Makematic

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TEACHING ONLINE MASTERCLASS

Teaching Online Masterclass Whitepaper 'Taking Classes Online'

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Introduction

During the spring of 2020, the Coronavirus pandemic forced 30,000+ schools across the UK to adopt online learning overnight. Educators worldwide - including over 500,000 in the UK are having to find new ways to teach. Some will have had technical training - using tools like Zoom or education management tools from Microsoft, Google or Apple - but very few will have had pedagogical training in how to actually teach online.

So teachers are learning on the fly; leading to frustration for them and discrepancies in the quality of instruction for students. Beyond the immediate crisis, online and blended learning will be increasingly common practice - the "new normal" - necessitated by restrictions but also accelerating what was already a trend.

Numerous studies around the world have found that educators found it tough when they made the change to teaching online. A study of 3,500 teachers in Australia and New Zealand found that "teachers struggled with how best to adapt their teaching methods for a digital environment," when they were required to take their classes online during the pandemic. One educator responded: "It is like being a beginner teacher all over again, as you don't know what works or doesn't work well. You have to transition into a new teaching format very quickly, which is stressful." (Flack, et al., 2020)

Beyond the immediate crisis, online and blended learning will be increasingly common practice – the "new normal".

Similarly, in the United States research found that whilst 62% of teachers had received some training on how to use virtual learning management platforms and technology, only 30% had received training on other distance learning topics such as accessibility and differentiation in online learning environments. Professional development in online teaching pedagogy and supporting students' social and emotional learning needs in an online learning environment was most desired. (Hamilton, Kaufman & Diliberti, 2020)

Closer to home in the United Kingdom, a study by the National Foundation for Educational Research, Schools' responses to COVID-19: pupil engagement in remote learning (2020) found that whilst 66 - 75% of teachers felt they were able to offer their pupils a 'good or very good' level of support in online teaching environments, 80% felt that all, or at least certain levels of the curriculum were getting less attention than usual. The two main reasons cited were: provision and engagement challenges. Both provision and engagement challenges meant that educators' ability to deliver pedagogy in online learning environments was hampered because of a lack of their skill in online teaching. (Lucas, Nelson & Sims, 2020)

Finally, Makematic's report of educators surveyed in Europe, North America, Asia, Oceania, the Middle East, and Africa, Priorities for Teacher Professional Development (Walsh, 2020) found that whilst 57% of educators surveyed felt they were proficient or highly proficient to teach online, 65% said they wanted more professional development in subject-specific online pedagogy.

It's clear that K-12 educators want to understand what effective online teaching looks like, and hunger for pedagogically sound strategies to implement into their online classes. But what does effective online teaching look like and how can this be applied to K-12 online learning environments?

Aim of the Whitepaper

The aim of this whitepaper is to provide the education community practical ways to connect research and theory with practice. Drawing on a number of significant studies, both established and more recent, that focus on online pedagogy in K-12 online or distance learning, we've synthesised the evidence and provided strategies and activities so educators can implement effective online teaching as soon as possible.

Outline of The Whitepaper

We've tried to make this whitepaper as user-friendly as possible, which means we've focused on areas that the research has identified are of particular importance to the success of online learning. These are: design principles for inclusive learning; the important contribution of cognitive psychology on how we learn; motivation and engagement in online environments; and the power of feedback.

Section 1 **Designing Principles for Inclusive Learning**

In this section, educators will learn how to plan structured, purposeful, and inclusive lessons and curriculum for online learning environments.

Section 2 **The Important Contribution of Cognitive Psychology**

In this section, the focus is on the important contribution cognitive psychology has made to online teaching and learning.

Section 3 **Motivation and Engagement in Online Environments**

In this section, the focus is on understanding how to develop online pedagogical strategies that effectively engage pupils in the learning process.

Section 4 **The Power of Feedback**

In this section, the focus is on feedback, what the research says, and ways educators can provide feedback to their students when learning becomes online oriented.

Section 5 **Conclusion**

Designing Principles for Inclusive Learning

Designing online learning isn't quite the same as face-to-face. There are definitely similarities between the two, but there are distinct differences that educators need to be aware of. First of all, it's important to understand what are the **elements of effective online delivery** before moving on to looking at frameworks that can help design inclusive and effective curriculum.

Elements of Effective Online Learning

There's been quite some work in this area, and research suggests that effective online learning has these six elements.

1. Positive interdependence
2. Individual accountability
3. Promotive interactions
4. Elaborated explanations
5. Multiple sources of content
6. Student-centred
7. Careful instructional design

(Abrami et. al., 2011; Branch & Dousay, 2015; Kreihins et al., 2003; Kerr, 2011)

Universal Design for Learning (UDL)

The Universal Design for Learning is a conceptual framework that is grounded in neuroscience (Meyer, Rose & Gordon, 2014). It's an inclusive teaching methodology for supporting all students in diverse, classroom settings. Some research has found that as a teaching methodology it is effective for improving the learning process for all students, and offers flexibility and adaptability to maximise engagement. For online learning environments, it offers a systematic approach to building and creating a series of lessons that accommodates diversity among and between students.

(Capp, 2018; Azawai, et al., 2016, Meyer & Rose, 2000; Rose & Meye, 2000; Tobin, 2014)

UDL Explained

Universal design principles, which are closely aligned with the concepts of equity, diversity, accessibility, and inclusivity have inspired the Universal Design for Learning. (CAST, 2015) Three educational design principles are central to UDL. (National Center on Universal Design for Learning, 2014)

Principle 1: Provide multiple means of representation
This principle is based on the notion that learners perceive things and process information in different ways.

Principle 2: Provide multiple means of action and expression
This principle is based on the notion that learners approach learning differently and will express their ideas in different ways.

Principle 3: Provide multiple means of engagement
This principle is based on the notion that learners are motivated and engaged by different things.

UDL Essential Questions

The three UDL principles are used to help educators design lessons and curriculum. A good way to start thinking about designing classes using such a framework is to ask the following, essential questions:

1. Representation
Have you given learners various ways of acquiring information and knowledge?

2. Action and expression
Have you provided learners alternative ways of demonstrating what they've learned?

3. Engagement
Have you provided multiple means of student engagement, that tap into their interests, challenges them appropriately, and motivates them to learn?

EXPLORE FURTHER

We recommend checking out the resources below to explore UDL further.

Universal Design for Learning Videos

A series of bite-sized videos where educators can learn what UDL is, how to use it to design & create a series of lessons, and a case study where an educator shares her experiences with using UDL to build more accessible and equitable lessons.

The UDL Guidelines

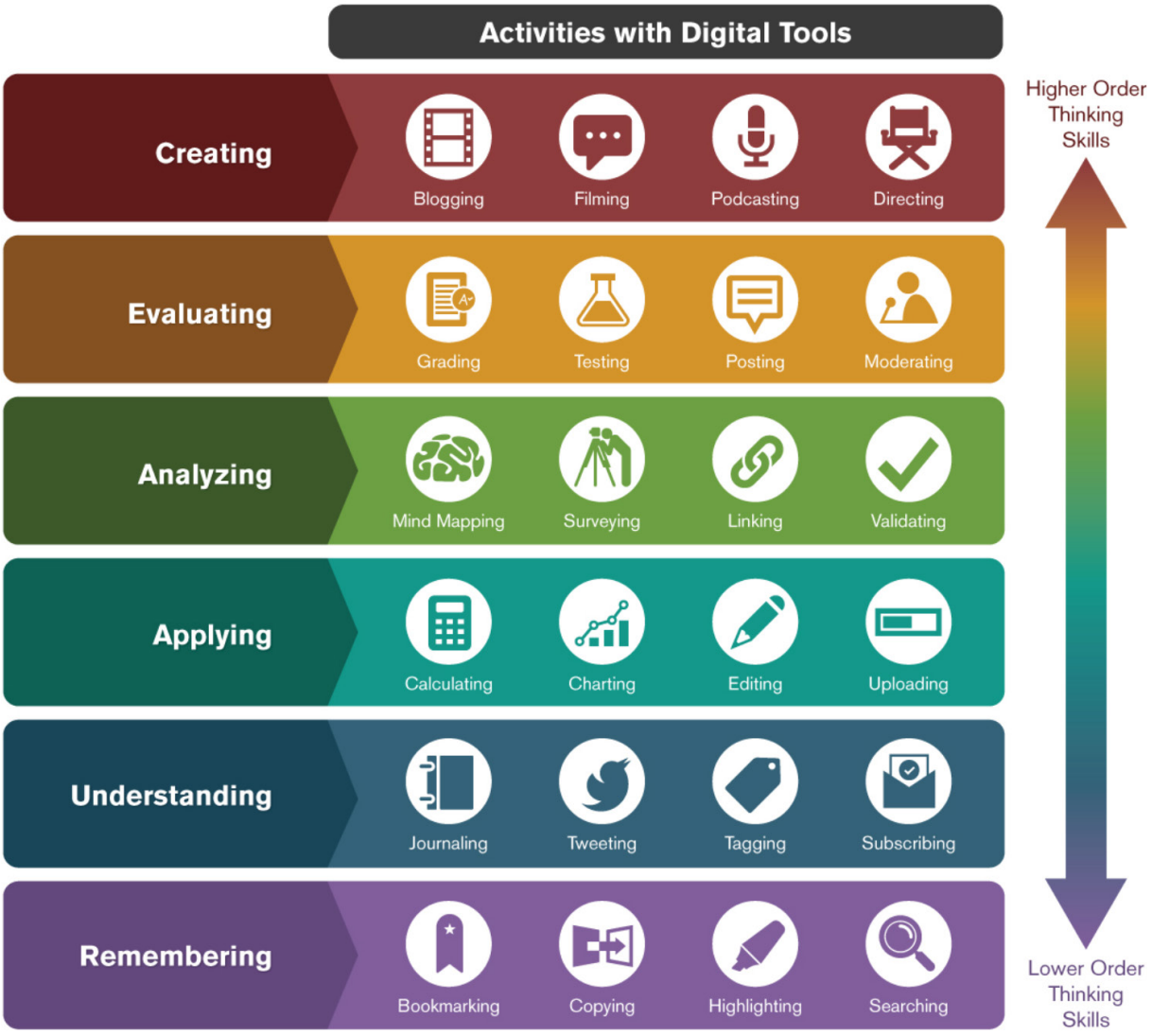
A tool that will help educators implement UDL in their classroom or across a whole school.

Universal Design for Learning Infographic

An in-depth visualisation that will explain the three main UDL principles outlined above.

Bloom's Digital Taxonomy

Conceived by Andrew Churches, the Bloom's Digital Taxonomy is about considering how technology and digital tools can facilitate learning. This is a useful framework to help educators design inclusive and engaging online learning.



[Arizona State University - Ron Carranza]

The Important Contribution of Cognitive Psychology

Cognitive Load Theory of Multimedia

The cognitive load theory of multimedia is a cognitivist learning theory that's grounded in neuroscience. Proposed by Richard Mayer in the 1990s it's a sub-theory of cognitive load theory that is applied particularly to multimedia learning. But what does 'multimedia learning' mean? It's defined by Mayer to mean learning from both pictures and words, a far more effective way of learning than by using words alone. (Mayer, 2014)

The Basics

The theory has three main assumptions suggested by cognitive research:

1. Dual-channel assumption
There are two separate channels (auditory and visual) for processing information

2. Limited capacity assumption
Each channel has limited capacity and limited time to hold information

3. Active processing assumption
Learning is an active process of filtering, selecting, organizing, and integrating information based on prior knowledge.

Why Reducing Cognitive Load Is Important for Learning

Put simply if we place too many demands on our working memory, it can impair learning. Reducing the mental effort required to learn new information, is likely to produce greater success. Educators who teach in online learning environments are using more multimedia. So understanding how to reduce cognitive load in multimedia learning is imperative. The good news is that Mayer and his colleagues developed 30 principles of multimedia learning to help educators more effectively convey ideas, whilst reducing cognitive load. (Clark and Mayer, 2016; Johanes, & Lagerstrom, 2016) Educators can use these principles to create engaging **instructional videos** and **presentations** and can help **choose appropriate media** to use either in their classes or for homework.

We've chosen twelve of the thirty principles and provided suggested applications to help educators create and choose engaging videos and presentations for their students.

Principles of Multimedia Learning

PRINCIPLE	APPLICATIONS
Coherence Principle People learn better when extraneous words, pictures, and sounds are excluded rather than included.	Use simple text and visuals that relate to the learning objectives in presentations and instructional videos.
Signaling Principle People learn better when cues that highlight the organization of the essential material are added.	Show the learner exactly what you want them to pay attention to on the screen by highlighting important words or using arrows to point to significant information. Have slides or scenes that separate learning sections. This is a quick and easy way to signal to the learner that we're moving on to the next topic.
Redundancy Principle People learn better from graphics and narration than from graphics, narration, and on-screen text.	With an audio or narration voice-over, use only graphics on the screen. Don't use graphics and text. Add closed captions that can be optionally turned on, for those who prefer or need subtitles.
Spatial Contiguity Principle People learn better when corresponding words and pictures are presented near rather than far from each other on the page or screen.	Keep all related text and graphics in the same place in the frame. This will make it easy for learners to see how text and graphics are related.
Temporal Contiguity Principle People learn better when corresponding words and pictures are presented simultaneously rather than successively.	Make sure the visuals and audio occur at the same time as opposed to having the voiceover audio first and the visual after.
Segmenting Principle People learn better from a multimedia lesson that is presented in user-paced segments rather than as a continuous unit.	Provide learners with more control over their learning. This is done by adding the next buttons or allowing the speed at which a video plays. Make sure that no one lesson, slide, or video has too much information included.
Pre-training Principle People learn better from a multimedia lesson when they know the names and characteristics of the main concepts.	Create a"cheat sheet" for learners to look at before watching the video or presentation. Or before watching the video or presentation spend time with the students understanding the basics before they move onto the video or presentation.
Modality Principle People learn better from graphics and narrations than from animation and on-screen text.	Try to limit the amount of text you use on-screen overall. Rely more on visuals, unless you need to define key terms, list steps, or provide directions.
Multimedia Principle People learn better from words and pictures than from words alone.	Avoid using text on screen alone. Use relevant visuals instead. Make sure the visuals clarify or enhance the information.
Personalization Principle People learn better from multimedia lessons when words are in conversational style rather than formal style.	Keep your messages simple and casual. Try to avoid overly professional sounding text, or long, complex words. It also helps to use the first person (you, I, we, our).
Voice Principle People learn better when the narration in multimedia lessons is spoken in a friendly human voice rather than a machine voice.	Use your own voice and use high-quality audio. You can purchase high-quality microphones that can clip onto your lapel relatively cheaply. This will make all the difference.
Image Principle People do not necessarily learn better from a multimedia lesson when the speaker's image is added to the screen.	Instead of just having you on the screen (talking head), use relevant animations and visuals that help reinforce the audio voiceover. A talking head is great to establish a relationship and trust, but once you get into the nitty-gritty, use the strategies described above.

(Johanes, & Lagerstrom, 2016)

Supercharge your Multimedia and Design Skills!

Many of the principles in the cognitive load theory of multimedia focus on how educators can make their presentations and videos more pleasing to the eye. It might seem that it would take a graphic designer to create worksheets, presentations, or web pages that are impactful, clear, and easy to understand. But really the key is understanding basic design principles of proximity, alignment, repetition, and contrast.

You can learn more about these design principles by watching bite-sized videos on **Understanding Design Principles** and **Design in Action**.

EXPLORE FURTHER

Pedagogical Strategies for Teaching Online

A series of bite-sized videos where you can explore the pedagogy of effective online teaching and learning.

Retrieval Practice

Retrieval practice is a knowledge-based framework that, like the cognitive load theory of multimedia has a lot of support from cognitive science. (Weinstein et. al. 2019) Retrieval practice is the act of trying to recall information from the long-term memory and prioritises active over passive learning.

The "testing effect" supports the idea for retrieval for learning; during tests or quizzes, students are forced to retrieve memories from their long-term memory and as a result, they learn from this activity (Duchastel, 1979). More recently cognitive psychologists have found that nothing cements long-term learning as powerfully as retrieval practice. (McDaniel, Agarwal, Huelser, McDermott, & Roediger, 2011)

Retrieval Practice Online

The table below offers suggestions on how to adapt three well known face to face retrieval practice activities for live online classes.

	FACE-TO-FACE CLASSROOM	ONLINE CLASSROOM
Retrieval Quizzes	**Paper or online quizzes**	**SurveyMonkey** **Google Forms** **Microsoft Forms** **Kahoot** **Poll Everywhere**
Brain Dumps	**Stream of consciousness brain dump to a prompt for a timed period either written or spoken**	**Collaborative document** **Flipgrid**
Flashcards	**Index cards created by a student or teacher**	**Quizlet**

EXPLORE FURTHER

Pedagogical Strategies for Teaching Online

A series of bite-sized videos where you can explore the pedagogy of effective online teaching and learning.

Take a look at the book **Stop talking, start influencing: 12 insights from brain science to make your message stick**. We also interviewed Dr Horvath Cooney for our series **Teaching Online Masterclass**. You can access his videos from the link above.

Metacognition – Reflective Practice

"Metacognition and self-regulation approaches aim to help pupils think about their own learning more explicitly, often by teaching them specific strategies for planning, monitoring, and evaluating their learning. Interventions are usually designed to give pupils a repertoire of strategies to choose from along with the skills to select the most suitable strategy for a given learning task" (Education Endowment Fund, 2020).

Features such as prompts for reflection, self-explanation, and self-monitoring strategies have shown promise for improving online learning outcomes. Fortunately, research has shown that metacognition is a teachable skill (e.g., Moely et al., 1995; Schraw, 1998) and that tools or features prompting students to reflect on their learning is effective in improving outcomes in online learning environments.

The table below provides six reflection ideas for online teaching and learning.

REFLECTION IDEAS FOR ONLINE CLASSES

1. Digital, video, audio, or handwritten journal.
2. Use sentence starters to reflect on lessons or activities.
3. Exit tickets – Help students think about how and why they learn, as well as challenges they are still facing.
4. Sketch reflections using Sketchnote
5. Student blogs
6. Twitter summary – Students summarise what they've learned using 280 characters. To make it harder, make it 140 characters. Students can share their tweets in the chat function or on a shared document.

Best Practice Exit Tickets

The most effective exit tickets are:

- Aligned to the lesson objectives.
- Vary in format (use multiple-choice, open-ended).
- Use clear and concise language.
- Have short questions.
- Use 'how' and 'why' questions to get students to demonstrate mastery.
- Have a specific and measurable aim.
- Use shared documents and classroom pin boards like Trello and Padlet to keep track of them

Motivation and Engagement in Online Environments

Motivation and Engagement

Motivating and engaging learners can be challenging in any learning environment. It may even seem more challenging when learning goes online, especially when research has shown that online learners must be highly motivated in order to achieve (Chyung, 2001; Park & Choi, 2009; Roblyer, 1999; Sankarn & Bui, 2001).

Evidence tells us that using Self-Determination Theory as a theoretical framework and online tools to support **active**, **constructive**, **intentional**, **authentic**, and **collaborative learning** can motivate and engage K-12 learners in online learning environments. (Kerr, 2011)

Self Determination Theory (SDT) Explained

SDT represents a broad framework for the study of human motivation. It suggests that when people are motivated to grow and change, they become self-determined. They can become more self-determined when they:

- Master tasks and learn different skills (Competence)
- Feel a sense of attachment and belonging to people (Relatedness)
- Feel in control of their own goals and behaviours. (Autonomy)

Moreover, engaging in activities for an inherent reward is more motivating and engaging than carrot and stick ones. (Skinner & Belmont, 1993; Ryan & Deci, 2000) Therefore it's very important that when designing online learning that educators think about how they can incorporate these elements into their lessons or curriculum.

Creating Online Learning Experiences to Motivate and Engage Learners

Over the next couple of pages, we will be focusing on strategies and activities that educators can use to motivate and engage students in online learning environments.

The strategies and activities described will:

- Encourage student-to-student interaction.
- Facilitate online discussions, virtual brainstorming, and problem-based learning activities.
- Develop reflective thinking practices.

Student-to-Student Interaction

Research has shown that student-to-student interaction when teaching online can produce high student achievement outcomes, especially compared to student-teacher interaction. (Moore, 1989) The most effective student-student interaction treatments online are those that are designed and implemented intentionally to provide students with opportunities to work collaboratively (also known as cooperatively). (Bernard, et. al., 2009; Borokhovski et. al., 2012)

Designing opportunities for students to interact with one another will allow them to collaborate and communicate synchronously and asynchronously and will boost engagement. Developing collaborative working skills in students will help them work better together and will help develop the following five key components of cooperative working, all useful skills in online learning environments.

Positive interdependence: Group members must work together to achieve a common goal.

Individual accountability: Each member is responsible for doing their part.

Promotive interaction: Group members help, support, and encourage each other.

Effective interpersonal skills: Group members are taught how to communicate, solve problems, and resolve conflict effectively.

Group processing: Groups are given time to reflect on how well their group functioned and to make plans for improvement. (Gillies, 2016)

Increasing collaboration in online learning environments

To increase student-to-student interactions (collaboration) in your online classes (Borokhovski et. al., 2012) suggests:

1. Developing **role-based scenarios** to specify and guide collaborative interactions.
2. **Scaffolding** collaborative interactions by establishing and upholding rules and procedures of exchange amongst students
3. **Monitoring and adjusting** collaborative interactions by providing meaningful and timely feedback, both from the teacher and from peers.

Here are **three collaborative learning strategies** you can use in live online classes to increase student-to-student interaction.

Poll-Group-Repoll

At the beginning of a live lesson, launch a poll and ask students a question with divergent responses. Have students discuss their positions in a breakout group or via. the private chat function. Relaunch the same poll later in the live session to see if their responses have changed. Anchor a class discussion around any changes to students' answers.

Value Line

Ask each student to rank how they feel about an idea, then break them out in groups of up to four students to discuss the issue. Bring students back to summarise their discussions.

Role Play

You can prepare role-play scenarios and use the breakout room function for students to complete the role-play. Effective role-plays have a peer who can give them some feedback. It's best to provide a feedback rubric or create one as a class prior to the role-play beginning.

Supercharge Collaboration

Explicit teaching of skills, like collaboration and communication, is more effective than implicit approaches (Cullinane and Montascute, 2017). To help students develop collaboration skills either in-class time or on their own, below is a series of bite-sized videos that we recommend educators share or use with their students.

The focus on the list of activities below is collaboration and communication skills, but in the collection, there are videos on developing critical thinking and creativity skills too.

The '**Learn how to** …' videos teach students what they need to know about communication and collaboration skills.

The '**Practice the skills**…' videos are self-directed activities that students can watch to develop their collaboration and communication skills on their own. These videos can also be used as warmers or as homework tasks when educators take classes online.

How can giving and receiving feedback make you a better collaborator?	Practice the skills to be a better communicator and collaborator
How can giving and receiving feedback make you a better collaborator?	Improving Your Concentration
How can understanding body language make you a better collaborator?	Understanding Micro Expressions
How can having good social skills make you a better collaborator?	Are You A Good Listener?
How can having good listening skills make you a better communicator?	Asking Questions
How can crafting clear messages make you a better communicator?	Relaxation Technique For Public Speaking
How can understanding email etiquette make you a better communicator?	The Subject Line Pitch

Online Discussion

Online discussions have been used in higher education since the late 90's, but are a relatively new addition to the K-12 classroom. Unlike face-to-face discussions, online discussions are slower paced - often taking place over a week or more. They require access to a device, and encourage a more reflective approach to conversation. Online discussion is a text-based learning activity that can be delivered synchronously and asynchronously. (Hew, Cheung, and Ng 2010)

The main things that students will need to do are:

- Carefully read classmates' ideas and perspectives.
- Think about, respond to and question ideas being discussed.
- Write and communicate ideas through writing.

Effective Discussion Strategies

The research suggests the following approaches to creating **effective, online discussions**:

- **Structured and defined discussions** where students are encouraged through their questions and prompts to share their opinions.
- **Teacher social presence**. Educators actively participate in the discussion with a strong emphasis on social interaction.
- Use of the **four-question technique** (which fosters analysing, reflecting, relating, and questioning) and enhances critical thinking in online discussions.
- **Modeling**, **coaching**, and **scaffolding** on behalf of the teacher.
- **Self-reflection** activities.

(Shea & Bidijerano, 2009; Dennen and Wieland 2007; Alexander et al. 2010; Dietz-Uhler and Lanter, 2009, Boling and Beatty, 2010; Kanuka, Rourke, and Laflamme, 2007)

ONLINE DISCUSSION IDEAS

STEP 1: Introduce the discussion topic with some multimedia - video, presentation or reading. Here some video resources you can use:

Think Like A Global Citizen series

United Nations Sustainable Development Goals

STEP 2: Provide students with the online discussion question using the question stems below to get them started.

How could we...

Eg: How could we reduce poverty in our community? How could we limit food waste in the school cafeteria/at home? How could we limit cold and flu transmission among students?

How might we...
Eg: How might we track and protect local plant and animal species? How might we improve access to healthy food in our community?

Is there a better way to...
Eg: Is there a better way to manage school traffic during pick-up and drop-off times?

STEP 3: Give students time to do some research and formulate their opinions before the discussion begins.

STEP 4: Spend time with students creating online discussion guidelines, discussing the etiquette for online discussion, and practise using the technology they'll be using. This is the most important bit and should not be skipped.

STEP 5: Discussion time. Be prepared for the first one to not go to plan. It's okay. It's part of the learning curve. This is where a flexible mindset and a sense of humour is so important.

STEP 6: Individual and class reflection.

Online Discussion Resources

Kialo Edu is a free platform designed to foster thoughtful debate and discussion.

YO Teach! is a free backchannel web app teachers can use to create and moderate chat rooms for real-time student interaction.

TOP TIP

Online discussions take a little bit of persistence to master. We recommend starting online discussions synchronously. This means everyone is online at the same time. Prepare the students by giving them some of the prompts in advance, which means students can think about their responses before the discussion begins.

Another way to introduce online discussions is by focusing the online discussion around a novel theme such as 'Are Santa's elves slaves?' or 'Which is a better pet: a dog, cat, bird etc..?'

Problem-Based Learning (PBL) Tasks

Problem-based learning approaches can be effective in online learning environments and have been shown to positively affect educational outcomes, as well as motivate and engage learners. (Wirkala & Kuhn, 2011; Gündüz, et. al., 2016) But what are the components of PBL tasks in online learning environments that educators need to be aware of?

Designing PBL for online learning

To design PBL for online learning, educators must:

1. Create **self-directed and student-centered tasks**. Students individually and collaboratively can therefore assume responsibility for generating learning processes and issues.
2. **Explicitly teach students the skills they need to be able to work collaboratively to solve problems online**. This could be problem solving skills like convergent and divergent thinking skills, collaboration and communication skills or even how to use the technology they'll be using. This step is not one to miss out. Never assume students have the skills they need to effectively collaborate online.
3. Give **reasonable timelines with some flexibility**. Check in with students more rather than less, because it's easier for students to get off track. Make sure students and teachers have access to the group's collaborative documents too, so there is full visibility.
4. Have at least one, if not more **self-reflective** components to the task.
5. Give students **online and offline opportunities to meet**. Encourage them to keep minutes of their meetings and set action items so that the task can be completed. This is something they'll probably need explaining. To make it easier, provide them with an online template that they can fill in.
6. Include **peer assessment or feedback** in the process. This also applies to the teacher too. Getting feedback from students about how to make the process better can often be very insightful.

(Johnson and Johnson, 2002; Johnson, Johnson and Stanne, 2000; Kyndt et al., 2013; Chappell & Nunnery, 2013; Puzio and Collby, 2013; Roseth, Johnson and Johnson, 2008; Slavin, 1989, 2013, 2014; Slavin, Lake, Hanley and Thurston, 2014, Wirebring, et. al, 2015; Hattie, 2009)

Developing Problem Solving Skills Online

Developing problem solving skills in learners can help them thrive when tackling problem-based learning tasks, and its explicit teaching of them that is more effective than implicit approaches. (Cullinane and Montascute, 2017).

Here are three problem-based warmer activities that educators can use in live classes.

Moral Dilemma

Create a number of possible moral dilemmas that students might encounter in life. Create enough so that only a few students have similar prompts. Prompts could say:

"I saw my friend cheat on a test and they got the highest mark in the class. What should I do?"

"I was given too much change when I purchased an item. What should I do?"

The dilemma can be privately messaged to individual students or sent via email before class. After some thinking time, students can read their prompt aloud and share with the class how they would approach the situation. Students with the same prompt can also share their responses too.

Survivor Scenarios

Create a pretend scenario for students that requires them to think creatively to make it through.

An example might be getting stranded on an island, knowing that help will not arrive for three days. The group has a limited amount of food and water and must create shelter from items around the island.

Place students in breakout rooms for a limited amount of time, and when they return ask each group to share their decisions.

Lateral Thinking Tasks

Here are some video-based short, problem solving activities that educators can use in their online classes to get students engaged at the beginning of their lesson.

The video should be paused at the appropriate moment to give students thinking or discussion time.

Students can respond to questions verbally or via. the chat function. These activities can also be given to students independently in class or for homework.

Alternative Uses Test

The Problem With The Elevator

Rebus Puzzles

Recognizing Patterns

Questioning Basic Assumptions

These tasks can also be set as at home activities too. To take the learning further, the following videos explain some of the skills above in more detail.

How can you be more creative with lateral thinking?

How can being able to think differently make you a better creative thinker?

How can ideation help you think creatively?

How can analysing arguments make you a better critical thinker?

How can being open minded make you a better critical thinker?

How can understanding multiple perspectives make you a better critical thinker?

Brainstorming

Virtual brainstorming has been shown to enhance creative performance and generate higher quality ideas by almost 50%. (De Rosa, etal. 2007) But how can educators facilitate a brainstorm in an online learning environment?

Three Online Brainstorming Activities

Here are three online brainstorming activities that can be done in individually or live classes.

Brain Writing

Designed by Bernd Rohrback in 1969, this brainstorming strategy enables everyone to share their ideas. It gives people time to formulate their ideas while also providing time to develop ideas offered by others. Here is the basic method:

1. Before the activity starts, divide students into groups of 4 or 5. You can allocate the groups before class and place the names and groups on a shared document. Make sure on this document that all class members have access to a shared file. This will ensure that the students can share documents amongst each other easily.
2. Each person writes down their ideas in response to a question or problem on an online document. When finished, they will share their document with other classmates. That classmate will review the idea and add to it.
3. Once the document has four or five responses, the team shares their ideas by sharing their screen.

Rapid Ideation

Give students a short time limit and ask them to write as many ideas as possible on an e-doc or piece of paper. Once that's done, the class will vote on their preferred ideas by placing their initials next to it on the sheet. An online timer can be utilised to create suspense.

Mind mapping

Being able to brainstorm on your own is a very important skill. Give students a topic or theme to brainstorm. Before they attempt to come up with ideas individually, have them watch the Brainstorming on Your Own video and ask them to apply what they've learned in the video to the brainstorm task they've been set.

The Power of Feedback

Feedback studies in both face-to-face and online learning environments has shown that it can guide learners toward positive learning outcomes (Getzlaf, Perry, Toffner, Lamarche, & Edwards, 2009; Education Endowment Fund, 2020; Bigatel et.al, 2012, Hattie & Timperley, 2007).

According to the Education Endowment Foundation (2019)

"Effective feedback tends to:

- be specific, accurate and clear,
- encourages and supports further effort,
- is given sparingly so that it is meaningful, and
- provides specific guidance on how to improve and not just tell students when they are wrong."

The difference with feedback in the online teaching environment is that it must be given more frequently. Research has found that frequency in online environments helps motivate learners, especially if they have less face time than when they met their teacher face-to-face. (U.S.Department of Education, 2010)

Feedback When Teaching Online

Since feedback when teaching online is more frequent, it's recommended that educators get creative. Here are five ways educators can give feedback to their students when teaching and learning goes online.

1. Video feedback using a smartphone or screen capture tools - like **Screencastify**.
2. Audio feedback using a smartphone or tools like **Synth**.
3. Private and group instant messaging during live classes. Breakout rooms can also be used to give more personalized feedback.
4. Peer-to-peer feedback. There are so many creative ways to do this and there are many tools that can help: **Flipgrid**, **Wakelet**, GoogleForEdu, **Padlet** or **Nearpod** or create online surveys using **Google forms** or **SurveyMonkey**.
5. And of course, there's email.

The most important thing is that it needs to be done often. Mix it up. And feedback goes both ways. It's very important that educators ask their students for regular feedback too. It's important to understand what students like and dislike about the processes that are being implemented in their classes. It's as simple as asking questions like: How are you getting on? or Do you have any suggestions?

Conclusion

K-12 online teaching and learning is not something that is likely to disappear. Therefore it's important to remember that any form of teaching and learning, online, blended, flipped or face to face, will make certain assumptions about the learning process, and that there are competing ideas about the correct or best way to learn. As online learning has developed, educators have been informed by theories and have adapted and extended them in the online environments. Moreover, developments in cognitive psychology have also become influential in teaching and learning processes in the last 10 years, and have given support for online educators to develop more effective learning strategies. In this paper we didn't enter into a full debate about learning theories or cognitive psychology, instead we shared the emerging consensus around what counts as the core elements of effective online teaching and learning.

Building on this, we also have important new evidence about teaching and learning in online environments. The Education Endowment Foundation (2020) and the Education Development Trust (2020) conducted a review of the available literature to investigate methods that schools could use to support remote learning during the school closures caused by the 2020 coronavirus pandemic (COVID-19).The reviews sought to find the best evidence behind the wide array of approaches that schools might choose to utilise during the crisis.

Here are the key findings from the reports.

1. The **general principles of effective pedagogy** remain valid in the context of remote learning.
2. **Teaching quality** is more important than how lessons are delivered.
3. It's important to develop and maintain '**teaching presence**', to ensure that learners thrive when studying remotely.
4. **Peer interactions** and **supporting pupils to work independently** can provide motivation and improve learning outcomes.
5. **Different approaches** to remote learning suit different tasks and types of content.
6. Effective remote teaching is a **subject matter expert skilled in different aspects of direct instruction**, including exposition and explanation.
7. **Technology can be used to enhance the impact of distance learning**, and access to technology is key, particularly for disadvantaged pupils.

In conclusion, this report has attempted to provide the education community with a set of tools to plan structured, purposeful and inclusive lessons and curriculum for online learning environments. We acknowledge that this is only the start and much more needs to be discovered. But in any discussion about what effective online teaching and learning looks like we believe that the focus must be on pedagogy over technology, evidenced based approaches to teaching and learning and further research in online learning in K-12 settings.

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