various techniques, software is to be developed.

The software is developed for Collaborative Content development and its proper evaluation based on the parameters suggested by the students in response against Questionnaire. Accordingly, the name of the software will be Collaborative Content Development Software (CCDS)

Finally the software depicted here is to be designed by PHP and database to be designed by MySql.

DESIGN OF THE SOFTWARE

SCREEN - I

In screen 1, each Content Expert decides the level of content according to its difficulty and knowledge. It is necessary because many knowledge bases fail due to insufficient quality of their content. Typical problems of such repositories are inconsistent formats, inaccurate and ambiguous conclusions. Since many corporate as well as student knowledge bases lack adequate validation mechanism, they become trapped in a vicious cycle of decaying content quality. As a consequence, the knowledge base loses its credibility and acceptance with the relevant users. To prevent this phenomenon content expert judge the content against ten parameters and after clicking "Submit" button this test's mark will be stored in database.

SCREEN - 2

In screen 2, result (which is calculated in database) is shown as number as well as grade of the particular content.

SCREEN - 3

In Screen 3, each student has to enter his/her previous qualification, his/her rank and whether possess any previous knowledge about the subject which is going to be learnt. After clicking "Submit" button the marks will be stored in database.

SCREEN - 4

In screen 4, each student has to give background knowledge test on that particular subject whether he/she has some previous knowledge on that particular subject or not. If in the previous case(in screen 3) , he intentionally or by mistake ticks all 'yes' without knowing the least bit about the subject then he will be properly judged here. After clicking "Submit" button these marks will be stored in database.

SCREEN - 5

In Screen 5, finally software shows the result (which is calculated in database) grade of individual student. After clicking exit he/she exits from the screen. And if clicks continue then he/she will get the content according to his/her standard.

ENDNOTE

The awareness of e-learning has to be increased among Graduate and Post Graduate students to increase the quality of e-learning. In undergraduate syllabus of Engineering and Management, many new subjects have been introduced by different Universities of the world and India as well. But even then, most of the colleges follow traditional classroom Teaching Methodology for all the subjects included in the syllabus. At least one subject in one semester should be introduced, which students will learn without the help of teacher. This will generate feedback and improve the overall quality of e-learning process by increasing productivity through development of user's awareness in e-learning.

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