

Complied & Edited By Ms. Faiqa Anwar Senior Program Officer

Enhancing Instructional Design Through Educational Technology

Introduction

Faculty Development Academy (FDA) organized a virtual workshop on "Enhancing Instructional Design through Education Technology" on Monday, March 01, 2022. The workshop was organized for faculty of all disciplines and instructional levels (undergraduate and graduate). The following areas were covered in the workshop i.e., how to create content for online teaching, how to adapt teaching resources to learners' needs and how to make use of E-Learning Tools in the classroom, and student engagement in a virtual classroom. Dr. Sumbal Manzoor (CMgr MCMI), Academic and Strategic Manager in Higher Education, Head of Centre-International Centre of Excellence-iQualify UK and Ms. Maheen Zahra, Academic Operations Officer, iQualify UK were invited to act as resource persons.

Dr. Sumbal started her sessions by introducing the participants to the notions of active learning and classroom engagement through the possible incorporation of online polls into classroom activities. Besides, she explained to the participants about the paradigm shift of the COVID-19 pandemic which has changed education dramatically, with the distinctive rise of e-learning. She briefed that online teaching is a completely different domain. It is not as same as face-to-face teaching. In addition, she stated that there are four different types of learning, face-to-face learning, online learning, distance learning, and blended learning. She further explained that in all four of them we create content in different ways. The domain expert highlighted that instructional design and the Cognitive Load Theory describe what kind of Instructional Design and Cognitive Load theories our leaner wants to learn or what impact we want to achieve. She is of the view, that participants from the Psychology department must be familiar with the CLT however, others may not get an idea of how the learning occurs. Hence, she started her lecture by defining Cognitive. Cognition refers to

mental activity including thinking, remembering, learning, and using language. When we apply a cognitive approach to learning and teaching, we focus on the understanding of information and concepts.

Later, Dr. Sumbal explained the Cognitive Load Theory (CLT) in detail. She stated that CLT was developed by John Sweller in the 1980s. CLT states that during complex learning activities, information and activities must be processed. Sweller emphasized that the quality of instructional design will be raised if greater consideration is given to the role and limitations of working memory. John Sweller always tried to look at problem-solving. According to him, Problem-solving is something trying to integrate the stumbled on CLT and how content is developed, prepared, and conveyed. Besides, she elaborated on the difference between working memory and longterm memory. She elucidated that working memory is something built upon our own learning. She then gave an example of working memory- what participants are learning from this lecture is working memory. On the other hand, long-term memory is what we could keep in terms of retaining knowledge. Then she quoted the example of school learning that we have learned in schools committed to longterm memory as we always remember that learning.



The domain expert was of the view that instruction is not just to deliver content; in fact,

first, we need to understand how a person learns. She stressed that the instructor has to find the right balance for the learner; make sure that resource is tailor-made and customized, adapted based on the respective subject, learners' competency, their understanding, and previous background well. She further elaborated that the instructor has to make sure that delivery is being received and logically understood by the learner. They can build upon that learning as well. She emphasized that CLT is based upon the idea as our working memories have very limited capacity, it is easily overloaded by irrelevant information. This overload reduces the chances that the information will be transferred to long-term memory.

Dr. Sumbal highlighted that the instructor needs to segregate information based on what is essential, supportive, and additional. She was of the opinion that the instructor should not add a lot of whiz-bang into their online course. It is better to present information in words and pictures than solely in words. Later, she quoted a few examples of instructions composed of both words and pictures. She advised that in order to split attention, the instructor can also present words as an auditory narration rather than as visual on-screen text.

The domain expert was of the opinion that teachers are being asked to create online courses without knowledge of how a student learns. Some knowledge of CLT and principles of multimedia design can eliminate some of the issues in the poor design of online courses and can assist these teachers. In addition, she briefed Schema - a cognitive framework or concept that helps organize and interpret information. She believed that schema is useful because it allows us to take shortcuts in interpreting the vast amount of information that is available in our environment. It also helps the learner to create connections and more deeply develop existing ones. She stressed that for real learning a learners' schematic structure must be altered.



Dr. Sumbal illuminated that both long-term memory and working memory are interrelated because schema held in long-term memory affects the manner in which information is synthesized in working memory. She felt that a lot of information is coming in a digital age, the teacher needs to segment what information is required or relevant to the learner. Later, she explained that the cognitive load of any task is made up of three elements:

- 1. Intrinsic Load This is imposed by the material to be learned. All instructions have an inherent difficulty. The inherent difficulty cannot be changed by the instructor. This is directly linked to the related prior knowledge (schema) a person can draw upon to help them understand the new information or solve the problem presented. But some large schemas may be chunked into smaller ones. Intrinsic CL is the characteristics of the materials themselves.
- 2. Extraneous Load This is imposed by the manner in which the information is presented. This can be directly influenced by the teacher and includes aspects such as how new information is presented, explained, and modeled, as well as the impact of other factors which can distract the student, such as the classroom environment. This CL is directly related to learner outcomes.

She briefed that extra sounds, long complex explanations, unnecessary format, information, or animation are examples of Extraneous Load.

3. Germane Load – This is also called effective cognitive load and is under the control of the instructional designer. This is devoted to processing information and constructing schemas. Dr. Sumbal stressed that this CL should be promoted as it contributes to learning while extraneous should be limited. This is the mental effort a student can exert to process information in order to create a new schema or link new knowledge to the existing schema.

The second session of the virtual training was delivered by Dr. Maheen. Her lecture focused on how to structure the content for Online Teaching and Aligning Teaching Strategies for Diverse Learning Styles. She highlighted that instructional design does not involve any of the processes commonly associated with industrial design, such as engineering, construction, or product fabrication. Rather, instructional design is the science of creating an instructional curriculum that is geared towards producing specific learning outcomes, based not only on pedagogical research but also on current instructional practices.



She further emphasized that the first and foremost responsibility of an instructor or developer is to align instructions with learning objectives and assessments to enhance students' learning.

Visual Learners

For visual learners, the instructor could use visual aids and provide visual analogies and metaphors to help with visual imagery. Sometimes graphics are not easy to use for specific topics but consider writing key points in front of the class as this provides visual cues. Visual learners retain information more effectively when visual aids are used, such as pictures, images, film clips, colors, and diagrams. They are also good at understanding visual data presented in maps, charts, and graphs. Avoid using large blocks of text. Include exercises where the students create mind maps and use storytelling to help with visualization. The use of acronyms or mnemonic devices can enhance the learning of visual learners.

Aural Learners

Aural learners respond to sound, music, recordings, etc. They remember conversations well and music causes emotional responses in them. The instructor needs to encourage these learners to participate in discussions. If reading is required suggest audio books if appropriate. If the instructors are explaining a detailed theory, pair it with relevant audio/ narration from your computer. Get students to pair up and explain concepts to each other.

Verbal Learners

Verbal learners are often strong public speakers. Providing these learners with a combination of information in a variety of verbal ways can assist their learning, for example, they may initially read about a concept, afterward, they listen to an audio to support what has been read, then they write notes and finally they partner up with someone and discuss the topic.

Social Learners

This type of learner processes information by interacting with and relating to others. They enjoy working with others and are often strong leaders. Instructors need to be inquisitive and ask them what they think about a concept/topic/ idea. Ask them to bounce ideas off of each other and compare their ideas with others and allow them to discuss and share stories, including group work and engage them in a role-play.

Logical Learner

These learners favor using logic and reasoning. They like to classify and categorize information and solve problems with numbers. Logical learners are especially good at analyzing cause-and-effect relationships. It's better to provide the class with problemsolving tasks. Challenge them to work things out for themselves. Ask them to interpret abstract visual information. Include critical thinking exercises, provide statistics and facts and ask them to suggest conclusions after providing them with evidence.

Physical and Tactile Learners

Tactical learners process information effectively when they use their bodies and when they are actually doing something. They put learning into practice. Use physical exercises and provide hands-on experiences. Include activities where they use a pen and paper to map out their thoughts and problemsolve because writing is a physical exercise. Encourage them to draw diagrams, graphs, and maps. Provide real-life examples such as case studies. Ask them to teach other class members some of the lesson content.

Solitarily Learners

These types of learners like to work and learn by themselves and self-study. They may come across as shy or cold as they keep to themselves. If solitary learners feel comfortable during some of the training, they are more likely to speak up during presentations or group work. Ask questions from them to know what they are thinking and how they are feeling. Provide individual problem-solving exercises. Explain why the lesson material is important as solitary learners are often interested in outcomes. Along with this, give the class ways to track their progress. Suggest links between what they have previously learned should know and new concepts.

Neutralist Learners

Neutralist learners process information by working with and experiencing nature. They learn by finding patterns in nature and using scientific logic for understanding. Include sharing of experiences in lessons. Get them to imagine what the instructor is teaching is a new ecosystem that they can understand by finding patterns. This will help them link concepts together. Give them exercises where they can identify and classify. Use examples linking to daily life, people, or nature. Provide them with observational data, such as case studies.

The third session of the virtual workshop covered the topic- E-learning Tools- How to make use of tech-based tools in your Classroom. Dr. Maheen started her session by defining E-learning. According to her, Elearning refers to a learning system that we can obtain through the internet using an electronic device. We also call it online learning or online education. Later, she briefed about the Ed-Tech Tools and their use. She explained that Educational Technology or ED Tech is a catchall term for a variety of digital tools and methods that can enhance learning. EdTech can help teachers to design instructions, develop engaging ways for students to learn, reflect upon learning and make data-based decisions.

Moreover, the domain expert explained the SAMR in detail. The SAMR Model is a framework created by Dr. Ruben Puentedura. The letters "SAMR" stand for Substitution, Augmentation, Modification, and Redefinition. It provides a pedagogical insight into how technology can and should be used in the classroom. She highlighted the significant features of SAMR and E-learning. She stated that the SAMR model is essentially a planning tool that helps to design better learning activities for students. She further elaborated the following four terms:

SAMR the IPad			
SAMR LEVEL	Description Tasks can be redesigned so that students now work in ways that were never possible before	Examples	
REDEFINITION		Students work with students from around the world as they try to figure out how proximity to the equator effects average hours of sunlight	
MODIFICATION	The iPad is used in ways that significantly redesigns tasks	Students screen capture the shapes they made on se them to create a screencast about their learning to share with others	
AUGMENTATION	Use of the iPad augments the task by adding a little "bit more"	Using interactive games that enhance learning such as Motion Maths to explore fractions	
SAPZULATION	The iPad is a direct substitute with no functional change	Instead of using an actual geoboard to investigate fractions and shapes students use the Geoboard app.	

Substitution- Technologies that replace other tools without adding anything significant

Augmentation- Technologies that replace other tools and add new functionality

Modification- Digital tools that replace other tools and add new functionality that also affects learning in a significant way and

Redefinition- Digital immersive environments that change fundamental relationships and pose cognitive (and some ethical) challenges.

Later, the domain expert asked the participants where do their current teaching fit in the SAMR Model. She stressed that this is the transformation stage where the instructor can redesign the task by using technology as it allows for the creation of new tasks, previously inconceivable. In addition, she explained different learning apps, for example, Wordwall-Offers teachers a quick and easy way to extend and consolidate vocabulary with fun practice. Near-pod and Edmodo, learningapps.org. According to her, these are an incredibly easyto-use tools with a variety of activities teachers and learners can use, adapt or make from scratch to practice the full range of language systems and skills at any stage of a lesson.

Dr. Maheen also explained various online tools

and resources. For Example, ThingLink - This allows teachers and learners to easily create, collect and share interactive images and videos. She further elaborated that with ThingLink, learners can explore areas relevant to their study in a dynamic way- and also create their own projects. Story bird also offers creation tools and public libraries to writers and readers around the world. It is easy to use and can transform learners' experiences of reading and creative writing. Learners can browse for stories that interest them and create their own documents and reports. Moreover, the domain expert explained a formative assessment tool i.e. Socrative. This tool helps teachers and learners to assess understanding and progress in real-time in class through the use of quizzes, questions, and reflective questions.

In the last session, she explained to the participants about 'Student Engagement in Online Class'. She emphasized that if the instructor examines the student engagement it increases their attention and focus. She believed that successful learning is more than passive receipt of processed information. Later, she discussed various effective engagement strategies. She is of the opinion, that to engage students in an online learning environment the instructor needs to ask them to participate. She believes that students' input in the form of polls/surveys and discussions can enhance their engagement in an online class/ session. An online class does not allow the stimulus and connection of seeing a person in front of a physical classroom with their accompanying movements, gestures, looks, and surprises. The instructor needs to give the contemporary human's evershortening attention span, shorter classes are probably going to prove more effective. Another technique is to use breakout sessions. The teamwork required with breakout groups is a great way to engage your students. She advised the participants to play the role of a facilitator instead of a presenter.





In the end, she asked the participants, before signing off for the day- a few twined to think about asking themselves, how do you know that your students understood today's lesson. What evidence do you have that your students have achieved something? How can you better engage them tomorrow so that they can begin to become authentic learners? She also advised the participants to take advantage of the courses and resources focusing on E-pedagogy, as it increases their digital literacy and connectivity. Do action research and try out new tools, resources, and methodologies. Find blogs, articles, webinars, and podcasts about emerging trends.

Participants' Feedback

- > I enjoyed and learned a lot being a part of this session!
- > Overall, it was an informative workshop especially in term of the tech tools
- > Material may have been provided to the subscribers before the webinar. The speed of the presentation was a little fast.
- Session of Ms Mehreen should have full one day session as they were ed-tech tools which is the requirement of the time as well.
- > This type of workshop will be conducted on regular basis
- > It was informative
- > Very well-organized thanks FDA
- > The presentation was good and delivery in good manner but there is no time management some of the important points were not explain in effective manner.
- > keep up FDA
- > should be continued in future
- Please consider the lecture timing for the participants, the training was very useful and informative, but few of the participants has lecture and they have to leave the session in between
- > perfectly designed



Campus	No. of Participants	
Islamabad	1	
Virtual	25	
Lahore	8	
Sahiwal	28	
Wah	25	
Abbottabad	27	

S.No.	Name	Designation	Department
Islamabad Campus			
1.	Ms. Sobia Yaqub	Res. Assot.	Humanities
Virtual Campus			
2.	Ms. Sana Khan	Lecturer	Comp. Sci.
3.	Mr. Ali Husnain	Lecturer	Comp. Sci.
4.	Mr. Muhammad Mudassir Feroz	Lecturer	Comp. Sci.
5.	Ms. Moneeza Batool	RA	Mathematics
6.	Syed Kazim Usman	Lecturer	Mathematics
7.	Mr. Khurram Shahzad	Lecturer	Mathematics
8.	Ms. Muneeba Rahman	Lecturer	Humanities
9.	Ms. Uzma Naz	RA	Humanities
10.	Mr. Anmol Ahmad	Lecturer	Humanities
11.	Dr. Saima Shaheen	Lec./HoD	Humanities
12.	Mr. Sana Ullah Khan	Lecturer/ HoD MS	Mangt. Sci.
13.	Mr. Mehmood Anwar	Lecturer	Mangt. Sci.
14.	Mr. Shahkar Ullah Khan	Lecturer	Mangt. Sci.
15.	Ms. Aruba Sharif	Lecturer	Mangt. Sci.
16.	Ms. Noor-E-Matin	Lecturer	Mangt. Sci.
17.	Ms. Rabia Shafaat	Lecturer	Mangt. Sci.

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S.No.	Name	Designation	Department
18.	Ms. Sadaf Nayyar	Lecturer	Mangt. Sci.
19.	Ms. Anam Sultana	Lecturer	Mangt. Sci.
20.	Ms. Nadia Khalid	Lecturer	Mangt. Sci.
21.	Ms. Sania Khalid	Lecturer	Mangt. Sci.
22.	Ms. Munaza Ambreen	Lecturer	Mangt. Sci.
23.	Ms. Sara Saeed	Lecturer	Mangt. Sci.
24.	Mr. Fazal Ur Rahman	Dy. CoE/ Head	Content
25.	Mr. Wajid Ali	Manager IT	IT
26.	Mr. Saadat Iqbal	Incharge	Virtual Campus
Lahore Campus			
27.	Ms. Sara Khan	Lecturer	Humanities
28.	Ms. Huma Ejaz	Lecturer	Humanities
29.	Ms. Maryam Jahangir	Lecturer	Humanities
30.	Dr. Muhammad Naeem Shahzad	Assist. Prof.	Elec.&Comp
31.	Dr. Muhammad Naeem Awais	Assist. Prof.	EngElec.&Comp
32.	Mr. Muhammad Hassan Aslam	Lecturer	EngElec.&Comp
33.	Ms. Mayyda Mukhtar	Lecturer	EngElec.&Comp
34.	Ms. Ghazala Mushtaq	Lab Engineer	EngElec.&CompEng
Sahiwal Campus			
35.	Dr. Muhammad Azhar	Lecturer	Comp. Sci.
36.	Mr. Yawar Abbas	Lecturer	Comp. Sci.
37.	Ms. Tamsila Parveen	Lecturer	Bioscience
38.	Mr. Muhammad Saad Khan	Lecturer	Bioscience
39.	Ms. Annam Hussain	Lecturer	Bioscience
40.	Mr. Muhammad Yousaf Mushtaq	Lecturer	Civil Eng.

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S.No.	Name	Designation	Department
41.	Syed Tafheem Abbas Gillani	Lecturer	Civil Eng.
42.	Mr. Shad Muhammad	Lecturer	Civil Eng.
43.	Mr. Muhammad Fayyaz Ulhaq	Lecturer	Civil Eng.
44.	Mr. Muhammad Shakil	Lecturer	Civil Eng.
45.	Mr. Khadim Hussain	Lecturer	Civil Eng.
46.	Ms. Hiba Arshad	Lab.Engr	Civil Eng.
47.	Hafiz Muhammad Sohaib Yasin	Lab.Engr	Civil Eng.
48.	Ms. Maham Fatima	Lecturer	Elec.&CompEng
49.	Dr. Muhammad Rafi Raza	AP	Mech. Eng.
50.	Dr. Muhammad Salman Mustafa	AP	Mech. Eng.
51.	Dr. M. Tuoqeer Anwar	Lecturer	Mech. Eng.
52.	Mr. Hassan Iqbal	Lecturer	Mech. Eng.
53.	Mr. Muzamil Hussain	Lecturer	Mech. Eng.
54.	Mr. Muhammad Nawaz	Lab. Engineer	Mech. Eng.
55.	Ms. Ramisha Sajjad	Res. Assot.	Mech. Eng.
56.	Mr. Yasir Raza	Res. Assot.	Mech. Eng.
57.	Ms. Sara Batool	Lecturer	Mangt. Sci.s
58.	Dr. Muhammad Waqas Sadiq	Lecturer	Mangt. Sci.s
59.	Ms. AbidaPerveen	Res. Assot.	Mangt. Sci.s
60.	Ms. Sadaf Noor	Lecturer	Mathematics
61.	Dr. Hameed Ullah	Lecturer	Mathematics
62.	Ms. Sana Nasir	L.E. / DCO	Mech. Eng.
Wah Campus			
63.	Dr. Muhammad Awais	Assist. Prof.	Elec. & Comp Eng
64.	Dr. UmerJaved	Assist. Prof.	Elec. & Comp Eng

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S.No.	Name	Designation	Department
65.	Dr. Adeel Akram	Lecturer	Elec. & Comp Eng
66.	Dr. Sadiq Ahmed	Lecturer	Elec. & Comp Eng
67.	Dr. Muhammad Masood Sarfraz	Lecturer	Elec. & Comp Eng
68.	Dr. Anam Nazir	Lecturer	Comp. Sci.
69.	Dr. Majid Mumtaz	Lecturer	Comp. Sci.
70	Ms. Ayesha Hussain Khan	Lecturer	Comp. Sci.
71.	Mr. Ashfaq Ahmed	Lecturer	Comp. Sci.
72.	SyedaMaedah Kazmi	Assist. Prof.	Mathematics
73.	Dr. Mehvish Naz	Lecturer	Mathematics
74.	Dr Majid Jamal Khan	Assist. Prof.	Mangt. Sci.s
75.	Dr. Khurram Shafi	Assist. Prof.	Mangt. Sci.s
76.	Dr. Muhammad Yar Khan	Assist. Prof.	Mangt. Sci.s
77.	Dr. Amer Saeed	Lecturer	Mangt. Sci.s
78.	Mr. Muhammad Saqib Bashir	Assist. Prof.	Mangt. Sci.s
79.	Ms. Farah Riaz	Lecturer	Mangt. Sci.s
80.	Ms. Sana Dar	Lecturer	Mangt. Sci.s
81.	Dr. Danish Farooq	Lecturer	Civil Eng.
82.	Mr. Mujeeb Ur Rehman	Lecturer	Civil Eng.
83.	Dr. Ali Usman	Assist. Prof.	Mech. Eng.
84.	Dr. Muhammad Abid	Assist. Prof.	Mech. Eng.
85.	Dr. Arslan Ahmad	Assist. Prof.	Mech. Eng.
86.	Dr. Muhammad Shakeel Afzal	Visiting Faculty	Mech. Eng.
87.	Mr. Abuzar Jamil	Lecturer	Mech. Eng.
Abbot	abad Campus		
88.	Dr. Asad Muhammad Khan	Asso. Professor	Chemistry

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S.No.	Name	Designation	Department
89.	Dr. Adnan Anwar	Lecturer	Elec. & Comp Eng
90.	Mr. Usman Khalid	Lecturer	Elec. & Comp Eng
91.	Ms. Rabia Sajjad	Lecturer	Elec. & Comp Eng
92.	Dr. Abdul Mannan	Asso. Professor	Pharmacy
93.	Dr. FiazAlam	Assist. Prof.	Pharmacy
94.	Dr. Atif Ali	Assist. Prof.	Pharmacy
95.	Dr. Muhammad Ikram	Assist. Prof.	Pharmacy
96.	Dr. Asam Shad	Lecturer	Envir. Sciences
97.	Dr. Habiba Zafar	Res. Assot.	Envir. Sciences
98.	Dr. Ikram Shah	Assist. Prof.	Dev. Studies
99.	Dr. Adeel Jalal Malik	Lecturer	Dev. Studies
100.	Dr. Zainab Khalid	APO	Dev. Studies
101.	Dr. Sehrish Khan	Lecturer	Humanities
102.	Ms. Nazia Bashir	Lecturer	Humanities
103.	Ms. Sadaf Taj	Lecturer	Humanities
104.	Ms. Shaina Rauf Khan	Lecturer	Humanities
105.	Mr. Zeeshan Ali Afsar	Lecturer	Humanities
106.	Dr. Raza Ahmad	Asso. Professor	Biotechnology
107.	Dr. Sabaz Ali Khan	Assist. Prof.	Biotechnology
108.	Dr. Ayesha Baig	Assist. Prof.	Biotechnology
109.	Dr. Abdul Rehman Khan	Assist. Prof.	Biotechnology
110.	Dr. Shahid Masood Shah	Assist. Prof.	Biotechnology
111.	Dr. Yasar Sajjad	Assist. Prof.	Biotechnology
112.	Dr. Iftikhar Zeb	Assist. Prof.	Biotechnology
113.	Dr. Basit Shah	Res. Assot.	Biotechnology
114.	Dr. Ghazal Khurshid	Res. Assot.	Biotechnology

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