INVESTIGATING CONTENT ATTRIBUTES AND SCOPE OF USING TECHNOLOGY IN CURRICULUM DESIGN

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ABSTRACT

Teaching, using technology in the classroom involves detailed comprehension and exploration of the curriculum content, in order to identify the most appropriate technology for its delivery. Understanding what is meant by content and being familiar with the types of content that exist are the fundamental requirements for any teacher. This paper explores what is meant by content and the process of content analysis. A teacher who has access to various digital resources has to focus on another aspect of integrating technology into his/ her classroom. The various videos available online, several free apps available on your mobiles, the scannable QR codes in your textbooks, or the CD that may be available with one's school may provide one's students with enriched learning experience, but before we can exploit these resources, it becomes vital for the teacher to realize what and how we can use these for. The available resources do not dictate your lesson. A teacher will not enter a class with the thought "today, I will teach this video" rather the thought that dominates is "today, I will teach this content with the help of this video". What discerns in these situations is that the teacher needs to have a detailed understanding of the content that is to be delivered.

KEYWORDS: Content Analysis, Content Analysis Chart, Technology, Comprehension, Exploration.

INTRODUCTION

Technology is understood to be a powerful tool for bringing a transformative change in learning. It may assist in affirming and advancing relationships between teachers and students, reinvent the methodologies adopted for learning and collaboration, reduce equity and accessibility lacunae, and adapt learning experiences in order to meet the needs of all learners, be it students or teachers. Our schools, colleges, coaching institutes and universities can be understood as incubators of exploration and invention. Educators are understood to be collaborators in learning, gaining new knowledge and consistently acquiring new skill sets, alongside their students. Educational leaders are required to set a vision for creating learning experiences that provide the requisite tools for learners to thrive. However, in order to fully realize the benefits of using technology in classrooms and provide an authentic learning experience, teachers need to use technology effectively in their praxis. Moreover, stakeholders of education are required to commit to working together in order to utilise technology to improve Indian education. These stakeholders include politicians, policy-makers, teachers, researchers, funding agencies, technology experts and civil society.

This calls for a three pronged approach involving content analysis, pedagogy analysis, contextual and learner analysis. Before one can explore content analysis, it becomes important to understand what one means by Content in the context of Digital education and curriculum transaction. Content can be perceived as any information that can be learned in school. School curriculum content is a collection of facts, concepts, generalization, principles and theories. Content for a classroom is not limited to its textual form. It may come in many forms namely audio, video and text and it informs, entertains, enlightens and teaches people who consume it. Any content is transacted to impart knowledge, develop skills and/ or bring a change in attitude. Content allows teachers to recognize aspects like what to teach? and how to teach it?

REVIEW OF LITERATURE

Saylor and Alexander (1974) defined content as *"those facts, observations, data, perceptions, discernments, sensibilities, designs and solutions drawn from what the minds of men have comprehended from experience and those constructs of the mind that reorganise and rearrange these products of experiences into the lore, ideas concepts, generalisations, principles, plans and solutions"*.

Hyman (1973) categorised content as knowledge (i.e. facts, explanations, principles, definitions, skills and processes (i.e., reading, writing, calculating, critical thinking, decision-making, communicating) and values (i.e. the ideas and belief systems that separate the right from wrong, the good from the bad). To teach any content effectively, one should understand its nature.

In studies conducted two decades ago, the well known Bloom's Taxonomy was revised and republished by a former student of Bloom, Dr. Lorin Anderson. This altered version of the taxonomy intended to have an impact on teaching and learning by taking into consideration a wide range of parameters. This revised taxonomy attempted to correct some problems with the original taxonomy. In comparison to the older version of 1956, the updated taxonomy attempted to differentiate between "knowing what," the content of thinking is, and "knowing how," the procedures used in solving problems pertains to. These include the following:

a. Remembering which consists of recognizing and recalling relevant information from long-term memory.

b. Understanding which is the ability to make your own meaning from educational material, such as reading and teacher explanations.

c. Applying that refers to using a learned procedure either in a familiar or new situation.

d. Analysis, which consists of breaking knowledge down into its parts and thinking about how the parts relate to its overall structure. Students analyse by differentiating, organising, and attributing. and

e. Evaluation which is at the top of the original taxonomy, which includes checking and critiquing.

According to this modified taxonomy, cognitive processes may correspond with knowledge at each level, for learners to be able to remember factual or procedural knowledge, understand conceptual or metacognitive knowledge, or analyse metacognitive or factual knowledge.

Figure 1: **Flowchart depicting structure of Content (modified from Bloom's Taxonomy)**
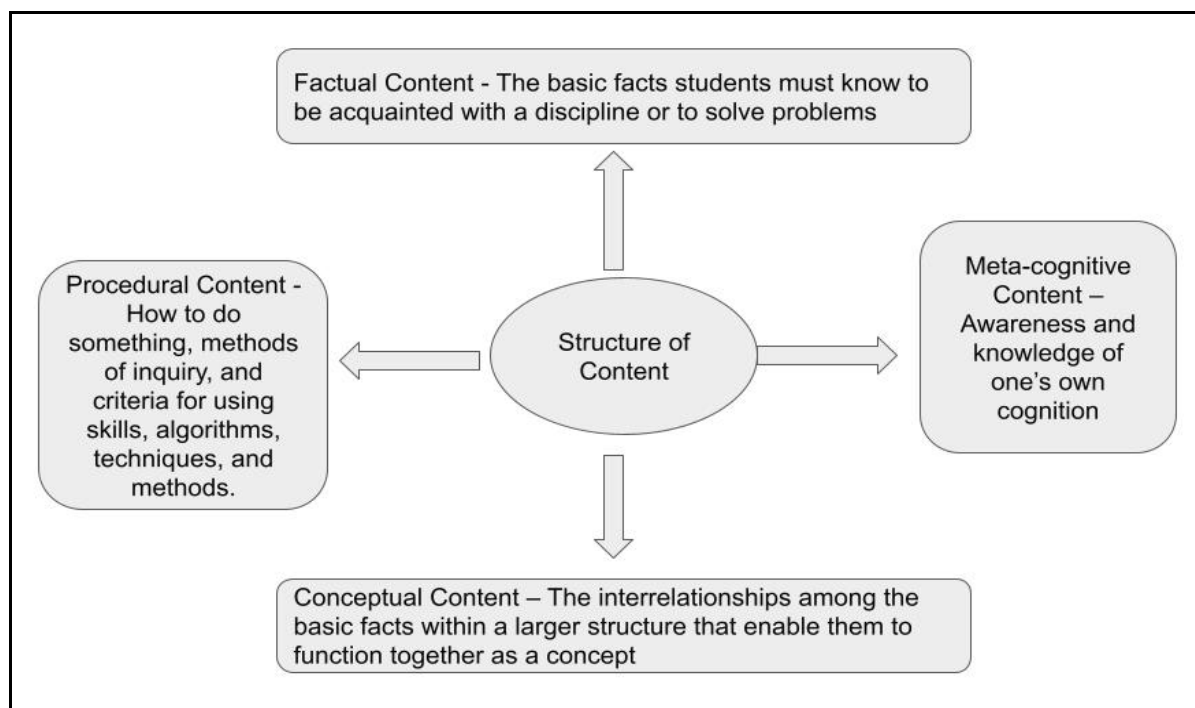
Table 1: Example portraying use of contents in different subjects

Sl. No.	Content	Nature of Content	Media that may be utilised	Remarks
1	Fundamental Duties (Social Science)	Facts	Visual Mode- use of visual aids to represent the list of Fundamental Duties	Since the content is factual and the pupils will be required to enlist the various fundamental duties given in the constitution of India and hence, audio-visual cues may prove to be beneficial as well. Students, if just provided with a list in the form of visuals, may be able to reproduce it.
2	Surface Area of a Sphere	Concept	Demonstration Video	In this section, the learner has to comprehend as to how the surface

				area of a sphere is calculated. An audio in itself may not be the sufficient tool, as learners will have to visualise a sphere and its various surfaces. A visual aid would also require a certain level of visualisation. A demonstration video fits into providing a greater and more effective understanding
	(Mathematics)			
3	Functioning of the Human Respiratory System (Science)	Procedural	Audio-Visual Animated Video	The concept requires the learner to understand a biological process involving internal organs of a human body therefore neither an audio or an ordinary video can capture the process. Here an animated video can aid the learning process as through animated version of the human anatomy, the learner can see the organs and their functioning.
4	The road not taken-Poem (English)	Meta - cognitive	Discussion Forum	One's process of decision-making has to be questioned and logically analysed. A discussion forum may be used to discuss the different decisions learners may make in different situations.

Source: Referenced from NCERT text book

It is vital to have a clear grasp on the nature of the content and the structure of knowledge before it can be transacted in an e-Classroom. For instance, Procedural content may employ videos or interactive slides for clear transaction, whereas conceptual concepts can be taught

through presentations or PhETs (Physics Education Technology) simulations. However, higher up when the content calls for the situation based learning it becomes difficult to curate content according to the available digital resources. Thus, it becomes necessary to recognize the nature of the content and categorise them into workable formats for knowledge dissemination.

RESEARCH OBJECTIVES

This paper attempts to explain what content is, its types and the meaning and scope of nature of the content. As the content varies in form and impact, it would also go on to analyse the content and identify concepts for using ICT in the teaching-learning process. After assessing and analysing various forms of content this research would try to understand and appreciate the need for content analysis for planning teaching-learning processes and the need to familiarise with various tools to be used for content analysis. Understanding the relationship between various forms of content and how one presupposes the other would be essential to look for under the research study. While work has been done on understanding the meaning, types and nature of content that enables ICT integration, the current research focuses on exploring the importance of content analysis for a digital classroom and analysing the content using various tools for planning the teaching-learning process.

RESEARCH METHODOLOGY

Research, in a way, goes beyond the process of simply collating information, but it also goes about finding responses to the questions that have been unanswered in its pursuit of discovering new knowledge. For the current study an extensive review of literature was undertaken to make the study broad and interdisciplinary in nature. As the study aims to assess the content attributes in school education, textbooks published by National Council of Educational Research Training were studied in order to cull out the various nuances in the teaching-learning pedagogy and style structuring of the textbooks. The subjects chosen varied from social sciences and sciences to English and Hindi. In order to keep up with the limited scope and space of the research, a few examples from each subject were chosen. Two examples, forming an eclectic range in particular, were taken in from the English textbook of grade 9 and from the Science textbook of grade 8. Further investigations continued with use of content analysis chart, where the attributes culled out from the textbooks were appropriately placed in the chart in order to arrive at suitable tools that may go in to

enhancing the learning outcomes. Suitable inferences were then drawn out of the analysis chart. Categorising content into facts, concepts, procedural and Meta cognitive proceeds a space to assess the content and place them under appropriate tool usage headers.

CONTENT CATEGORIZATION

Content categorization becomes imperative for our understanding, as the classification and selection of content concretizes the learning outcomes that are expected out of a lesson plan. Content may be broadly categorised as:

- **Facts**: Facts are information that have been scientifically proven and based on logical reasoning. They are proven information. Facts form the basic structure of any lesson in the subject that creates a cognitive change in the students

- **Concepts**: These are fundamental abstract notions and ideas that are fundamental to thoughts and beliefs. They are mental representations and abstract objects based on varied concrete examples

- **Principles**: A principle is a proposition or a rule that is generally followed to guide behaviour and understanding. They give rational explanations of phenomena and establish cause and effect relationships. Presenting scenarios as examples for principles makes explaining the cause and effect relationships easier for the teacher and helps learners to remember them.

- **Process**: A sequential and step by step continued actions that can explain the functioning of a system, equipment or solve a problem.

- **Interpersonal skills**: Interpersonal skills are based on the attitude, values and beliefs of a person. Attitude may be defined as a judgement made on an object that may be a person, a place or a thing. Judgements emanating from an attitude may range from positive, negative or neutral.

Therefore, content may primarily resort to

- Responding to the needs of the learner,
- Include the cognitive skill and affective elements,
- Being of use to the learners,
- Being Practical and achievable,
- Going beyond facts,

- Being thematic & integrated and

- Being integrated with the cognitive, skill, and affective components.

SELECTION OF CONTENT FOR E-LEARNING

The world today demands at least some form of competency in digital media and digital literacy. Our workplaces, our social lives as well as our education has evolved to include digital content. Thus, everyone today requires being digitally literate. It is thus important to know what digital literacy is. Digital literacy goes beyond knowing how to use technology. It is about communicating and navigating through different digital environments. Students need to have digital literacy skills in the world today to compete for employability as well as to become lifelong learners. There are also so many new ways to learn. Searching through physical texts is not enough today; an individual should now know how to access information and research instantly, via the web. Therefore, this necessitates the use of video, audio and images for teaching and or student assignments. Communicating and collaborating on content can be facilitated through a variety of online platforms. With all these new opportunities, there is a rise in requirements and responsibilities on how we approach digital media and digitised content. We need to understand how to evaluate and look at the authenticity and validity of the wealth of information available to us.

Digital e-learning promotes learning in students by promoting the use of maximum senses and skills in the least time possible. It is thus important as a teacher to adopt technology into the classroom by choosing the most appropriate method suitable for the appropriate content. So, the teacher must curate the content according to the needs of the students. Selecting suitable content to teach through digital methods is significant as:

- The content should contribute to the basic ideas, concepts, principles, and generalisation that align with the overall aim of the curriculum. It will develop learning abilities, skills, processes and attitude in students. It will also assist in developing the cognitive, affective and psychomotor skills of the learners. The cultural aspects, and the variations thereon, are also taken into consideration.

- Relevance to life: The learning experience should be relevant to the life of the learners and should be connected to the life of the learners both inside and outside the school. Thus, the content should be Valid, Relevant to the goals of the curriculum, Authentic, Useful for the learners, and at the levels of the learners.

- Learnable: The content should be thematic, sequential and appropriately organised

ENGAGING WITH CONTENT ANALYSIS

The content analysis in a digital classroom focuses on the systematisation, quantification, objectivity, contextual suitability and validity of the content. Thus, the analysis of content emphasises on making valid, replicable and objective inferences based on the curricular content.

Content analysis is important because through it:

- The teacher is enabled to form well defined objectives that may be achieved.
- The teacher may organise the content psychologically, logically and systematically.
- The teacher may be able to put all the pieces of information in a meaningful and succinct manner.
- If a teacher gives organised information, the students will get a better understanding of the content.
- Content analysis will give the idea to relate different facts, generalisations and concepts.
- Sequencing the content will lead the students to attend and take interest in particular subjects.
- Teaching will become more interesting and arousing motivation among students to learn.
- Students will engage in the activities.

PRAXIS OF CONTENT ANALYSIS

Content is the starting point in content analysis. The key question it asks is 'What knowledge is most vital for students?' For this, content must be broken into parts. Consider the topic of government. Students must understand the general concepts of government and citizen, but also the narrower concepts of representative government and citizen responsibility. They must also know certain facts, such as the number of branches of government and the dates when the Constitution was passed. Breaking down the knowledge of government requires giving that knowledge realm some structure. We can do this by creating a content analysis chart that is suitable to our needs.

A content analysis chart uses the information present in the curriculum. This includes important facts, concepts, rules, laws, generalisations, theories, and so on the present in the books. Essentially, the content analysis chart contains the topics and related information to be

learned in a certain course or a total curriculum. One way to design the chart is to create a row for each crucial topic and a column for the various learning behaviours that students must exhibit regarding each topic: concepts, generalisations, and so on.

Once the content has been curated, it is necessary to identify the relationships among the content topics. In determining the relationships, we reflect on how to organise the content so that the concept formation can be facilitated. The content can be organised chronologically, according to the specific content's knowledge structure, in the order in which it might be used, or according to the manner in which psychologists indicate students might best learn it. We may organise the content using the following steps:

1. Identification and classification of the content into facts, principles, ideas, concepts, processes and interpersonal & communication skills
2. Establish a well-organised sequence and orders for the content, going from easy to difficult and concrete to abstract.
3. Prepare the chart that represents the content most appropriately.

The questions should incite answers from the students and engage them in the learning activity. These answers can be aided with the digital resources available. Thereafter, the teacher can re-examine the tools available to them in their classroom which are suitable to their content and allow the learning to evolve into e-learning.

The depth and details of our content analysis should be based on our learner analysis as a guide, since it would set the boundaries of the content based on the learners' prior knowledge of the content area.

EXEMPLARS OF CONTENT ANALYSIS

1. Content Analysis in Language

Content Analysis for a language classroom helps to streamline the classroom experiences of the learners. As language classrooms focus on a variety of contents, content analysis allows the teacher to practice the most appropriate methodology and choose the most appropriate tool that can enhance the learning experience of the students.

Content Analysis for language classroom focuses on all the aspects of language teaching i.e. listening, speaking, reading, writing as well as grammar and vocabulary.

Exemplar 1

Example of ICT integrated activities

Subject: English

Class: 9th

Chapter: 2

Topic: *The Road Not Taken* by Robert Frost

Learning Outcome

Learners will be able to-

- Share the impact of life choice and their feelings on them
- Understand the implications of the poem and its title on everyday life
- Read and comprehend the poem
- Identify the poem's rhyme scheme and poetic devices
- Express their views and opinions in the answers based on the poem and inferences made by them

Key Ideas:

- Life of Robert Frost
- Choices that they have in life and their impacts
- The importance and impact of decision-making in our life
- Appreciating beauty in nature

Previous Knowledge

- Understanding various poetic devices like metaphor, rhyme scheme, simile, imagery and personification.
- Word meanings of claim, worn, trodden, sigh.

Figure 2: Info-graphic depicting learning outcomes to Content Analysis in Language

Table 2: Content Analysis Chart based on the given Exemplar

Content Analysis Chart				
Topic	Content category	Skills and Values focused	Leading Questions	Tools that can be used
1. Life of Robert Frost	Facts	Analysis	What impact can you see of the author's life on the poem?	Wikipedia
2. Vocabulary	Concept	Remembering	What do you understand by the phrases?	Online dictionaries
3. Themes	Interpersonal skills	Understanding	How are different themes brought out in the poem?	Videos

4. Poetic Devices	Concepts	Applying	What poetic devices have been used by the poet?	Videos

Exemplar 2:

Example of Air & Water Pollution and the classification of content within

Subject: Science

Class : 8

Chapter No: 18

Chapter Title: Air and Water Pollution

Table 3: Content Analysis chart

Major Topic	Subtopic	Nature of content	Appropriate Resources
Prior Knowledge	Importance of clean air Components of air Identification of pollution in given scenario	Factual & Procedural	Interactive quiz H5P - Presentation
Air pollution	Air pollution - Definition	Concept	Image
	Sources of air pollution - natural, man made	Conceptual	Mind Map - Sources, air pollutant, effects
	Air Pollutants-Definition, Examples & non examples, essential attributes	Concept	H5P - Image Hotspot
	Effects of air pollutant on health	Procedural	
Other effects in	Effect on building a crop	Metacognitive	Video -

air pollution			Documentary on Effect of air pollution on Taj Mahal
	Greenhouse effect, Greenhouse Gases and its contribution to global warming, Effects of Global Warming	Procedural	Infographics - Greenhouse effects & threads of Global warming
Ways to reduce air pollution	Reduction of air pollution - success stories	Metacognitive	Animation - stop-motion, Podcast, Digital story

Source: Referenced from NCERT Class 8 textbook

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While the content has to be able to adhere to various guidelines, needs and wants of teachers and students alike, at a preparatory stage certain formulations may be taken into account to arrive at specific learning outcomes. It is in light of the same, that content is classified based on the attribute it explores for the learner. For instance the example given above, a certain level of prior knowledge is assumed to be taken into account with respect to air pollution demands a factual and procedural knowledge as prerequisite knowledge. The appropriate resource to be used in such a scenario may be an interactive quiz or an H5P presentation to refresh the prior knowledge of the learner. A conceptual knowledge of Air pollution becomes a prerequisite for understanding the procedural understanding of the types of air pollution. This procedural knowledge assists in establishing connection when taking into account the knowledge that demands conclusions and inferences. Hence, Metacognitive knowledge comes into play. Metacognitive knowledge undertakes all the other three into account into creating a base for learning and application of that knowledge in real life situations.

CONCLUSION

Education is essentially influenced by a progression of occasions, commonly alluded to as "the information blast". The gigantic expansion in accessible data presents significant concerns identified with instructive substance, showing cycles, and fundamental data abilities required by students. Analysts need to test genuine inquiries regarding the nature, job, and effect of explicit characteristics of substance (e.g., data frameworks, assets, abilities, and processes) in instruction. Albeit most instructors would concur that all schooling is data based somewhat, there is no bringing together system, model, hypothesis, strategy, or even jargon for considering the nature and effect of explicit data it ascribes. This classification scheme has the potential to be developed into a tool that assists curriculum designers, policy makers, teachers, students, parents and all other stakeholders to conceive and formulate an inclusive paradigm of content creation, curation and dissemination. Curriculum Design which centres on learner, subject and problem are important to consider when bringing out a tool for the same.

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