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Instructional Design Models – A Review

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Abstract
This review paper intends to review Instruction Design Models (IDMs) to facilitate better understanding of Instruction Design Models in today's dynamic education field. We have witnessed many changes in last 20 years in the field of education, training and learning. The factors including but not limited to Information and Communication Technology, e-learning, blended learning, free and easy access to information, emergence of new Instruction Design Models and business start-ups based on online education has revamped the entire teaching – learning scenario. We believe that it is highly imperative to review and further teaching-learning thought process in the field of instructional design. We have reviewed 8 instructional design models comprising of both traditional and emerging segment. We acknowledge that there are over 40 Instruction Design Models under single and multidisciplinary discipline. The emergence of e-learning, free flow of information, change in thought processes of various stakeholders has led to many emerging Instruction Design Models yet traditional models are still relevant and does have backing of empirical research. We have reviewed these 8 models in a qualitative manner. We suggest that it is imperative to further investigate these and other Instruction Design Models while keeping recent changes in view specially in Indian context.

Keywords
Instruction Design Models, ADDIE Model, Cultural bias, Bloom's Taxonomy, Indian Context, Diversity.

Introduction
"Perfection of means and confusion of ends seems to characterize our age" – Albert Einstein.
There are approx. 40 instructional design models that have contributed to the field of instruction design from the period of 1930 to 2024. During 1930s instruction design process was used in business, industry and military and known as Instructional System Design (ISD). During same period there was limited exposure of instructional design approach in education domain. The three main construct to understand learning process are behaviourism, cognitivism, and constructivism. There are traditional models like ADDIE Model, Bloom's Taxonomy etc. and emerging instructional models including but not limited to ARCS model and 4C/ID model. The ADDIE model has influenced the development of many other models and the Bloom's Taxonomy, Gagné instructional events model, and Merrill's pebble in the pond model are still relevant to today's instructional design paradigm. The emerging instructional design models have integrated information and communication technology, progress in the field of cognitivism and blended learning environment. (Digital and Face-to-face).
There are so many opportunities and possibilities that e-learning and blended learning can offer to the millions of the students. There is even more possibility for marginalized learners in India as we can reach these students in economic manner and bypassing the barriers of distance and time through digital learning. All the Instructional Design models (IDMs) have their preferences and biases and they are based in western context. If we talk about an Instructional

Design Model (IDM) in Indian context, we should take note of Advanced Curriculum Model of Cognitive-Learning (ACMCL, 1976) model. This model was designed for creation of a bridge course in Kannada language with a goal to bring certain changes in language skills acquisition in 1972. Later Dave modified it in 1976. His idea was to create a cognitive instructional design model which can blend elements of Bloom's model(1954). This model focuses on objective based instruction, material development and evaluation for use in primary education. We should also recognize Activity Based Lesson Planning (ABLP) Model by Bhat and Kumar (2011) for primary students. They combined behaviourism, constructivism and activity based learning. Later Kaur & Kumar (2012) also suggested technology integration in the same model.

Our objective in reviewing Instructional Design Models (IDMs) is to understand the nuances of the Instructional Design Models in terms of background, assumptions, application and relevance. Before we delve into review of these IDMs, let us clarify that we have not covered pedagogical theories, learning styles, Instructional design frameworks and Instructional designing of pre service teachers' education programmes related research and models, Socio-cultural theory (1934) etc. We acknowledge the contribution of these instructional design models but our scope of review is 8 Instructional design models out of more than 40 Instructional Design Models (IDMs). Probably the most important criticism of the instructional design models (IDMs) is that they are linear in nature, lacks flexibility and time-consuming tools and these models may not be able to design effective learning experiences. (Gordon & Zemke, 2000). The 8 popular and important instructional design models that we have discussed do not pay any special attention to cultural diversity among learners while some IDMs do acknowledge the diversity but do not have anything to offer in terms of inclusion of cultural diversity. It is up to Instructional designers to make suitable changes to accommodate cultural diversity. There is hardly any tool to sensitize and implement inclusion of cultural diversity in Instructional Design Models (IDMs). USAID's Ten Key Principles for "conceptualizing, designing, and implementing ICTs in education systems" (Bloome & Chassy 2019,) does offer general guidance but specific tips on designing of instruction is lacking. We sometimes assume that IDMs are culturally neutral but that is not true. Subramony (2017) mentions that there is a lack of recognition regarding cultural aspects of race, ethnicity and social justice among the instructional designers and Instructional Designing Models. When we try to understand Instructional Design Models (IDMs), we realize that they offer specific process to teachers, trainers and instructional designers to create learning experiences. (Merrill 2013). The research on how learning actually happens and what environment is best suited for quality education is something that we as teacher/trainer community need to not empirically proven especially in Indian Context. Before we decide whether to use a particular Instructional Design Model, it requires instructional designer to think through quite a few aspects. one of the aspects Instructional designer should evaluate is to check IDM's assumptions about learner, his past knowledge, his motivation towards learning, his learning need and relevance, feasibility of selecting or developing teaching material, teaches' teaching styles and cultural diversity. Though culture is essentially a human idea, it is reflected deep within neural circuitry. Many researchers have echoed the similar ideas regarding role of culture in learning, content and instructional design. (Chang 2017)

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Review of Instructional Design Models

1) ADDIE Model (1975)

ADDIE Model derives its name as an acronym of Analyze, Design, Develop, Implement and Evaluate process steps of the model. This is one of the most widely used instructional design model across the world including India. It is Interesting to note that there is no recognized author of this instructional design model. (Molenda 2015) The first well-documented use of ADDIE model is by US military in 1940s during second world war. (Piskurich 2015). The Florida State University further developed the ADDIE model for training purposes. This IDM offers a complete design process and general guidelines. ADDIE offers a linear approach rather than an iterative design.

ADDIE Model is too generic for the novice teaching faculty and they may find it impossible to use without the help of experienced instruction designers. (Baturay - 2008) An Instructional Design Model should not be linear, rigid and inflexible. (Allen, M. W. - 2012). In today's digital world where revisions/changes happen frequently linearity and rigidity hinders the work flow and performance. ADDIE Model is more suited to large and complex projects, it may become expensive and difficult to apply when applied to small no. of students in a classroom. (Adnan, A. R., & Ritzhaupt, A. D. - 2016) Another concern thanks to complex nature of ADDIE model is time duration required to create a course as many experts are required to contribute for the final version. (Santally, M. J., Eitel, A., & O'Shea, T. - 2018). ADDIE Model is a behaviourist model and it does not provide space for learner - instructor interaction. Constructivists feel that there is greater emphasis on content designing and developing but it fails to provide opportunities to explore, observe and interact. (Tessmer, M., & Richey, R. C. - 2009). Though ADDIE model defines all five phases very succinctly, it does not offer guidelines on how to make choices within these broad categories. Instructional designers need to find answers to questions like choice of content development tools, needs analysis techniques and assessment practices by themselves.

2) Bloom's Taxonomy (1954), Revised Bloom’s Taxonomy (2001) and Digital Bloom’s Taxonomy (2008)

The Bloom’s Taxonomy originated during American Psychological Convention in 1948. The objective of the taxonomy was to help educators to set learning objectives and evaluation standards. The taxonomy was not about how to design and develop content or how interactions between learner and instructor should happen or how to create and sustain learning environment. The Bloom’s taxonomy is also known as Bloom’s evaluation approach. They revised levels of Bloom’s taxonomy to reflect the changes in the technology and society. The revised taxonomy considers Creative Thinking as HOTS (Higher Order Thinking Skill) (Anderson and Karathwohl, 2001). Bloom’s Taxonomy was again revised (Churches - 2008) as all the elements of teaching-learning ecosystem have changed including learner, teacher, society, pedagogy etc. Today access to information is not limited to teacher and classroom only. Information is readily available from diverse sources. (Laufenberg, 2010)

The extent of outcomes achieved by students specially in HOTS (Higher order of Thinking Skills) is a concern as evident in teaching of literature in Malaysian schools. The relationship between thinking skills and learning has been made simplistic or at least oversimplified in Bloom's taxonomy. The emphasis given to the order of learning skills inhibits learner's natural method of exploring and understanding. If a student finds it difficult to recall and comprehend something, instructor may not consider his ability to think beyond the sequence given by

Bloom. Student who may struggle in comprehension, may have better grip at application. (Case 2013) Hierarchical Structure of the Bloom's taxonomy lacks empirical support. There are inconsistencies within the levels of bloom's taxonomy. (Tori M. Larsen at al - 2022) The culture plays an important role in learning process but this model does not attempt to include cultural diversity. (Kirsten 2020) The action verbs used to denote cognitive skills is not sufficient measure for assessing learning skills. (Tori M. Larsen at al 2022)

3) Dick and Carey Systems Approach Model (1978)

The Dick and Carey Systems Approach Model has 10 steps based on ADDIE pattern of Analysis, Design, Development, Implement and Evaluation. The Dick and Carey model is rooted in behaviourist theory. This model has 10 steps. This model lacks steps for implementation and maintenance of the instructional design. In other words, critics say that this model lacks required components. It is difficult to grasp that the instructional design process can begin at any stage. Instructional designers do not design in one linear line but back and forth between steps. This model does not pay attention to cultural issues which are increasingly important in today's environment. However, it is interesting to note that they do question the application of instruction design in various cultural context. They wonder whether e-learning instruction created for Utah (USA) will be applicable for other countries with similar effectiveness. ((Dick, Carey & Carey - 2009) This model does not provide tips to instructional designer on how to deal with sensitive issues like culture context and diversity. (Kirsten 2020) This model lacks adaptation to digital technology which is very important in today's teaching-learning process. This model focuses strongly on defining clear and very specific instructional objectives and it may hinder outcome based learning due to overly emphasis on objectives.

4) Merrill's Pebble-in-the-pond Model (2002)

David Merrill introduced the pebble in the pond model in 2002 in his book "First principles of instruction". He believed that learning happens when students learn actively using problem-cantered approach. One of the criticisms of Merrill's Pebble-in-the-pond Model is that he has shown this model as linear and sequential process to design instruction. The criticism is that real world learning instructions do not work in a sequential or consistent fashion. (Reigeluth, C. M. - 1999) This model like many other Instructional design models (IDMs) believe that IDMs are culture neutral. So to say that cultural context does not interfere in learning environment. This is not correct not only culture impacts individual learning but also group learning. (Kirsten 2020)

5) Morrison, Ross, and Kemp Model (The Kemp Model, 2004)

This model is a non-linear, learner centred and iterative. This model has its roots in Jerrold Kemp's design process proposed in 1971. The current model is an adaptation of his model. This model is an eighth edition (Morrison, Ross, & Kalman - 2019). This model has nine components and it offers flexibility to instructional designer to start at any stage. The prime focus of the model is to improves learner's performance rather than content delivery. This model is good for K-12 environment as it allows teachers to find out relevant material rather than developing material. (Gustafson & Branch 2002) The continuous modification of the model has helped to maintain its relevance. (Gustafson & Branch 2002) There is a lack of required instructional analysis details. The criticism is that this model is slow, orthodox, and unattractive for modern learner.

6) Gagné's Nine Events of Instructions

Gagne asserted that learners learn in certain learning conditions (Gagne, Wager, Golas & Keller 2005). The Learning conditions include motivation, previous knowledge, and interest as internal factors while learning activities, the environment, content are external factors. Gagne has conceived nine events of instruction. (Gagné et al. 2005). Gagne has assumed that learning is a linear process while it is a non-linear and complex process. (Reigeluth, C. M. - 1999) Gagne has focussed on cognitive skills like problem solving and analysis. He has not paid attention to social, emotional or creativity in his instructional design approach. (Clark, R. C., & Mayer, R. E. - 2011) This approach is very teacher centric and expects the learners to be passive. On the contrary evidence suggest that teaching is more fruitful when students play an active role. (Clark, R. C., & Mayer, R. E. - 2011)

7) Universal Design for Learning (UDL)

Though Universal Design for Learning (UDL) is influenced with cognitivism, it is still a constructivist model. Dr. David Rose and Dr. Anne Meyer developed Universal Design for Learning (UDL) in the 1980s at the Center for Applied Special Technology (CAST). Universal Design for Learning (UDL) tries to remove barriers or at least reduce the no. of barriers to learning encountered by students with disabilities, and to benefit all learners in the process. This Instructional Design Model follows a complex process. It can be very difficult for the teachers to implement this instructional design model specially if they are not trained in Universal Design for Learning (UDL) model. (Boysen, S. J. - 2021) Though UDL's intent to cater individual student while keeping their different needs in mind is a commendable approach, it can be too difficult for the teacher to manage and create different learning content and experiences for many students. (Murphy, M. C. - 2020) There is a lack of empirical evidence to support the effectiveness of Universal Design for Learning (UDL). Some studies have shown improvement in students' performance while many studies have shown no impact whatsoever. (Rose, D. H. - 2019).

8) Seel's and Glasgow ISD Model (1998)

Barbara Seels and Zita Glasgow designed Instructional Systematic Design (ISD) model also known as the Seels and Glasgow Model II in 1998. This model has nine steps and it is aimed at assisting novice instructional designers to create instructional design properly. The ISD Model has been organized in nine steps. There is too much trial and error factor in this IDM which makes it time consuming process. (Gustafson & Branch 2002) The more emphasis is given to content creation than learning outcomes. Such approach may lead to preference to material development than other learning aspects. (Bell & Lefoe 1998) This approach is machine-like and lacks focus on direct human learning. (Richey 1993) This model has been recognized as a ""product oriented model"" which requires to perform under the constraints of time and budget.

Discussion

Various researchers all over the world have shared their thought process about the instruction process through Instructional Design Models (IDMs). These models have contributed to the field of instructional design and have influenced teachers, trainers and facilitators not only in education field but also in business, technology, military and other fields. It is important to understand these models thoroughly for effective application by teacher community. When we look at limitations of each of these models, it appears that the implementation of these models need to be customized for respective needs of instruction. As we know that learning styles,

teaching styles, Students' attitude and motivation, availability of time, expertise, monetary and technological resources can vary in each case.

It is even more imperative to pay attention to implementation and evaluation phase where instructional designer, teachers and evaluators are different. We need to ensure that different stakeholders need to be on the same page to create an efficient, effective and result-oriented instruction for the benefit of most of the students if not possible for all the students. There are certain common features in each Instructional design model and there are certain different viewpoints suggested by the researchers to make instruction useful and effective for the students' community. We believe that these distinctions among instruction Design Models are due to different needs felt by the researchers at different point of time. This different needs can be attributed to change in learner, teacher, teaching objectives, technology, contributory disciplines including behaviourism, cognitivism and constructivism and events including World War 2, advent of internet and Covid 19.

These different needs felt by researchers can also be attributed to researcher's own point of view and preferences. As we have noticed that researcher have their preferences regarding learning theory, instruction design framework, objectives of learning, and their own world view about how learning happens and how value can be added to be process of teaching-learning.

when we talk about Indian perspective in terms of Instructional Design Models (IDMs), we realised that we don't have an indigenous Instruction Design Model (IDM). India being a country of 1.4 Billion and with all sorts of variety in its demography deserves either a separate Instruction Design Model or at least a different vantage point on implementation and evaluation of existing Instructional Design Models (IDMs).

Conclusion

We believe that Instruction Design Models (IDMs) provides framework for teachers, trainer and learning facilitators for better learning experiences and effective results. A careful study of various stakeholder including learner, teacher/trainer, parents and examination of important processes including learner analysis, analysis of learning objectives, feasibility study of intended learning process etc. and other factors including university, education policy, cultural diversity specially in case of country like India and society expectation at large shall lead to better application of long held views of Instructional Design Models (IDMs) and empirically proven practices. Our view is one should follow these models for creation of their respective instruction design by keeping his/her approach and local needs in view.

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