OʻZBEKISTON RESPUBLIKASI OLIY TA'LIM, FAN VA INNOVATSIYALAR VAZIRLIGI TOSHKENT IQTISODIYOT VA PEDAGOGIKA INSTITUTI TILLAR VA MAKTABGACHA TA'LIM FAKULTETI





Z.B.Sabirova

INGLIZ TILI O'QITISHNING INNOVATSION PEDAGOGIK TEXNOLOGIYALARI

uslubiy qo'llanma

(pedagogika oliy ta'lim muassasalarining xorijiy til va adabiyoti yo'nalishi bakalavriat 3-bosqichi talabalari hamda fan o'qituvchilari uchun mo'ljallangan)

Ushbu uslubiy qoʻllanma Toshkent iqtisodiyot va pedagogika instituti ilmiy-uslubiy kengashining qaroriga asosan nashrga tavsiya etilgan.

UDK: KBK:

Z.B.Sabirova ingliz tili oʻqitishning innovatsion pedagogik texnologiyalari. Uslubiy qoʻllanma. Mas'ul muharrir **O.Yoʻldoshev**. OʻzR Oliy ta'lim, fan va innovatsiyalar vazirligi, Toshkent iqtisodiyot va pedagogika instituti. Chirchiq,

KBK

Mazkur uslubiy qoʻllanma Toshkent iqtisodiyot va pedagogika institutining davlat ta'lim standartlari va "Ingliz tili oʻqitishning innovatsion pedagogik texnologiyalari" kursining namunaviy oʻquv dasturiga muvofiq ravishda yaratildi. Unda pedagogik texnologiya asoslari, uning tarkibi, tuzilishi, vazifalari va unga boʻlgan zamonaviy yondashuvlar hamda undan amalda foydalanishga doir tavsiyalar bayon qilingan. uslubiy qoʻllanmadan Xorijiy til va adabiyoti yoʻnalishida tahsil olayotgan talabalarga, shuningdek, shuningdek, professor-oʻqituvchilar foydalanishlari mumkin.

Mas'ul muharrir	O.Yo'ldoshev, pedagogika fanlari
	boʻyicha falsafa doktori (PhD), dotsent
Taqrizchilar	D.A.Ibragimova , dotsent v.b.
_	N.F.Ibragimova, dotsent v.b.

Uslubiy q	oʻllanma Toshkent	iqtisod	iyot va ped	dagogik	a instit	uti Kenga	ashining
2025-yil	dagi	sonli	yigʻilish	qarori	bilan	nashrga	tavsiya
etilgan.							

ISBN: © Z.Sabirova.

Ingliz tili oʻqitishning innovatsion pedagogik texnologiyalari. Uslubiy qoʻllanma

So'z boshi

Bugun Yangi Oʻzbekiston hayotining barcha sohalari chuqur islohotlar maydoniga aylangan. Bu jarayonda ijtimoiy sohaning asosi hisoblangan ta'lim tizimidagi oʻzgarishlar haqida toʻlqinlanib soʻzlamaslikning iloji yoʻq.

Ta'lim sohasida amalga oshirilayotgan islohotlarning asosiy qismini, albatta, oliy ta'lim tizimidagi islohotlar tashkil etadi.

Xususan, Oʻzbekiston Respublikasi oliy ta'lim tizimini 2030-yilgacha rivojlantirish Konsepsiyasi mazkur sohadagi yangi islohotlar uchun debocha vazifasini bajarib beradi.

Ushbu hujjatga intellektual taraqqiyotni jadallashtirish, raqobatbardosh kadrlar tayyorlash, ilmiy va innovatsion faoliyatni samarali tashkil etish hamda xalqaro hamkorlikni mustahkamlash maqsadida fan, ta'lim va ishlab chiqarish integratsiyasini rivojlantirish singari vazifalar asos qilib olindi. Konsepsiya mazmuni mamlakatimiz oliy ta'lim tizimini isloh qilishning ustuvor yoʻnalishlarini aks ettiradi. Unda oliy oʻquv yurtlarida qamrov darajasini kengaytirish hamda ta'lim sifatini oshirish, raqamli texnologiyalar va ta'lim platformalarini joriy etish, yoshlarni ilmiy faoliyatga jalb qilish, innovatsion tuzilmalarni shakllantirish, ilmiy tadqiqotlar natijalarini tijoratlashtirish, xalqaro e'tirofga erishish hamda boshqa koʻplab aniq yoʻnalishlar belgilab berilgan. Bularning barchasi ta'lim jarayonini yangi sifat bosqichiga koʻtarish uchun xizmat qiladi.

Oʻquv-uslubiy qo'llanmada kelajakda yaxshi pedagog boʻlishda mustaqil oʻqib oʻrganishi uchun yordam beradi.

LECTURE 1.

Introduction. The notions of teaching technologies and innovations in teaching

- 1. What are the innovative technologies in teaching?
- 2. What are the technologies used in teaching and learning?
- 3. What is the concept of innovation in teacher education?
- 4. What is innovative teaching?

Let's talk about innovation in education, discuss a few examples, and find out why this focus on innovation education is important.

In a recent post, we explored innovative teaching strategies and how educators can deploy these strategies in the classroom. Let's talk a bit more about innovation such as what it is and more specifically innovation in education. Why this focus on innovation education? Skill gaps.

As teachers, our goal is to educate students. Educated students are then able to advance their education further – to get whatever degree or certification they need – to eventually succeed in a career that they find rewarding and give back to their community.

One of the key challenges employers face today is that their employees are struggling to meet the challenges of ever-changing skills requirements. In fact, a Gartner skills gaps analysis found that 64% of managers don't believe their employees can keep pace with the evolving skills needed while 70% of employees don't believe they have mastered the skills needed for the job they have.

What does the skills gap have to do with innovation in education? Well, let's first unpack what innovation in education even means.

What is Innovation in Education?

Innovation is one of those words we like to throw around whenever possible. To innovate means to make changes or do something a new way. To innovate does not require you to invent. Baked into innovation are creativity and adaptability.

Innovation in education isn't a specific term with fixed definitions. The spirit of innovation education is an openness to looking with fresh eyes at problems and to address them in different, new ways. It is a recognition that we don't have all the answers and are open to new approaches to improve such as methods of knowledge transfer with innovative teaching strategies.

Innovation in education can be:

- Recognizing that students are better served by a flipped classroom where they watch lectures at home and complete assignments in the classroom.
- Introducing more technology in the classroom to create a blended classroom where students experience technology as they would in the real world.
- Providing greater ways to facilitate clearer and better communication between school districts' parents with powerful video tools.

Innovation in education comes from identifying problems, watching and learning from others, to develop new methods to address these problems, and iterating on them when these experiments don't necessarily give the results you need



Why is Innovation Important in Education?

Charles Darwin never said, "It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change." Regardless, let's consider that a moment.

It is nearly impossible to predict or keep pace with the rate of change in today's workplace. Accepting that, we can then agree that perhaps more important than the knowledge we have is the ability to adapt and evolve.

How can we teach a student to adapt? Well, in most industries, the catalyst of change is innovation. There are always improvements to be made. Innovation education helps prepare students for a dynamic workplace by providing them opportunities to develop skills such as creativity, adaptability, and resilience.

As educators, we can leverage innovation in education to improve student outcomes from a purely academic standpoint as well as to develop those soft skills that students need to succeed in life. We can also introduce more and more technology that students will need to be comfortable with overtime.

What are Examples of Innovation in Education?

As we've already started to see, innovation in education can come in many forms. Remember, it is not just introducing new technology into the classroom. It can be a new method of teaching for a specific project or topic.

- **Project-Based Learning (PBL)** Help students identify a real-world problem and develop a solution for it. Introduce a PBL-unit as part of a larger lesson where students can exercise their creative thinking, problem-solving, and collaboration with other students.
- **Blended Learning** Blending learning combines online learning with traditional classroom learning. Students must become comfortable with online tools and using the internet to contribute to their learning. A blended learning approach gives students the ability to discover how best to use tools that they will rely heavily on in their professional lives.
- **EdTech** Educational technology (edtech) typically refers to any software, application or service developed to enhance education. We must be careful not to go too far into the deep-end but introducing technology in the classroom is important. Innovative classroom technologies often mirror the innovations outside of education. So, the more students engage with technologies in the classroom, the better prepared they will be to engage with and through technology in the workplace.

LECTURE 2.

Innovative tools of teaching

As we mentioned above, innovation education does not have to mean introducing technology into the classroom. However, educational technology certainly has its role in innovation in education. Sometimes Edtech facilitates innovation in education by making possible what wasn't possible before. Think about how schools were able to maintain any sort of continuity during the pandemic. Schools and teachers innovated by offering new methods of knowledge transfer.

Most of us will first mention learning management systems (LMS's) when we think of educational technology. Learning management systems are often the centerpiece of a school's educational technology. But, let's face it, unless you are an IT Administrator or tasked specifically with onboarding a new LMS, you're not going to be introducing a learning management system into your classroom (TBH, you wouldn't need to).

So, let's consider some innovative educational technology that you could introduce into the classroom:

- **Feedback assessment tools** Feedback is critical both for students to receive and to give. It can help teachers gauge understanding in real time and get a pulse check of the class. Feedback assessment tools (polling, surveys, forms, knowledge check) are also incredibly easy to bring into the class. We even use them today by having students raise their hands and count their responses. Feedback assessment tools provide a fun way for students to leverage technology in the class. Additionally, it can save teachers time by aggregating the data and saving responses to review later.
- Video conferencing and virtual classrooms Though millions of teachers and students have become newly minted virtual classroom professionals over the last couple of years, virtual schools and virtual academies have utilized powerful virtual classroom platforms as their primary point of face-to-face instruction for years. Virtual classrooms are video conferencing platforms built with specific tools for learning. Conduct virtual classes or provide options for students to collaborate virtually. Students and teachers alike need to become more comfortable on video.
- **Video projects** Our students are digital natives. They are also video creators. Whether they are on TikTok, YouTube, Instagram, or Snap you can be sure that students know their way around video. Leverage their passion by

bringing video into their projects. Assign projects for student collaborators to create a video around specific topics. Not only will they exercise their creativity, but they'll also sharpen their communication skills as they work together.

There are many angles to look at so don't limit yourself. Search online or just ask what your fellow teachers are doing.

Kaltura Virtual Classroom as an Example to Education Innovation

Kaltura virtual classroom has been designed and built for education and training. Teachers can conduct interactive, face-to-face classes that actively engage remote students. Teachers are not simply connecting face-to-face to lecture passive students. The platform provides tools that allow teachers to introduce innovation in education.

- **Real-time polling** Teachers can use a live polling tool to pulse check students. Of course, they can ask students on video to raise their hands or click a hand raise button, but even better is a polling tool to gauge measurable feedback. With preset polling options, teachers can launch a poll with a click. Students then select their reply and teachers see real time aggregate results as well as what each student replied.
- Quizzing Sometimes polling isn't enough. We need to gauge a deeper understanding in real time and use that information to inform the rest of the lesson. Create quizzes with different question types for students to complete in the class. Teachers can give the quiz and see real-time results. The results are also available to review after class. With this information, teachers can be more confident that students are understanding the material presented or move to reinforce items now in class rather than finding out later.
- Interactive whiteboards and file annotations We want students actively participating in their learning. What better way to encourage that than with an interactive whiteboard. A whiteboard is a great space for students to share their ideas, collaborate, and brainstorm.
- **Video in the classroom** Video is incredibly powerful at explaining complex topics in digestible ways. Kaltura virtual classroom provides opportunities for teachers to leverage their own video library as well as video sources like YouTube in the class to drive home their lesson plan. When teaching, we have to make things dynamic and interesting. We cannot shy away from producing

multimedia experiences such as utilizing presentations, images, whiteboards, and, of course, video.

• **Breakout rooms** – Remote and distance education typically ignored peer engagement, but as educators, we know that peer engagement is critical to any student's success in the classroom. Kaltura virtual classroom breakout rooms provide awesome ways for teachers to host directed breakout room experiences. Students can engage one another safely around content provided directly by the teacher with a single click of a button. Encourage branching scenarios, role play, and group projects in breakout rooms.

1. Slideshow Presentations With Multimedia:

Text-only slideshow presentations are behind the times due to its monotonous content delivery. Also, it's evident that slideshow presentations are already a part of your educational curriculum. Therefore, if you add a variety of multimedia elements to the performances, it could capture the attention of students for a long time.

Few examples of multimedia elements you can include in your classroom:

- Colourful Images
- Gifs
- Short video clips
- Graphs
- Animations
- Sound Tracks

2. Podcasts Do Matter:

Podcasts for all your academic lessons can aid you with the teaching process in the long run. Especially, motivational podcasts, online learning platforms, interviews, and online courses. Likewise, there are a lot of podcasts available online on various topics of interest.

Few examples of podcasts that you can include in your classroom:

- Basic research on an academic topic
- Lectures from other educators
- Podcasts blogs

If you want to take it to the next level, you may ask your students to create their podcasts.

3. Take Your Students on a Virtual Tour:

Who doesn't get excited about field trips? We all do. With technology in education, cancelling trips due to logistical issues is not going to happen anymore. Additionally, you can simulate a virtual field trip with Google Cardboard.

Learn history by exploring historical places, study the phenomena of the earth, visit a foreign country and a lot more. Above all, engage your students and make them fall in love with the curriculum.

4. Keep Your Class Schedules Online:

Google Calendar helps you create and share a class calendar. This keeps your students informed about the class, duration, and important dates. Therefore, emailing your calendar's hyperlink to your students will do wonders. This will help you stay organized, in turn, make students come prepared for each class.

5. Use Virtual Manipulatives:

Visualizing mathematical concepts are difficult. Though there are manipulatives like base ten blocks, coins, blocks and tangrams, virtual manipulatives tend to be way effective. They are a relatively new technology modelled for a better adoption. Reinforcing mathematical concepts with virtual manipulatives allow students to in understanding complex concepts. Therefore, incorporating the use of virtual manipulatives in classrooms is not only comfortable but appeals to hands-on learners as well.

6. Videos For Teaching: How to make teaching videos?

Watching videos helps in remembering key concepts longer than reading. Use Hippo Video to help you record digital whiteboard explainers, classroom activities, peer presentations as videos. Additionally, you can share them with your class via Gdrive, Google Classroom or YouTube right away.

Adding videos to your classroom resonates with visual learners, allowing them to learn at their own pace. Besides, you could establish a deeper connection with your students and comprehend clarity through videos.

7. Hit Social Media:

Social media is not only for grown-ups. You could avail the benefit of using social media in education too. Therefore, you could come up with a exclusive hashtag and encourage students to tweet their inquiries, academic doubts, homework, presentations etc.

Answer your student's questions by displaying the results of your hashtag feed on the screen. This could be beneficial for those who may not be comfortable asking questions in front of a large crowd.

8. Video Feedback, Quiz, and Surveys:

You could record personalized feedback on student's work as a video. Also, allow students to give peer feedback through videos. Therefore, this could help students speak an opinion instead of keeping it writing focused.

9. Gamification

They say learning by playing is the best way to understand a complex concept. This applies true to all the students. When a complex concept is taught in the form of games, it sets the foundation right.

For example, Learning students to type faster can be taught in the form of playing typing games in the computer lab. Not only are they incredibly engaging for teaching students to speed typing, but they also invoke fun and excitement for students.

Teachers can ask students to form pairs or groups and encourage them to collaborate with each other while learning by playing. This also encourages teamwork among students, which is an essential skill when they want to grow up in their career.

10. Social Groups

Students spend so much of their time on social media more than adults do. So bringing social media into the curriculum is among the most innovative ways to use technology in the classroom. Teachers can connect students to curriculum, classroom resources, and one another. Create a Facebook or Whatsapp or Slack group specifically for your class where you can post discussion topics.

11. Corporate Training

Beyond this, videos can be particularly helpful for corporate training programs. Be it communication training, sales enablement training, professional or etiquette development training, you can easily and clearly articulate and share useful information via videos. The biggest advantage of asynchronous videos is that they can help you train candidates without the constraints of time or place. Also using interactive elements can enhance engagement and improve participation.

LECTURE 3

Traditional and multimedia learning the difference

- 1. What is the difference between traditional and multimedia?
- 2. What is the difference between traditional learning and modern learning?
- 3. What is the difference between traditional and digital learning?
- 4. What is the difference between traditional learning and concept based learning?

Children are getting more and more involved with interactive technology during their daily activities, both at home and in classrooms. However, little is known about the effect of using interactive technology in classrooms on young children's study results. Does the use of interactive technology for education actually improves children's knowledge? Besides, there is little evidence that children and teachers actually hold positive attitudes towards the integration of digital learning methods in classrooms. This study will give more insight in how both traditional and digital learning methods affect the learning outcomes of children between the age of 6 to 8 years old, by comparing traditional and digital learning methods. Furthermore, this study will present the attitudes of children and teachers towards the use of interactive technology for educational purposes. 24 children from a Dutch elementary school participated in a three-week experiment. In the first week, children were divided into a traditional learning condition and a digital learning condition and both groups learned English words for colors. In the second week, children switched conditions learned English words for animals. Their knowledge was tested after each week. The results of the knowledge tests showed that children's learning outcomes were significantly better in the traditional learning condition, in comparison to the digital learning condition. In the third week, children's attitudes towards interactive technology were measured with the help of three evaluation methods. The findings showed that children hold more positive attitudes towards digital learning methods. After the three-week experiment, five teachers of the elementary school were interviewed to get more insight in their attitudes towards interactive technology use in classrooms. All teachers indicated that they support the use of digital learning methods, but assistance and feedback from teachers remains important. Three important implications can be derived from the present study. First of all, interactivity of technology does not guarantee better learning outcomes, since children performed better in the traditional learning condition. Secondly, successful integration of technology in classrooms nowadays is not hindered by attitudes of children or teachers. Finally, the role of teachers in achieving desirable learning outcomes continuous to be a central factor, even if technology is implemented to existing education systems. 2 Table of contents 1. Introduction 4 2. Theoretical Framework 5 2.1 What is interactive technology? 6 2.2 The use of interactive technology for educational purposes 7 2.3 Different stages in child development 8 2.4 The effect of interactive learning methods vs. traditional learning methods on lea

The introduction of new smart classrooms has made the entire teaching mode more diversified, especially some well-equipped multimedia classrooms not only have rich information display but also have various projection terminal equipment, which can support fast projection in actual use Show and share and more. The essential differences between multimedia classrooms and traditional classrooms are described in detail below.

There are no smart devices in traditional classrooms to assist teaching, so the overall teaching atmosphere will be relatively boring, but the construction of smart classrooms is completely different. Many intelligent teaching management software are installed in this classroom. Connecting terminal devices can enrich classroom content and increase interest in actual lectures. At the same time, this method can also allow students to better enter the learning atmosphere. In addition, through the recording of classroom teaching content, each student can You can freely view the details of the classroom through the Internet, so as to facilitate the review of knowledge.

Traditional classrooms use blackboard chalk and other methods to write. This method is not only environmentally friendly but also not conducive to the health of

teachers. However, the construction of smart classrooms has completely changed this problem, because this classroom uses environmentally friendly layout design. Water-based pens are used for writing and wiping. This design method can provide a more environmentally friendly new environment for teaching. More importantly, the application of smart devices can also provide students with a more intuitive learning platform. All learning activities can be done, through this platform

In fact, there is a huge difference between the multimedia classroom and the traditional classroom, because everyone in this new type of smart classroom uses smart terminal equipment, which can not only realize two-way control and management during teaching, but also effectively save overall management. Cost, and more importantly, the use of new environmentally friendly materials in multimedia

LECTURE 4

Mind map

What is a mind map?

A mind map is a brainstorming technique used to visually organize information into a hierarchy. They feature one main idea as the central point of the diagram, with subtopics branching out and connecting to supporting ideas.

How do you make a mind map?

There are two main ways to create a mind map: by hand or using mind mapping software. By hand, you can use a pen and paper, sticky notes, or a whiteboard. Using mind mapping software, like Edraw Mind, allows you to create professional-looking mind maps with ease, using various templates, icons, and themes.

What are the 7 steps to creating a mind map?

The 7-step guide is as follows:

- 1. Step 1: Brainstorm a Central Idea. The first step is to not rush in finalizing the central idea. ...
- 2. Step 2: Come Up With an Impressive Image. ...
- 3. Step 3: Color Your Map. ...
- 4. Step 4: Create Connections. ...
- 5. Step 5: Make Your Branches Curved. ...
- 6. Step 6: Use Single Keywords. ...
- 7. Step 7: Replace Words With Pictures.

How to use a mindmap?

Mind mapping is like turning your thought process into a visual adventure. At the center is your main idea, and then, like branches on a tree, you draw lines to other related thoughts, creating a map of your brainstorming journey. This technique of mind mapping reshapes how we visualize and organize our thoughts.

Who made the mind map?

Tony Buzan

Mind maps are an idea created by Tony Buzan as a way of visually representing material. Buzan (1995) argued that drawing maps of ideas and concepts rather than lineal lists is much more in tune with the way we think.

What is mind map in English?

A mind map is a diagram used to visually organize information into a hierarchy, showing relationships among pieces of the whole. It is often created around a single

concept, drawn as an image in the center of a blank page, to which associated representations of ideas such as images, words and parts of words are added. How do mind maps work?

In contrast to the traditional, linear notes you might make in a text document or even on paper, mind maps let you capture thoughts, ideas and keywords on a blank canvas. These ideas are organized in a two-dimensional structure, with the title/main idea always located in the center of the map for visibility.

Here are some science-backed reasons why mind mapping works.

- It helps you remember and recall information. ...
- It helps you learn new concepts. ...
- It's a fun way of learning. ...
- It makes complex ideas easier to understand. ...
- It improves your presenting. ...
- It boosts your creativity. ...
- It improves productivity. ...
- It's flexible.

How do you solve a mind map?

How to solve problems with mind maps

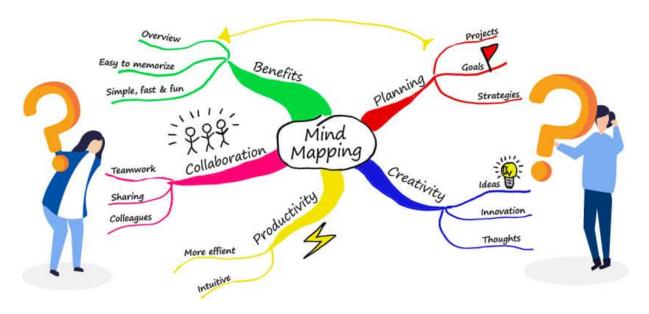
- 1. Make the problem the central idea of your first mind map.
- 2. Add all the aspects and causes of the problem as main branches, then investigate these in further detail with sub-branches.

How to mind map lesson?



How to make a mind map

- 1. Write your topic or theme in the centre of the page.
- 2. Think of the sub-topics you want to add and start adding branches to these from the central topic.
- 3. Add twigs to sub-topics as you think of more ideas and relevant information.



A Mind Map is an easy way to brainstorm thoughts organically without worrying about order and structure. It allows you to visually structure your ideas to help with analysis and recall.

A Mind Map is a diagram for representing tasks, words, concepts, or items linked to and arranged around a central concept or subject using a non-linear graphical layout that allows the user to build an intuitive framework around a central concept. A Mind Map can turn a long list of monotonous information into a colorful, memorable and highly organized diagram that works in line with your brain's natural way of doing things.

Here is an example of an outline for vacation plans. It only takes a few moments to go through the list of locations and activities. But by the time you get to the bottom of the outline, do you even remember what you read at the top?

Take that same information and view it in Mind Map. You can now overview the information much faster and recall the data much more easily.



Theory Behind Mind Maps

When you study the brain's functionality and memory system, you will realize the extraordinary extent of its capacity and potential. The Mind Map is a tool used to entice, delight, stimulate and challenge you. You will discover some astonishing facts about your brain and its function, and you will take the first major steps on the path to freedom of the mind.

How Mind Maps Harness the Brain's Power

A Mind Map is a highly effective way of getting information in and out of your brain - it is a creative and logical means of note-taking and note-making that literally 'maps out' your ideas.

All Mind Maps have some things in common. They have a natural organizational structure that radiates from the center and use lines, symbols, words, color and images according to simple, brain-friendly concepts. Mind Mapping converts a long list of monotonous information into a colorful, memorable and highly organized diagram that works in line with your brain's natural way of doing things.

One simple way to understand a Mind Map is by comparing it to a map of a city. The city center represents the main idea; the main roads leading from the center represent the key thoughts in your thinking process; the secondary roads or branches represent your secondary thoughts, and so on. Special images or shapes can represent landmarks of interest or particularly relevant ideas.

The Mind Map is the external mirror of your own radiant or natural thinking facilitated by a powerful graphic process, which provides the universal key to unlock the dynamic potential of the brain.

The Five Essential Characteristics of Mind Mapping:

- 1. The main idea, subject or focus is crystallized in a central image
- 2. The main themes radiate from the central image as 'branches'
- 3. The branches comprise a key image or key word drawn or printed on its associated line
- 4. Topics of lesser importance are represented as 'twigs' of the relevant branch
- 5. The branches form a connected nodal structure

The Brain's Natural Architecture and Foundation of Mind Maps

Almost the moment Mind Maps came into use another major piece of scientific research confirmed their validity as a brain-compatible thinking method. In California, Dr. Roger Sperry, who won a Nobel Prize for his research, confirmed that the evolutionarily latest part of the brain, the 'thinking cap' of the Cerebral Cortex, was divided into two major hemispheres, and those hemispheres performed a comprehensive range of intellectual tasks, called cortical skills. The tasks included: Logic, Rhythm, Lines, Color, Lists, Daydreaming, Numbers, Imagination, Word, Gestalt (seeing the whole picture).

Sperry's own research confirmed that the more these activities were integrated, the more the brain's performance became co-operative, with each intellectual skill enhancing the performance of other intellectual areas. When you are Mind Mapping®, you are not only practicing and exercising the fundamental memory powers and information processing, you are also using your entire range of cortical skills.

The Mind Map is made even more powerful by the use of all the left and right brainthinking tools, which enhance the clarity, structure and organization of your thinking. And because the Mind Map constructively uses the tools of Imagination, Association and Location, as well as the tools of the left and right brain, you can consider the Mind Map the ultimate thinking tool that incorporates all the significant and potent ways of thinking into its own structure.

The Power of Images

In 1970 Scientific American magazine published Ralph Haber's research showing that individuals have a recognition accuracy of images between 85 and 95 percent. There is a well-known quote, "A picture is worth a thousand words".

We associate and remember images because they make use of a massive range of your cortical skills, especially imagination. Images can be more evocative than words, more precise and potent in triggering a wide range of associations, thereby enhancing creative thinking and memory. These findings support the argument that the Mind Map is a uniquely appropriate tool. It not only uses images, it is an image.

Tony Buzan and Mind Mapping

Although people have been creating maps using an image-centered radial graphic organization technique for centuries, British psychology author Tony Buzan has made a claim to the origin of the Mind Map. He argues that 'traditional' outlines

require that the reader scans the information from left to right and top to bottom, whilst the brain's natural preference is to scan the entire page in a non-linear fashion.

Buzan also uses widespread assumptions about the cerebral hemispheres in order to promote the exclusive use of Mind Mapping over other forms of note making. Tony Buzan has several registered trademarks on Mind Map and Mind Mapping.

Is Mind Mapping Effective?

It is also proven that Mind Mapping is helpful for dyslexics and autistic students to better understand concepts and strategies. In fact, The British Dyslexia Association states, "Dyslexics struggle with their spoken and/or written language, following instructions, poor concentration and carrying out analytical or logical tasks. Strategies such as Mind Mapping are recognized as valuable learning tools."

LECTURE 5

Teaching English to Generation Z and Alpha students

How to teach Generation Alpha students?

How to Engage Gen Alpha in Class? Incorporate higher-order thinking in classroom teaching – Develop gen alpha's problem-solving, design thinking, collaboration, and critical thinking help equip them with the skills they need to become future innovators and leaders in their chosen fields.

How to teach Generation Z students?

- 1. Clear Directions: Provide straightforward, clear instructions for assignments and activities.
- 2. Digital Integration: Incorporate educational technology into assignments, classroom activities, and assessments.
- 3. Fast Content Delivery: Use quick, engaging delivery methods for content and graphics.

What are the differences between Gen Z and Gen Alpha?

Gen Z is defined as those born between 1995 and 2012, meaning the oldest are starting in their careers, and the youngest are in middle school. Meanwhile, Alphas' birthdays range from 2013 to 2025, meaning the newest generation members haven't even been born yet, and the oldest are beginning to pick up summer jobs.

What is the learning style of Generation Alpha?

Generation Alpha has been shown to develop characteristics such as hyperconnectivity, independence, and visual learning. Alpha children are connected more than ever due to their technologically based way of living. They also prefer to learn visually, especially due to their technological involvement.

How to teach English to Generation Z?

You don't need to teach Generation Z the importance of being a team player. They like working on teams using collaborative tools. In general, they like learning in a supportive environment with teamwork. Generation Z likes to learn by working with peers where the slower learners are supported by faster learners.

What is the difference between Generation Z and Alpha?

We are in the midst of a generational landmark, as Generation Z (born 1995-2009) enter the workforce and Generation Alpha (born 2010-2024) move through their schooling years.

Teaching English to generation Z students may require a change in teaching style. In this article we take a look at the challenges facing teachers when teaching Generation Z.

Generations come and go. They all have their unique characteristics, some shared and some not. Generation Z or the Millennials, are no different when it comes to the skills they need to understand English. They are different when it comes to teaching style.

Generation Z is a social classification of people born since 2000. They are also referred to as Millennials. The usual characteristics of Generation Z are social, good at multitasking, speedy and are more inclined to instant gratification. Their learning styles and preferences are different from people in previous social classifications: Baby Boomers, Generation X and Generation Y (see end for definitions).

Generation Z students generally fall within the following:

- 1. They like to experiment and learn. They prefer learning by doing rather than being told what to do or reading static books. Students can intuitively use a wide range of technology. They like to tinker with the latest electronic gadgets. They use the Internet to learn new material, to research what they don't know, to meet new people and make friends. They are creative on social media. They take the initiative to learn new tools and apps. If they don't know something, they ask the digital world such as Google, Wikipedia, etc.
- 2. The prefer visual learning. Technology has been present all their lives. They are very comfortable with all sorts of digital devices. The list of available technology changes quickly and Generation Z adapts to it as fast as the changes arrive. They are used to interactive experiences at home or in school where teachers should use rich visual effects to motivate, engage and teach these students.
- 3. They are good team players. The other generations were told that working in teams and being a good team player was an essential quality at work from an entry to management levels. You don't need to teach Generation Z the importance of being a team player. They like working on teams using collaborative tools. In general, they like learning in a supportive environment with teamwork. Generation Z likes to learn by working with peers where the slower learners are supported by faster learners. They learn by building knowledge from each other. To them, there is nothing wrong if you do not understand straight away when you are learning something new. Generation Z likes to share their experiences in groups.
- 4. They tend to have short attention spans and multi-task well. The media-rich environment that Generation Z has grown up in appears to have shortened their attention span. If you ask them to work on the same thing for hours, it would probably overwhelm or frustrate them. They will probably enjoy the activities more if they can get several things done simultaneously, because

- they can usually shift attention rapidly from one task to another. They are generally able to multi-task better than their parents and can split their attention between different activities. Thus, an teacher should not be surprised by seeing a student listening to music, surfing the Internet, and talking to friends on the phone while doing homework. These diverse activities are all part of Generation Z's daily life.
- 5. Edutainment. Derived from education and entertainment. Entertaining education or educational entertainment. According to Wikipedia, Edutainment typically seeks to instruct or socialize its audience by embedding lessons in some familiar form of entertainment: television programs, computer and video games, films, music, websites, multimedia software, etc. Compared to the traditional teaching perspective of the older generations, with Generation Z there is little importance given to the teacher's authority. Generation Z students value learning if they consider it interactive with games and fun activities incorporated into the EFL/ESL and curriculum.

The Good Teacher for the Generation Z

- 1. EFL/ESL teachers need to use more technology in their teaching strategies. Teachers need to update their teaching strategies. They need to adopt more technology-based tasks, include visual content and give students opportunities to give and receive feedback. Start a class blog and think of reasons how your class can use the class blog. How they contribute their ideas on the blog and how you can teach them on the blog.
- 2. Bring movies into the class and get your students review the movies by taking notes and discussing their findings in class.
- 3. Generation Z are multi-taskers so you can incorporate pictures, sounds, video into all your teaching activities. You can have listening, drawing and speaking activities at the same time.
- 4. Let them record and upload their presentations, reports on a social media video channel and establish an online communication by bringing different cultures and countries together.
- 5. Get them to access technology based sophisticated EFL and ESL sites to create their own pictures

Conclusion

After all is said and done, after all the talk about tech savvy generations, teachers are advised not to throw away all the traditional methods in favour of the new technology based teaching strategies. The most practical way to look at this is for teachers to innovate, technify, change within reason. As one saying goes, "If it ain't broke, don't fix it." The traditional method of teaching EFL/ESL isn't broken, it just needs updating and upgrading.

TEFL and TESOL are for non-English speakers to learn English and we hope that the young learners learn it as early as possible.

The players have changed but the EFL/ESL game is still the same.

Definition of terms used

- Baby Boomers 1946 1964 This large generation was due to the many soldiers who returned home after World War II and started families. More people were born in this twenty-year period than at any other time in United States history.
- Generation X **born between 1965 80-** This generation was much smaller than the Boomer generation. Generation Xers have been generally characterized as hard working, independent and skeptical.
- Generation Y **born between 1981 99** This generation came into being during the last two decades of the 20th century. Its members are identified as confident, technologically advanced and often have a sense of entitlement.
- Generation Z **born between 2000 present** This name refers to those born since 2000. So far, this group has received little attention from a cultural perspective.

LECTURE 6

Role playing and scenario analysis based teaching

1. What is scenario based role playing?

Scenarios and role plays involve giving participants a prompt, problem statement or example situation and observing them interact with the issue in real time. This may involve using actors and props that dynamically respond to participants decisions and interactions.

2. What is the role playing method in teaching?

Role play is a form of experiential learning (Russell & Shepherd, 2010). Students take on assigned roles and act out those roles through a scripted play. The role play can be carried out one-to-one (individual role play) or as a group role play with each member in the group taking on a role/character.

3. What is role playing based learning?

Role playing can be effectively used in the classroom to:

- Motivate and engage students.
- Enhance current teaching strategies.
- Provide real-world scenarios to help students learn.
- Learn skills used in real-world situations (negotiation, debate, teamwork, cooperation, persuasion)

4. What are the 4 types of role play?

Methodologies include conflict roleplay, cooperative roleplay, information gap roleplay, and task-based roleplay.

5. Why role playing is important in teaching?

Role-playing, one of the communicative teaching methods, is believed to develop learners' speaking competence and help them learn the language in an authentic context. Therefore, the main purpose of this study is to examine the relationship between the role-play teaching method and students' speaking competence.

Role Playing

Role play exercises give students the opportunity to assume the role of a person or act out a given situation. These roles can be performed by individual students, in pairs, or in groups which can play out a more complex scenario. Role plays engage students in real-life situations or scenarios that can be "stressful, unfamiliar, complex, or controversial" which requires them to examine personal feelings toward others and their circumstances (Bonwell & Eison, 1991, p.47).

Unlike simulations and games which often are planned, structured activities and can last over a long period of time, role play exercises "are usually short, spontaneous presentations" but also can be prearranged research assignments (Bonwell & Eison, 1991, p.47).

Benefits of Role Playing

Role playing can be effectively used in the classroom to:

- Motivate and engage students
- Enhance current teaching strategies
- Provide real-world scenarios to help students learn
- Learn skills used in real-world situations (negotiation, debate, teamwork, cooperation, persuasion)
- Provide opportunities for critical observation of peers

Role plays can be effectively used in the classroom to provide real-world scenarios to help students learn.

Guidelines in Developing Role Playing Exercises

Using a set of guidelines can be helpful in planning role playing exercise. Harbour and Connick (2005) offer the following:

- If you plan to use role playing as a graded exercise, introduce small, non-graded role plays early in and during the semester to help students prepare for a larger role play which will be assessed.
- Determine how the role play will be assessed: will observers be given an assessment rubric? Will observers' remarks and scores be shared with the role players? Will the observers' scores be included with the instructor's scores? Will the role players be given the opportunity to revise and present the role play again? Will observers be taught how to properly assess the performance (include meaningful feedback that is not purely judgmental but rather justify all remarks that are practical and unbiased)?
- Instruct students that the purpose of the role play is to communicate a message about the topic and not focus as much on the actual person acting the role.
- Tie role plays to learning objectives so students see their relevance to course content.
- Allow time for students to practice the role play, even if it is spontaneous, so they will be able to think deeply about the role and present it in a meaningful way.
- Reduce large chunks of content into smaller sections which can be more effectively presented as a role play.
- When assigning a role play, explain its purpose and answer questions so students are able to properly prepare the exercise. Provide guidelines about content to include: general presentation behavior (eye contact, gestures, voice

- projection); use of props; and specific language to be used (content-related vocabulary) and language not to be used (profanity, slang).
- Challenge all students equally when assigning role plays so everyone will be assessed on equal ground.

Examples of Role Play Exercises

Students can gain additional (and alternative) meaning from the context of role playing than from non-context specific book learning and lectures. By means of guidance from clearly developed objectives and instructions, role plays can help students gain knowledge and skills from a variety of learning situations:

Role plays provide students with the opportunity to take part in activities which mirror career-related scenarios.

- **Interview practice**—In preparation for career interviews, students can assume the role of the interviewer and/or the interviewee.
- **Marketing**—In preparation for a class presentation, students can assume the position of a sales representative and sell a product.
- **Retailing**—To help prepare students for a guest speaker in merchandising course, students can play the role of sales manager and sales representative to gain better insight on the responsibilities of these positions.
- **Counseling**—In preparing for clinical practice, students can role play a family therapist whose client has revealed she has committed a criminal act.
- **Teaching**—In preparation for a job fair, students can role play the teacher and the student, or the administrator and the student, or the teacher and a parent.
- **Debates**—As a spontaneous exercise, the instructor has students briefly prepare arguments for and arguments against positions on a topic such as *Logging in the Northwest and the Spotted Owl, Arab-Israeli Conflict or Airline Flight Departure Delays*.

Summary

Role plays provide students with the opportunity to take part in activities which mirror career-related scenarios. To help students understand the use of role playing sessions, role plays should be content-focused, match learning objectives, and be relevant to real-world situations. Role playing exercises encourage students to think more critically about complex and controversial subjects and to see situations from a different perspective. When properly employed, role plays can motivate students in a fun and engaging way. Role play activities for communicative skills. Questioning skills. Feedback skills. Modeling skills. Self-monitoring skills. Dialogue skills.

LECTURE 7.

Learner-centered approach innovative technologies. Learner-centered learning with technology. Problem-based learning.

Problem-based learning has been in the realm of education for the past fifty years (Wood, 2008). Its implementation in educational settings has promoted collaboration, problem-solving and independent acquisition of new knowledge. With changes in education (for example; the flipped classroom, online courses and students in charge of their own learning journeys), there has been a natural move towards the utilization of technology. Twenty-first century learners are more adept at using technological tools than ever before. Students are accessing tech platforms to communicate with each other, research topics of interest to them and learn about world issues.

Technology refers to the designs and environments that engage learners (Abbas et al., 2013). The integration of technology in problem-based learning supports exploration, collaborative inquiry and the development of the skills required for students moving into the modern world. When done effectively, technology can support problem-based learning because of the wide range of tools available; the way in which technology naturally lends itself to collaboration, and its ability to help students explore problems. Problem-based learning's scope has become even wider with the integration of tech in the classroom. The possibilities to promote the objectives of PBL (discussed later in this chapter) are flexible and ever-changing, allowing PBL to exist naturally in modern learning environments.

Background Information

Problem-Based Learning

Developed in the late 1960s for primary use in medical schools, problem-based learning or PBL is grounded in the constructivist learning theory (Wood, 2008). This theory posits that learning is an active, constructive process. Constructivism states that learning takes place in contexts (Abbas et al., 2013). PBL was developed by Barrows and utilized at McMaster University in 1968 for the first time. Barrows proposed the following three objectives of PBL:

- 1. Students acquire knowledge that is retrievable and usable.
- 2. Students develop the cognitive skills appropriate for reasoning.
- 3. Students extend and improve knowledge to remain current with new problems that may arise (self-directed learning skills), (Taylor & Miflin, 2008).

Other educational models emerged from this such as Bruner's 'discovery learning' (Taylor & Miflin, 2008). PBL was innovative because of its shift in teaching strategies and outcomes. It was predicted that PBL created better learning

environments, knowledge, skills, and attitudes (Wood, 2008). PBL focuses on meaningful tasks which are practical in their approach and experiential (Hmelo-Silver, 2004). Theorists such as Dewey (1938) explained that learning was most authentic when done through experience. He believed that education and learning were a social and interactive process. Students should experience and interact with curriculum and take part in own learning (Talebi, 2015). Similarly, in PBL, students solve problems which are related to the real-world, construct knowledge and develop strategies for problem-solving (Hmelo-Silver, 2004). One of the defining features of the PBL approach is that students investigate and work collaboratively to find out what they need to know in order to solve the presented problem (Hmelo-Silver, 2004). Today, PBL is a construct of previous research and practices. It has been adapted to modern learning environments, is flexible and dynamic.

The teacher's role in PBL.

In problem-based learning, the teacher acts more as a facilitator to student learning than being in complete control. Facilitators progressively fade their scaffolding as students become more experienced with PBL until finally the learners adopt many of the facilitators' roles (Hmelo-Silver, 2004). The teacher helps students acquire the skills necessary for problem-solving and collaboration (Hmelo-Silver, 2004). Modern PBL approaches vary depending on norms, beliefs and values of PBL practitioners. Furthermore, PBL and its implementation also rely on the cost, the extent of influences, understanding and interpretation by the teacher and institution (Taylor & Miflin, 2008).

The modern teacher is one who recognizes, encourages, facilitates and stretches student learning. Teachers are considered partners with their students and no longer need to teach by telling. Teachers should foster creativity and real-life problem solving, purpose and passion (Fullan, 2013). Allowing students to demonstrate their knowledge of technology is a great way for teachers to work alongside students.

Considerations and applications for technology in PBL

Technology is an integral and supportive factor of learning in PBL. The following section delineates characteristics of problem-based learning in the twenty-first century learning environment, and how technology can best support them.

Learner-centered.

With students at the forefront of this style of learning, teachers are able to engage and motivate learners. In learner-centered environments, the focus on abilities and process of the learner are of priority. This strategy also centers on what the students already know which encourages motivation (Megwalu, 2014). Student skill-level and interests are considered in a PBL environment. Web 2.0 for example, allows users to browse topics and explore (Tambouris, Panopoulou, Tarabanis,

Ryberg, Buus, Peristeras, Porwol, 2012). Students can use their own preferred technological tools to solve problems and show their understanding of topics. They may prefer to use their personal devices or engage in new tools.

With this in mind, the knowledge, skills, and attitudes of the learners are considered. Preconceptions, cultural differences, comfort level in various group settings are crucial to creating a positive learning environment. Attention should be given to individual progress and material needs to present the right amount of challenge. In order to achieve this, teachers and schools need to understand student knowledge, skill levels and interests (Donovan, 2002). Tools such as online surveys, polls and collaborative online workspaces engage students and help teachers check in with student progress, better understand their interests and their position as a learner.

Collaborative.

It is important that a technological tool create a community of learners by broadening repertoires and personal resources (Conoley, 2010). Collaboration promotes engagement as well as positive well-being. Collaborative spaces have proven to positively impact well-being, "People with relationships to other individuals they trust and depend upon are healthier, more productive, and happier", (Uchino, Cacipo, Kiecolt-Glasser, 1996 as cited in Conoley, 2010, p.77).

When technology tools are appropriately selected, they promote the collaborative production of knowledge through engaging with real-world problems or cases (Tambouris et al., 2012). The emergence and re-conceptualization of online systems supports collaboration between learners and teachers. It affords learners and facilitators access to external resources and resource persons. Donnelly (2010), suggests that the social processes of learning in PBL and through the enabling power of online asynchronous communication, actively engage students in their own learning. Current trends focus on virtual learning environments, but also a shift to personal online learning environments, which allow students to customize their learning journey (Tambouris et al., 2012). Additionally, there exist a plethora of collaborative online platforms from which to choose such as online classrooms, synchronous and asynchronous learning spaces as well as web-based software which allow multiple users to work, revise and comment simultaneously.

Real-life applications.

When students are able to make connections between new material and the real-world it creates for authentic learning environments, "Learning is stronger when it matters" (Brown et al., 2014, p.11). Repetition has not shown to remain in long-term memory, however, when connections are made to real-life problems, the learning is better retained (Hmelo-Silver, 2004). Research has shown that rereading, for example, is a time-consuming learning strategy which does not result in lasting learning. On the other hand, students exploring real problems that exist in relation

to the subject matter can deepen the learning. That being said, it is important for educators to take risks and allow students to connect with their communities and the world. Learners should apply new skills in context which can be facilitated through tools such as virtual reality, online forums, blogs and discussions and communication tools to connect via video chat across the world.

Optimal learning occurs with the development of norms and connections to the outside world. In these settings, intellectual camaraderie is promoted to build a sense of community. Students build upon each other's knowledge, questioning, make suggestions and work collaboratively towards a common goal. Problem-solving, argumentation, a sense of comfort, an excitement of learning, and a sense of ownership are developed. Furthermore, classroom learning should be connected to aspects of students' lives (Donovan, 2002). Educators play a key role in developing questions and creating tasks, "Real learning involves students immediately using what they learn to do something and/or change something in the world" (Prensky, 2010, p.20). Teachers set the learning goals and offer guidance and questions for students and then allow them the freedom to explore but also apply their learning in a real context. The notion of positioning learners as active and productive in real practices seems to correspond well with many of the ideas and ideals associated with Web 2.0 in learning (Tambouris et al., 2012).

Engages critical thinking.

In order to help students adapt to ever-changing situations and problems, critical thinking is an essential skill; "Higher level questioning requires students to further examine the concept(s) under study through the use of application, analysis, evaluation, and synthesis (Nappi, 2017, p.1). As questioning is an important teaching tool, questions which are simply recall of information are considered lower level questions and do not encourage higher order thinking (Nappi, 2017). Students can use the internet to research and seek solutions to complex problems.

Because of the influx of information available to them, students require questions which allow them to investigate rather than completing a simple search. The use of subject specific technological tools can enrich student experience and close gaps which were previously roadblocks in the problem-solving process. Such an example is explained by Taradi et al. (2005), "Virtual environments encourage students to explore a topic beyond the boundaries of given material, thus supporting the proactive and exploratory nature of learning that allows the student to become self-reliant" (p. 38).

Conclusions and Future Recommendations

The integration of technology and problem-based learning is complicated since individually they each demand that staff and students possess a complex array of different teaching and learning capabilities (Donnelly, 2010). Together they are complementary to learning. By combining PBL with collaborative technological tools, educators can create active, vibrant learning environments that enhance student learning (Taradi et al., 2005). Problem-based learning affords students the flexibility of exploring concepts and acquiring skills through the learning process and co-create problems and solutions. Student engagement increases as they are active participants in their own learning (Wirkala, Kuhn, 2011). PBL has a clear connection with the promotion of twenty-first century skills, it "offers an opportunity for moving beyond content acquisition to develop skills and dispositions needed for lifelong learning" (Taradi et al., 2005, p.35).

With student success in mind and preparing students for the world beyond the classroom, PBL encourages problem-solving and collaboration. Furthermore, it allows students to engage in critical thinking and make real-world connections. The advancement of technology has further supported the integration of PBL in learning environments. The wide array of available tools, the collaborative nature, and links to the outside world lend themselves suitably to PBL.

Due to the range of technological tools available, it is challenging to identify exactly which tools best promote PBL. Consideration should be given to whether the tool is enhancing the learning experience or if the same problem-solving strategy could be used without the technology? In fact, several questions should be considered when selecting the appropriate tool for PBL:

- 1. Does the tool encourage a learner-centered environment?
- 2. Will the tool allow for collaboration among students?
- 3. Does the tool promote real-world application?
- 4. Can the tool be used to facilitate investigation, problem-solving and inquiry?

Technology has an ability to increase the complexity with which students create and implement a multitude of roles. This can lead to specialization and promote in-depth investigation. Technology in PBL learning environments lends itself to authentic and challenging tasks which support communication with others and promotes active learning (Abbas et al., 2013). The blending of technology in PBL encourages students to become twenty-first century problem-solvers. While there are many factors which contribute to the effective implementation of tech in PBL, it is undeniable that there are positive correlations between the two.

LECTURE 8

The learning style approach. Four types of learning styles. Learning styles and technology.

1. What are the 4 learning styles?

There are 4 predominant learning styles: Visual, Auditory, Read/Write, and Kinaesthetic. While most of us may have some general idea about how we learn best, often it comes as a surprise when we discover what our predominant learning style is.

2. What are the four approaches to learning?

The four learning styles are visual (learning through seeing), auditory (learning through listening), reading/writing (learning through reading and writing), and kinesthetic (learning through doing and experiencing). These styles reflect the different ways individuals prefer to absorb, process, and retain information.

3. What are the different learning styles with technology?

Technology has become an integral part of teaching and instructing students. It allows them to develop critical thinking skills, learn new concepts and creatively express their own ideas. Technology also enables educators to accommodate the three main learning styles: visual, auditory and kinesthetic.

4. What are the learning styles approach to teaching?

The "learning styles" theory makes a big leap, suggesting that students will learn better if they are taught in a manner that conforms to their preferences. More than 70 different systems have been developed that use student questionnaires/self-reports to categorize their supposed learning preferences.

5. Who created the 4 learning styles?

Neil Fleming

One of the most prominent was developed by Neil Fleming in 1987. Named the VARK model of learning, Fleming theorised that we are all one of four main types of learners: visual, auditory, reading/writing, and kinaesthetic.

6. What are the four stages of learning styles?

This learning experience consists of four stages:

Concrete Experience (CE): feeling. Reflective Observation (RO): watching. Abstract Conceptualization (AC): thinking.

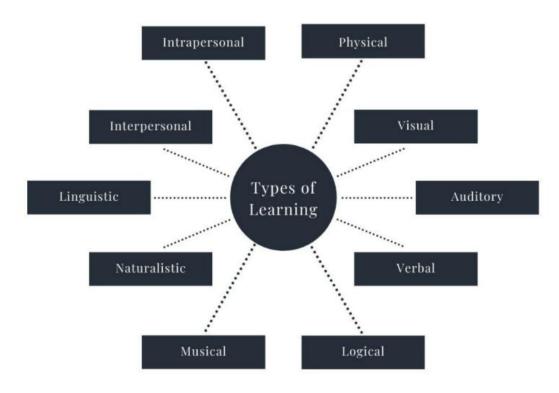
Active Experimentation (AE): doing.

If you have been a part of the education sector, you probably already know how different each child is. Every student has their own set of strengths and weaknesses which make them unique. Similarly, every student has a preferred way of learning and retaining the material. These preferences are called "learning styles".

Each learning style describes how a learner best receives information, interprets it, organizes it, and stores it. A majority of the learners today even have multiple or overlapping learning styles, also called <u>multimodal learning</u>. As an educator, it is extremely important to know the different types of learning – since this will help your students build on their strengths and retain information better. The original model of VARK only describes four of these - visual, auditory, reading/writing, and kinesthetic. However, in this article we explore 10 types of learning and how to teach them.

Another factor that contributes to learning and retaining information is the subject of the information. It is a well known fact that some people excel better in creative fields like design, fine arts, photography, while others might excel in practical or calculative fields like mathematics, engineering, science, and so on.

Thus, different people have different interests and these interests contribute to different learning *areas or subjects* as well.



1. Physical (Kinesthetic) Learning

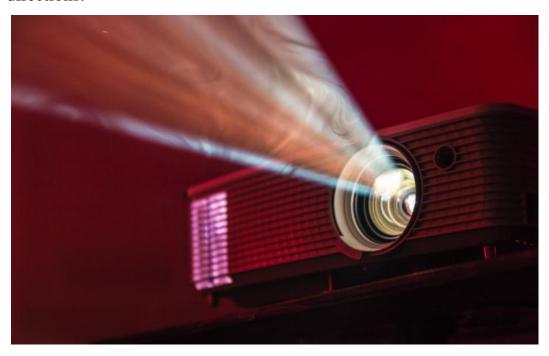
Physical or kinesthetic learners prefer a hands-on experience rather than listening to lectures or sitting in a class. They like interacting physically with things that are tangible in nature. These learners could see the idea of studying for hours as a daunting experience but are better with actually doing things themselves. They possess qualities like being restless, preferring to get their hands "dirty", outgoing and energetic.

Ways to engage physical learners:

- Encourage movement within lessons. Example: role play
- Give them well-spaced breaks between lessons to move around
- Use props and interactive models
- Declutter desks to promote better focus

2. Visual (Spatial) Learning

Visual or spatial learners learn best with the help of visual cues like charts, images, diagrams, graphs, etc. These learners respond best to colours and <u>mind maps</u>. They use their visual memory to retain information for longer periods of time. Many visual learners possess characteristics like frequent planning and doodling, they have a good attention span and are extremely observant, and they prefer visual directions.



Ways to engage visual learners:

- Use maps, diagrams, imagery
- Include technology like projectors
- Use <u>colour coding techniques</u>

• Encourage mind maps and flowcharts

3. Auditory Learning

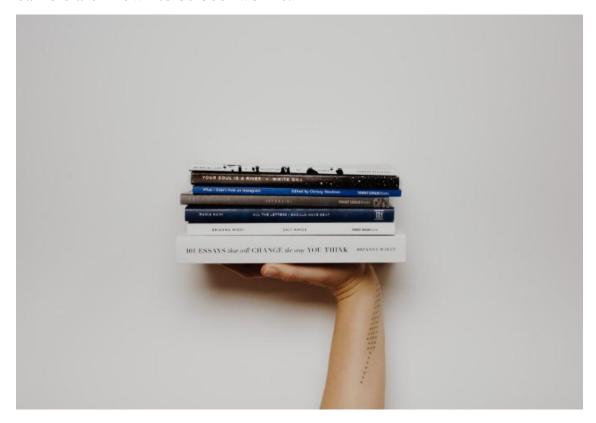
People who tend to understand and retain information by hearing it or saying it out loud (oral) are called auditory learners. These types of learners can quickly notice the change in someone's pitch, tone, and other voice qualities. They usually prefer discussing topics, participating in debates, and conversing about things to remember them. Most auditory learners are easy to distract and might even hum, sing, or talk to self frequently.

Ways to engage auditory learners:

- Try using different pitches and tones while reading the material
- Record voice lessons
- Encourage class presentations, group discussions, debates
- Ask them to teach others verbally

4. Verbal (Read/Write) Learning

These types of learners prefer traditional methods like using multiple written resources for learning. Verbal learners learn best through written material or by writing the material themselves. They usually possess a broad vocabulary and might even like using tools like acronyms, rhymes, tongue twisters, among others. Verbal learners are known to be bookworms.



Ways to engage verbal learners:

- Make use of mnemonics while teaching (song, rhyme, acronym, phrase)
- Inculcate scripts
- Encourage students to jot down and voice their ideas
- Include word games like crossword

5. Logical (Mathematical) Learning

Logical or mathematical learners tend to categorize information into groups to learn them better. They have a knack for quickly recognizing patterns and sequences; and understand equations, numbers, and relationships easily. These learners love structure and logic to things. Naturally, mathematics comes easy to them.

Ways to engage logical learners:

- Create an easy to navigate system to your lessons
- Try and inculcate statistics to subjects other than mathematics
- Classify concepts into groups or categories
- Generate cause-effect relationships between variables throughout all subject areas

6. Musical Learning

Where music or background noise is a distraction to most of us, musical learners prefer them. They tend to learn better with music, beats, and rhythm. Like logical learners, they too find patterns and relationships, but between different sounds. Some sources say they even think in sounds and rhythms instead of words and pictures.

Clearly, these learners often grow up to be musicians or instrumentalists. More often than never, some people are a combination of auditory and musical learners. This is why strategies to engage these two kinds aren't too different.

Ways to engage musical learners:

- Encourage listening to soft background music
- Promote podcasts

7. Naturalist Learners

Naturalist learners learn best through experimentation and practical experiences. They like making observations of the world around them. Just like the name suggests, naturalistic learners are also said to be one with nature. They retain information best when they are outdoors, around plants, animals, among others.

These types can also be somewhat related to kinesthetic learners since they appreciate tactile sensations. All-in-all, they apply scientific reasoning to the world around them and are highly interested in nature, as well as the things created by man.



Ways to engage naturalistic learners:

- Take students out for a field trip
- Give lessons in outdoor spaces
- Promote journaling, drawing, sketching, photographing or natural phenomena
- Encourage work that involves getting into nature (especially in subjects like biology)

8. Linguistic Learners

Linguistic learners are the combination of auditory and verbal learners. They absorb knowledge best by writing, reading, and sounding the material out. These learners can use the traditional methods of learning just like verbal learners and also prefer listening to the information. Linguistic learners also make their own notes while studying.

Ways to engage linguistic learners:

- Read out to them and have them read it back to you
- Include written projects and assignments
- Avoid using too many diagrams; use verbal methods of engaging them
- Avoid using a monotonous voice; use different pitches, voices, and characters

9. Interpersonal (Social) Learners

Social or interpersonal learners learn best while working in groups or with other people. They often make good leaders and others even come for advice to them. Social learners learn by relating their ideas and thoughts to the lives of other people. These learners are usually empaths and possess qualities like sensitivity to others, excellent communication, leadership skills, and problem-solving skills. This type of learning can fall adjacent to one or more types mentioned above.



Ways to engage social learners:

- Figure out their adjacent learning style and inculcate those strategies
- Encourage role-playing
- Assign group activities and projects

10. Intrapersonal (Solitary) Learners

In a complete contrast to interpersonal or social learners, intrapersonal or solitary learners prefer solitude while studying. They are more independent and introspective by nature and prefer to be with their own thoughts and ideas without too much external interference. Usually, you can find these types sitting at the back of the class or you might refer to them as the "quiet kid" but they may end up acing the exam. Solitary learning too can fall adjacent with other learning styles.

Ways to engage solitary learners:

- Figure out their adjacent learning style and inculcate those strategies
- Designate a quiet area
- Check in with them every once in a while
- Define a specific time for collaboration so they feel prepared enough

To summarize, remember to not put your students in a box. It is not necessary and probably unlikely that a student is only one type of learner. There can exist multiple variations and combinations between their learning styles. This is also called a multimodal approach. According to statistics, more than 60% of people are multimodal learners.

Acknowledge that each child is different and you might have the need to find varying ways to approach their education. Again, these differences can also exist with regards to the subject area. Certain people are simply better suited and more interested in some, while others might have completely opposing interests. These learning styles only provide you with a framework to follow.

If you're an educator committed to going the extra mile to help your students excel, <u>Classcard</u> is here to <u>help your teaching and learning business</u> in this meaningful journey. With our intuitive and practical class management software, you can seamlessly schedule classes, manage bookings, track attendance and payments, and much more. You nurture learners for the future while we streamline operations for you!

LECTURE 9.

Multilevel teaching.

Multidimensional teaching. Multi-level class. Multi-level instruction.

1. What is multi-class teaching?

A multigrade classroom simply means that there is more than one grade in the room, working independently or together, with each student working towards their individual curriculum goals for their grade level. They are learning simultaneously, both together and apart.

2. What is the multi model approach to teaching?

Multimodal learning uses multiple modes or methodologies to teach a concept. Instructors create materials for different learning styles like visual, reading, auditory, writing, and kinesthetic. Multimodal learning includes teaching methods that engage multiple sensory systems simultaneously.

3. How do teachers plan for multilevel classes?

You can create several different groups based on the levels in your classroom. Then, make a schedule of which group you will meet with each day. Use the groups and schedule to plan the activities and type of support you will give to your students.

4. What are multilevel classes?

In this resource, the term multilevel classrooms refers to student- centred classrooms in which students learn across two or more grades and are taught by the same teacher for two or more years.

5. What are the advantages of multi-grade teaching?

Several studies have found that multi-grade classrooms improve personal and social development. Students learn to work with a wide age span. Cooperative learning and peer tutoring helps sharpen social skills. Independent work habits as well as greater feelings of responsibility and self-esteem are developed.

6. What are the benefits of multiple learning styles?

It helps students learn better, remember more, and stay more engaged in learning. Using different learning modalities, like seeing and doing, supports diverse learning styles and skills, like motor skills and problem-solving. It also makes learning more inclusive for kids with different needs.

7. How do you manage a multilevel classroom?

Try These 6 Survival Tips for Multi-Level Classes

- 1. Face Reality. Multi-level classes are hard. ...
- 2. Keep It Level. Often, a mixed-level class has actually been advertised at a specific level. ...
- 3. Take Time to Ask. ...
- 4. Mix It Up. ...
- 5. Focus on Communication. ...
- 6. Be Flexible.
 - 8. Why use multiple teaching strategies?

Using multiple strategies is a very effective method to help keep students motivated and also improve their learning. However, how you implement this in your classroom makes a huge difference.

9. What is a multilevel method?

Multilevel modeling is a method for modeling dependence among effect sizes that avoids violating the assumption of independent effect sizes (Hox et al., 2010) and is therefore useful when multiple effect sizes are nested within the same study designs and samples.

The benefits of multilevel classrooms explored in this resource apply to classrooms that are maintained for two or more years. There are distinct benefits for the whole learning community—learners, teachers, and parents. Class/Learner Benefits Multilevel classrooms are built on the premise that diversity is not a challenge to be overcome, but an asset and a resource that promotes learning. In reality, all classrooms are diverse.

By the time students are eight years old, their academic performance in a single-grade classroom may span three or more years. In addition, students bring to the classroom a wide range of learning approaches, developmental stages, aptitudes, interests, experiences, cultural backgrounds, and personalities. Thus, there are no homogeneous classrooms. The natural varied composition of a multilevel classroom has specific advantages for learners:

• Multilevel programming recognizes that each student is at a different stage of learning and focuses on the developmental stage of the learner; of necessity, the focus moves to individual learning along a continuum. This minimizes competition

because students recognize and accept that each student is at a different place in his or her learning. Students learn to set personal learning goals, assess themselves, and reflect on their own learning.

• Multilevel classrooms provide opportunities for students to gain self-knowledge as they interact with older and younger peers. Throughout life, people rarely operate in groups that are systematically separated by age. The range of social relationships students build in a multilevel classroom more closely reflects the diverse social situations individuals encounter in workplaces, communities, and families. In fact, just as the youngest child in a family typically passes developmental milestones earlier than his or her siblings did through watching and listening to older siblings, younger students learn from the wider knowledge base of older classmates and from their modelling of skills and behaviour.

Benefits of Multilevel Classrooms Independent Together 1.6 Older students likewise develop their capabilities as they assume leadership roles and articulate their understanding as they share their learning with younger students. In the multilevel classroom, though, a student's position relative to her or his classmates changes each year. Students with strong leadership skills in their own age group enter the classroom as the youngest students and learn valuable skills in following leadership. Students who are less assertive or who require more support or guidance have opportunities to share their learning with younger students and experience themselves as leaders.

- Multilevel classrooms allow for continuous progress. All learners can be challenged. In a multilevel environment, students do not need to spend time on concepts and skills they have already mastered. Students who have not attained specific learning outcomes by the end of a school year have the opportunity to achieve them the following year. In multilevel classrooms, all students are expected to attain the learning outcomes, and time becomes a variable that can help them do so. (See Chapter 3 for more information about assessment.)
- Multilevel classrooms provide students with stability and an ongoing relationship with a teacher. Continuity within the same classroom over several years helps diminish the anxiety associated with moving to a new classroom at the beginning of a new school year, and shortens the time it takes to learn new routines, thereby increasing instructional time. Teacher Benefits Many teachers who have experience in multilevel classrooms report that certain challenges are minimized by the fact that students are at different developmental stages. Just as families consider multiple births a greater care-taking challenge than caring for children several years

apart, so teachers find there are advantages to having a contingent of older students in a classroom. Multilevel classrooms benefit teachers in a variety of ways:

- Teachers have more time to develop a deeper understanding of each student's strengths and needs over two or more years, and can plan instruction at the student's level of development. Teachers in single-grade classrooms often feel they have only begun to know their students by the end of the school year. A multilevel classroom allows teachers to profit from their understanding of each student's unique personality, interests, and learning styles, and offers them the satisfaction of following a student's growth over a period of years.
- Teachers have fewer students to learn to know each year. Orientation at the beginning of a school year is simplified and consumes less time. Senior students know routines and model them for new students.
- In planning programming for two or more years, teachers have opportunities to be more flexible with curricula, planning projects around student interests and current community events.
- Teachers can develop a stable parent volunteer program that relies on the same volunteers over several years. Over time, many parents feel more confident volunteering because they know the teacher better. If siblings are placed in the same multilevel classroom, teachers have the opportunity to work with a smaller group of families

Multi-level classrooms are as varied as the students in them. Most often, they include students who communicate in English at a variety of different levels. They may also be considered multi-level because they include students with different types of learning backgrounds, such as those who have learned orally and those who have learned mainly from a textbook. Students may also have different levels of literacy in their own native language. A classroom that contains some students who are familiar with the Roman alphabet and some students who are not may also be considered multi-level. Finally, the term multi-level can be used to refer to a group of students working together who range greatly in age.

Advantages and Challenges of Teaching Multi-level Classes

When faced with the challenge of a multi-level classroom many teachers do not know where to start. They fear that the preparation will take much longer, and that the students will be more demanding. Schools that have multi-level classes often have limited budgets, and teachers may fear that they will not be paid for what they are worth. However, it is only by looking at the advantages of the multi-level

classroom and employing strategies to overcome the challenges, that teachers can achieve success.

Advantages of Multi-level classrooms:

- Students are able to learn at their own pace
- Students learn to work well in a group
- Students become independent learners
- Students develop strong relationships with their peers
- Students become partners in learning

Challenges of Multi-level classrooms:

- Finding appropriate teaching resources and material
- Organizing appropriate groupings within the class
- Building an effective self-access centre in the classroom
- Determining the individual needs of each student
- Ensuring that all students are challenged and interested
- Enforcing English only policies when teacher is occupied and students are working in small groups or pairs

Determining the Needs of your Students

One of the first things you should do when assigned to a multi-level classroom is determine the needs of the individual members. If possible, this should be done before the first class.

There are a variety of ways to conduct needs assessment, depending on the size of the class, and your access to an office and a computer. Many schools use a standardized test for new students. While this may help teachers determine the language level of the students in the multi-level class, standardized tests cannot determine the personal needs of the individual students. For small classes it is useful to invite students into the office for a quick chat to determine what your students' objectives are (ex. improving writing skills, learning conversational English, understanding of rules and grammar). Students may not know the answer to this, so it is a good idea to create a list that they can pick from. You may give the option of picking a primary and a secondary reason. Here are some examples that could be placed in a list for students to choose from:

- To improve my speaking skills
- To get into college
- To use for travelling
- To become a future teacher
- To learn the rules of grammar
- To please my parents
- Other_____

You should also use this time to explain to your student that there will be other students with different levels of English in the class and that you will be using partnering and grouping exercises and activities in order to meet the needs of everyone. If you don't have access to an office or classroom or you have a large class, you may want to e-mail the question to your students, or have short telephone conversations with them. When none of these options are possible, you can always set aside your first class as an intake day. If possible, stagger the start times of your students by five minutes so that you can speak to each one individually. Brainstorming in a group may also work if you have a small enough class. In a circle on the board place the words, "I need English to/for..." and ask students to volunteer their answers.

Make sure to record the needs and level of each of your students in a simple way. Keep a chart for yourself, and alter it as your students' needs change. Make a conscious effort to monitor the needs of your individual students regularly. You may find that some students feel uncomfortable acting as a peer tutor, while others feel that they are focusing too much on a skill that they will never use in the real world.

Glossary of Terms

- **cross-ability learners:** Pairs or groups of students working together with varying degrees of ability or competence. More advanced learners can gain confidence and improve competence by helping and teaching lower level peers.
- **groupings:** Different ways of putting students together (based on things such as cross-ability, like-ability, special needs, compatibility).
- **like-ability learners:** Pairs or groups of students working together who share similar levels of ability or competence.

- **multi-level class:** *Group of students who learn and study together in one room, despite having varying levels of abilities and/or literacy backgrounds.*
- self access materials: Learning resources (ex. listening exercises, readers) that include instructions and answers, and are available for a student to use independently. Students in multi-level classrooms often finish small group or individual assignments and activities at different times, so it is important to have self-access materials available at all times to keep students engaged in learning.
- **small group activity:** An exercise or game in which a small group of students can participate in and learn from. Groups can be composed in many different ways (common interest, common levels, varying levels) and changed often.
- whole group activity: An exercise or game in which all students can participate in and learn from, regardless of their competence level and language ability.

Selecting Materials

Finding a core textbook for your class may help you if you have a number of students who are at a similar level of English. You may find that you need more than one level of the same textbook series. If you require more than two levels, however, using a core textbook may only make your life more complicated, and multi-level textbooks are difficult to come by. Another option is to use a theme based approach. Keeping all of your students working on activities and lessons based on the same theme is a great way of maintaining a class-like atmosphere in a multilevel classroom. Not only will this help your students feel like they all belong in the group, it will save you prep time and make you feel more organized. Follow up activities, such as games and discussions can then be based on the theme. EnglishClub.com has collected a wide range of theme based lessons to save time for teachers.

Suggested Activities

- Whole group Warm-up: Starting your class with a whole-group warm-up is a great way to foster a sense of community in your multi-level class.
- **Information gap exercises:** Works great for cross-ability and like-ability pairs.
- **Crossword puzzles:** Works well for cross-ability pairs or small groups. Despite their English vocabulary levels, each student will bring a wide variety of knowledge to the group to help fill in the puzzle.

- Self-Access Materials: Make sure everything is well labelled and organized. The materials should reflect the needs and interests of the students in your class. Self-Access materials can be intimidating for students if you just have a shelf full of textbooks. It is best to photocopy many copies of worksheets and exercises. If you have students who are preparing for something such as the IELTS test, have a file marked TOEFL Practice sheets. If your students need to improve their listening skills, have an audio shelf with an easy-to-use CD/tape player and level appropriate resources (CD's and worksheets). Rather than having guided readers, it is better to have photocopies of stories or articles with corresponding tasks (such as writing activities) stapled right to the readings. Board games, such as Word Up (comes with question cards for 5 different levels), should be viewed as an essential tool in every multilevel classroom.
- Folktales: It is easy to find different levels of common folk or fairytales. These work well in children's classes, and there are even some that are appropriate for adults. If you have difficulty finding a folktale that is a suitable level, you can always rewrite one yourself and use it again and again when you teach. A local children's librarian should be able to direct you to resources that you need. The follow up activities for folktales are unlimited, but include comprehension questions, group discussions, vocabulary activities, creative writing exercise, and role-playing, all of which can be done in various groupings.
- Art and images: Visual stimuli can be a great teaching tool. Use paintings as the basis for class discussions, writing assignments, and vocabulary building. Students of all different levels can participate together by describing photographs. Encourage students to bring in their own pictures and art and find ways to build lessons around them. One great pair activity that acts as a listening and speaking activity is to put students in pairs and have one of them describe a picture while the other tries to draw it. This can also be done as a whole group. Your students can choose a photo and describe it to you or another student who will try to reproduce it on the board.
- Computer lab assignments: If your school has a computer lab for students to use, or if you have a computer in your classroom, allow pairs to do online English lessons with English Club.com's Learning Centre. Jot down the URL's of any lessons you think will be useful, or give your students free time to explore the site.

Teaching Method Strategies

Experiment with different types of groupings to find the ones that work best.

You may find that cross-ability pairs work best for certain types of activities, while like-ability small groups work better for others. If possible, use a wide variety of groupings to keep things interesting for your class.

Use a simple schedule that is similar each day. Here is an example:

- 1. Start with a warm-up that involves the whole group.
- 2. Break part of the class off into one type of grouping (i.e. pairs) and work with part of the class on a lesson, grammar point, or activity.
- 3. Break off the class into another type of grouping (i.e. small groups) and have the other students use self-access materials.
- 4. Bring the class back together for a whole group activity/game.

Isolate students within the class who are interested in peer tutoring. This doesn't have to be the student with the highest level of English. Your students who fall somewhere in the middle may in fact be the most valuable to you, as they strive to attain a level of competency comparable to the most advanced students. Remind your students that the best way to practice and improve a new language is to teach it to someone else.

Consider enlisting a volunteer.

Limited budgets or low enrolment are often the reasons behind multi-level classes. For this reason, it may be difficult to convince administrators or managers that you need a paid assistant. If you feel overwhelmed, consider hiring a volunteer. Finding someone who is interested in helping you with your preparation work and teaching may not be as difficult as you think. Most native English students who are going into the teaching profession will be more than willing to put in volunteer teaching hours in exchange for a reference. Once you have permission from your supervisor, you can post an ad at the local library or college, or at a teacher training centre. You may even want to suggest placing an ad on the website for the school you work at.

WHAT IS MULTI-LEVEL INSTRUCTION?

Multi-level instruction (Schulz and Turnhull, 1984) is based on the premise that one lesson will be taught to the whole class. It is an approach to planning that assumes the individualization, flexibility and inclusion of all students regardless of their personal level of skills. It allows the teacher to plan for all students within one lesson, thereby decreasing the necessity for separate programs while allowing the teacher to weave individual goals into the classroom content and instructional strategies.

In order to achieve this, teachers need to fully understand the concept of multilevel teaching strategies. To develop a unit or a lesson that is truly multi-level, the lesson must have a definite aim for all students. It must also include a variety of teacher techniques aimed at reaching students at all levels.

References

- 1.Abbas, P. G., Lai-Mei, L., & Ismail, H. N. (2013). Teachers' use of technology and constructivism. *International Journal of Modern Education and Computer Science*, 5(4), 49-63. doi: http://dx.doi.org.uproxy.library.dc-uoit.ca/10.5815/ijmecs.2013.04.07
- 2.Brown, P.C., Roedinger, H.L., McDaniel, M.A. (2014). Learning is misunderstood. *Make it stick*, pp.1-22.
- 3.Brush, T & Saye, J. (2014). Technology-supported Problem-based Learning in Teacher Education. *The Interdisciplinary Journal of Problem-based Learning*, 8(1). Available from differhttp://dx.doi.org/10.7771/1541-5015.1480
- 4. Conoley, J. (2010). Why Does Collaboration Work? Linking Positive Psychology and Collaboration. *Journal of educational and psychological consultation*, 20(1), 75-82. doi:10.1080/10474410903554902
- 5.Donnelly, R. (2010). Harmonizing technology with interaction in blended problem-based learning. *Computers & Education*, 54, pp. 350–359. doi:10.1016/j.compedu.2009.08.012
- 6.Donovan, M.S, Bransford, J. D., & Pellegrino, J.W. (2002). *How people learn: Bridging research & practice*. Washington, DC: National Academy Press.
- 7.Fullan, M. (2013). Pedagogy and change: Essence as easy. *Stratosphere*, pp.17-32.
- 8.Hmelo-Silver, C.E. (2004). Problem-Based Learning: What and How Do Students Learn? *Educational Psychology Review*. *16*(3), pp.235-266. https://doiorg.uproxy.library.dc-uoit.ca/10.1023/B:EDPR.0000034022.16470.f3
- 9.Matthews, J. & Dworatzek, P. (2012). Millennial Graduate Students' Use Of Technology And Problem-Based Learning To Enhance Higher-Level Cognition In Health Promotion Program Planning. *American Journal of Health Science*, *3*(3), p.195-200.
- 10.Megwalu, A. (2014). Practicing Learner-Centered Teaching. *The Reference Librarian*, *55*(3), 252-255, doi: 10.1080/02763877.2014.910438
- 11.Nappi, P. (2017). The Importance of Questioning in Developing Critical Thinking Skills. *The Delta Kappa Gamma bulletin*, 84(1).

- 12.Prensky, M. (2010). Partnering. Teaching digital natives. *Partnering for real learning*. pp. 9-29.
- K. Educational 13. Talebi, (2015).John Dewey -Philosopher and Reformer. European Journal Education Studies. *1*(1). Available of from www.oapub.org/edu
- 14. Tambouris, E., Panopoulou, E., Tarabanis, K., Ryberg, T., Buus, L., Peristeras, V., Porwol, L. (2012). Enabling problem based learning through web 2.0 technologies: PBL 2.0. *Journal of Educational Technology & Society, 15*(4), 238. Available from http://search.proquest.com.uproxy.library.dc-uoit.ca/docview/1287025375?accountid=14694
- 15. Taradi, S., Taradi, M., Radic, K. & Pokrajac, N. (2005). Blending problem-based learning with Web technology positively impacts student learning outcomes in acid-base physiology. *Advances in Physiology Education*, 29, pp. 35-39. doi:10.1152/advan.00026.2004.
- 16. Taylor, D. & Miflin, B. (2008). Problem-based learning: Where are we now? *Medical Teacher*, 30, pp. 742–763. doi: 10.1080/01421590802217199
- 17. Wirkala, C & Kuhn, D. (2011). Problem-Based Learning in K-12 Education: Is it Effective and How Does it Achieve its Effects? *American Educational Research Journal*, 48(5), pp. 1157-1186.
- 18. Wood, D. (2008). Problem Based Learning. *British Medical Journal*, *336*(7651), p.971.