ICT INTEGRATION IN EDUCATION

EBS 337

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CONTEXT

The emergence of the information age has brought to the fore, the important role that information, knowledge and technology can play in facilitating socio-economic development. The effective use of information and knowledge is becoming the most critical factor for rapid economic growth and wealth creation, and for improving socio-economic well-being. Information and Communication Technology (ICT) should be integrated within all the learning activities of the school across all subjects. Targets for students' use of ICT relate to the usage of various ICT tools, broader issues associated with assessing information using these tools, and other management skills. As ICT is an important element in most subjects, ICT-related skills are assessed through traditional school subjects. The use of ICT in education can play a crucial role in providing new and innovative forms of support to teachers, students, and the learning process more broadly. With globalization, the information revolution, and increasing demands for a highly skilled workforce, nations are increasingly prioritizing education. The potential and promise of ICT use in education is clear: when implemented correctly, software in the classroom, for example, can allow students to learn at their own pace and tablets can help children develop important digital skills and computer know-how that they'll need to succeed in our knowledge-based economy. The programme has been designed to incorporate Digital Competence, which cover basic education. The programme's priority areas have been related to ICT infrastructure, competence development, research and development, digital teaching resources, curricula and working methods.

Indicators
Acquire knowledge of the principles and practices involved in the integration of computers in teaching and learning
Use the computer as tutor, as a mindtool and as a conversation support in the teaching and learning process.
Define multimedia and its elements Be able to select appropriate multimedia tools for teaching and learning.
Acquire skills in managing computer laboratories for learning, Select content for computer-based teaching, Provide support for teachers and pupils in teaching with and learning from computers

Introduction

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ICT integration is **defined** as the use of **ICT** to introduce, reinforce, supplement and extend skills. In other vein, ICT Integration explore the innovative ways teachers can use **ICT** to improve students' subject matter competencies.
The successful **integration** of **ICT** into the learning environment will depend on the ability of teachers to structure learning in new ways, to merge technology appropriately with a pedagogy, develop socially active classrooms, and encourage co-operative interaction and collaborative learning and group work.

Technology cannot be integrated into classroom programmes overnight.
Imagine yourself teaching a lesson to students in a classroom.
Exactly what would you do to convey the necessary information?
Would you use technology?
If so, what technologies and why?
If not, why not?
If you are like many college students, computers, cell phones, and other digital tools are interfaces to your life.
You communicate there.
You think there.
You create there.
You take care of the day-to-day events of your life there.
You are entertained, informed, stimulated, and soothed.
Technology provides a window into your world.
But have you thought about how you will integrate technology into your teaching practice?

Unit 1: Principles and Practices of Computers in Teaching and Learning

Technologies in Teaching and Learning

Technologies have been part of teaching and learning for centuries. As the types of technologies have changed over the years, so, too, has their importance to the teaching and learning process. For example, consider two functions of technology, communication and information storage, and how they have evolved from pre-mechanical to mechanical to electronic and then to digital forms.

By improving existing technologies and developing new technologies, information and communication technologies have become more accessible to the general public while offering increased speed and greater quality at the same time. Can you imagine your life without cell phones, the Internet, and other digital tools that help you communicate with your friends and family today? If you were a teacher when very simple communication and information storage tools were available—in a time we refer to as the pre-mechanical era—you would have had to depend on real objects and face-to-face communication with your students to describe the past, explain the present, and encourage thinking about the future.

The impact of technology on teaching and learning(importance of ICT in education)

- ***The classroom of today looks and operates significantly differently to the classrooms of five, ten and even 20 year's ago. Gone are the days of a solitary desktop computer in the corner, the 21st Century classroom houses various technologies from Interactive Flat Panel Displays (IFPDs), to tablets, laptops and smartphones, all seamlessly connected by Wi-Fi or Bluetooth and supported by a range of software from cloud-based to apps.***
- ***The current generation of digital-native students have become more independent in the classroom and technology is an expected requirement rather than an added advantage. So just how has technology changed the face of the classroom?***

Simplifying lesson preparation

Aiding assessment

Breaking down boundaries

The most notable use of technology is that it no longer limits lesson time to the traditional four walls of the classroom, creating a true learning continuum between home and school. Schools are empowering teachers and students to take more control over their learning and harness the potential of new learning experiences, encouraging learning to take place in other venues such as libraries and museums. Students can use technology to meet, collaborate and create content virtually. Technology helps students to research subjects, share ideas and learn specific skills.

Encouraging collaboration

Supported by technology, students are generating new approaches to problem solving and learning how to work alongside their peers, a great attribute for their future careers.

Introducing interactivity

While text books still have a place in the classroom, the reality is that students are much more likely to be found using a laptop or tablet or even a smartphone to support their studies by researching on the Internet.

- ***ICT tools helps promote individual learning***
- ***It bridges the gap between teachers and students***
- ***It encourages group learning***

- ***It simplifies teachers work***
- ***Promotes higher order thinking***
- ***ICT plays an important role in student evaluation***
- ***It helps in improving professional development and educational management***
- ***It enhance active learning of students.***
- ***It helps teachers in preparation of their teaching and provides feedback***
- ***ICT helps teachers to pass information to students within a very little time***
- ***ICT helps teacher to communicate properly with their students. So ICT bridges the gap between teacher and students***
- ***ICT helps teacher to motivate students and growing interest in learning***
- ***It helps improve teaching skill, helps in innovative teaching***
- ***Various technology based plans are used to help the teachers for their practice teaching***
- ***ICT helps teacher to design educational environment***

Why is ICT use in teacher Education?
The classroom is now changing its look from the traditional one i.e. from one way to two way communication. Now teachers as well as students participate in classroom discussion. Now Education is based on **learner-centric** education. So the teacher should prepare to cope up with different technology for using them in the classroom for making teaching learning interesting. For effective implementation of certain learner-centric methodologies such as project-based learning which puts the students in the role of active researches and technology becomes the appropriate tool. ICT has enabled better and swifter communication; presentation of ideas more effective and relevant way.
It is an effective tool for information acquiring-thus students are encouraged to look for information from multiple sources and they are now more informed then before. So for this reason ICT is very much necessary for Teacher Education.

Teaching Principles and Practices
Teaching and learning are highly complex, dependent on numerous contextual factors - including the ***nature of the teacher, students,*** **the** ***subject matter*** **and the** ***environment(s)*** **for teaching and learning**.
Among these, it is extremely important that teachers consider various principles and theories about *learning*. Among these, constructivist ideas about learning have been very influential.
Finally, it must be stressed that teaching and learning are *dynamic*. Educators need to continually review and evaluate teaching and learning and make efforts to improve them.

Differences between the traditional classroom and the 21st century classroom

Traditional classroom	**21st century classroom**
1. Teacher centric : Teacher is the center of attention and provider of information	Learner centric : Teacher is facilitator/coach
2. Based on school calender and operates schools year planner	Disregards the obsolete school calender and operates schools year round with alternate time and learning experience
3. Limited to classroom teaching in groups	Establishes individual learning plans for all students
4. Time bound	Provides 24/7 access to digital learning
5. Focuses on memorization of discrete	Focuses on what students know and can do

facts	
6 Textbook-driven	Research-driven
7. Passive learning	Active learning
8. Learners work in isolation- within 4 walls of classroom	Learners work collaboratively with classmates and others around the world - Global classroom
9. Little to no student freedom	Great deal of student freedom
10. Fragmented curriculum	Integrated and interdisciplinary curriculum
11. Teacher is judge	Self, peer and other assessments. Public audience, authentic assessment
12. Diversity in students is ignored	Curriculum and instruction address students diversity
13. Literacy is 3R's - Reading, writing and arithmetic	Multiple literacies of the 21st century - aligned to living and working in a globalized new millennium - aural and visual literacy, financial literacy, eco-literacy, media literacy, information literacy, cyber-literacy, emotional literacy, physical fitness and global competencies

Some challenges fa*ced by the 21st century teacher & some Tips to deal with the challenges*

1. Lack of teamwork, empathy, and support between students - With a stronger focus on individual performance, the role of teamwork is diminishing in modern classroom. If students spend the majority of their time working individually.

Tip to deal with the challenge: **Engage them in group work as well**

2. Not enough time to plan-teachers often decry the lack of time they are given to prepare, plan and execute all the tasks that are demanded of them. Adapting subjects to a new cohort of students are some of the tasks that teachers would like more time for.

Tip to deal with the challenge: **Teachers exhibits skill in time management**

3. Applying a prescribed curriculum to all types of students.- Every student is different. They learn at different pace, and they have their own way of taking in content and remembering it. Problems arise when teachers are expected to apply a fixed curriculum to students with vastly different needs.

Tip to deal with the challenge: **Deploy all learning theories to make sure every individual grasps what you are teaching**

4. Personalization

The age old “one size fits all” teaching method has long outgrown, with the focus moving on to different styles of learners. Students are no longer forced to learn beyond their own understanding. Instead, teaching is adjusted to help students understand, according to their learning styles. Teachers are now expected to personalize their teaching methodologies and assessments, depending on the learning styles of students, laying the foundation for student-centred learning. Various learning styles clubbed together, with fixed periods of time, can make personalisation challenging.

Tip to deal with the challenge: To make personalisation less daunting and challenging, teachers must make clear identification of learning styles through real time observation, and assessments – psychological and general. Right assessment, followed by planning and prioritizing learning plans, would simplify personalisation, and guarantee effective implementation.

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5. Making the Right Use of Technology

Digital induction in education goes far beyond merely bringing a computer into the classroom, or giving digital homework. Digitalization in classrooms extends to more intrinsic adaptations such as flipped learning, mobile learning, AI based decision making, data management, e-learning, visual learning, animations, digital assessments, record keeping etc.

Teachers may also get overwhelmed, trying to curate content from varied sources of information, and keeping a track of students' learning who may depend on carious digital sources.

Tip to deal with the challenge: Plan your strategy well in advance. Have a clear picture of your goals for the year, and decide which form of digitalisation may best meet student needs. Take the help of EdTech platforms to make your job easier, and to get a precise picture of your students' profiles and relevant approaches.

6. Classroom Management

Classroom management is often misunderstood to be as simple as keeping the class in control. In reality however, teachers are required to ensure that their teaching strategies keep students of different learning styles and behaviours, from getting distracted, and that they are organized, attentive, focused, and interested in the classroom, and are indeed learning, and not merely listening in a class. Changing learning strategies also change the dynamics of a classroom, making classroom management more challenging than before. Students aren't just passive listeners anymore. They expect to be an active participant, and need to feel important and respected in the class.

Tip to deal with the challenge: Effective classroom management requires patience, planning, and perspective. Do not brush off your students' views and opinions. Make them feel heard and understood. Notice and appreciate good behaviour, and confront bad behaviour respectfully. Create a friendly, open environment in the classroom. Students tend to learn better when the classroom culture doesn't intimidate them.

7. Curriculum

Teaching was probably far less challenging in times when learning and curriculum were limited to text books and classrooms. Modern education demands dynamic curriculum that encompasses content, competencies and essential skills aimed at overall development of a student, than mere academic scores. Teachers are required to create student-centric curriculum, that doesn't just peak their learning interests and abilities, but also instills critical, creative and cognitive thinking, acting as the base for lifelong skill development.

Tip to deal with the challenge: Create a curriculum, in collaboration with students and their learning plans. Regularly review its effectiveness and update if necessary, to meet the learning needs of students.

8. Global Awareness

Education today, doesn't just groom students for knowledge, survival and careers. It aims at creating future leaders and global citizens, with an integrated view and approach of communities and the world alike. Hence, teachers are expected to create global awareness in students, helping them understand environmental, social, cultural, political, and economic events in the world, and the role they play, or can play in it. Students must also be familiarized with various values such as tolerance, empathy, equality, justice and inclusion.

Tip to deal with the challenge: Use creative approaches such as literature, language, arts, food, culture and travel to instil global awareness. Have regular discussions over current events and news updates. Cultivate awareness, empathy, and fairness, through conversations and examples.

TPACK Model of Integration

TPACK model is a technology integration **framework** that identifies three types of knowledge instructors need to combine for successful edtech integration—technological, pedagogical, and

content knowledge (a.k.a. **TPACK**). **The Technology Integration model was proposed by Punya Mishra and Matthew Koehler in 2006**

This model, developed by educational researchers Mishra and Kohler (2006), is designed around the idea that content (*what* you teach) and pedagogy (*how* you teach) must be the basis for any technology that you plan to use in your classroom to enhance learning.

TPACK *stands for Technological Pedagogical Content Knowledge. It is a theory that was developed to explain the set of knowledge that* ***teachers*** *need* ***to teach*** *their students a subject,* ***teach*** *effectively, and* ***use*** *technology.*

The PCK model is depicted in Figure 1.

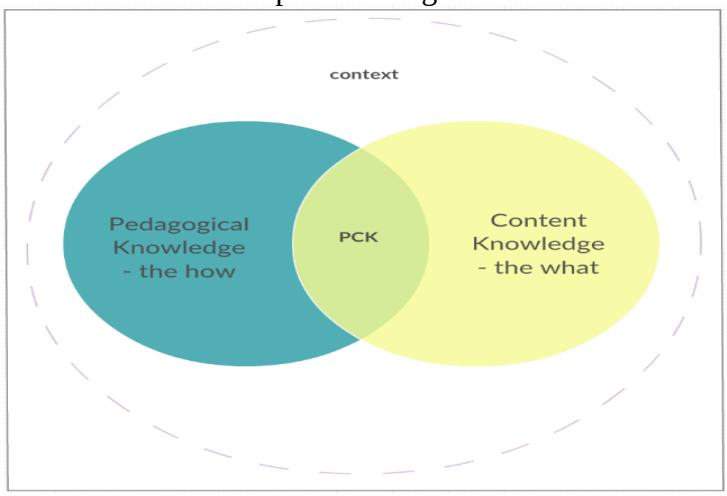

Figure 1. The PCK Model. Adapted from Wells (2017)

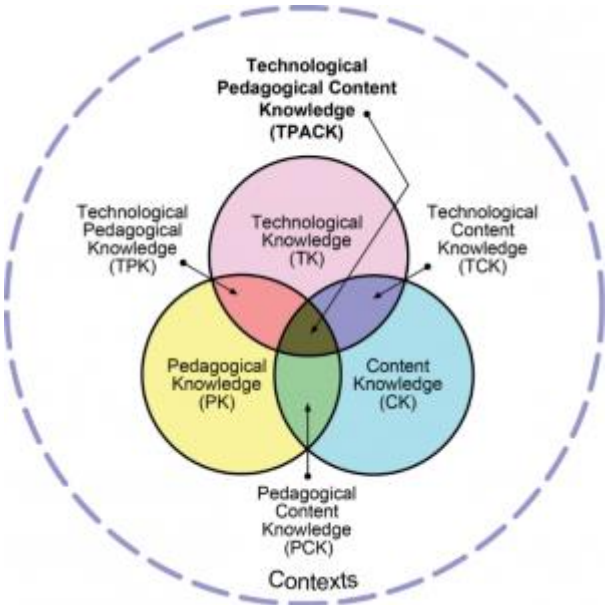

Figure 2. The TPACK Model. Adapted from Mishra & Koehler (2006)

Technological Knowledge

The Technological Knowledge (TK) is an interesting part of this model because it is hard to define due to the constant change of new and emerging technologies. Due to the changing dynamics of the technology accessible to learners and teachers, it is important that educators have a broad understanding of the available technologies and emerging technologies and how they can be productively integrated within their curriculum

Pedagogical Knowledge
Pedagogical Knowledge (PK) refers to the way in which the educator presents content to their students in an effective way and addressing challenges or misconceptions from the learner.

Content Knowledge
Content Knowledge (CK) is exactly what the term suggests which is the actual knowledge about a specific field or subject matter (Mishra & Koehler, 2006).
Educators are expected to be experts in the field of study they teach and the scope of complexity of which it is presented to the learner. Educators must have the fundamental backgrounds and understandings for their specific field of study.

The Ideal Overlap
The circles in the TPACK diagram represent *content knowledge*, *pedagogical knowledge*, and *technical knowledge*. The areas where the circles overlap — where the three kinds of knowledge combine — can be explained as follows:

- **Pedagogical Content Knowledge (PCK)** is the knowledge that teachers have about their content and the knowledge that they have about how to teach that specific content. First identified by Shulman in 1986, we can see evidence of PCK as we consider the different strategies that science teachers use as compared to the strategies used by language arts teachers, or teaching strategies used by art teachers as opposed to teachers of mathematics. This specialized knowledge allows teachers to use the most effective methods for teaching specific content.
- **Technological Pedagogical Knowledge (TPK)** is the set of skills, identified by Mishra and Kohler in 2006, which teachers develop to identify the best technology to support a particular pedagogical approach. For instance, if you want your students to work in collaborative groups (pedagogy) you might choose to have them share their learning in a wiki (a digital tool that is collaborative) or communicate what they have learned in a multimodal presentation using for example, PowerPoint, Glogster or Prezi (digital tools that allow students to present what they know).
- **Technological Content Knowledge (TCK)** is the set of skills, also identified by Mishra and Kohler in 2006, which teachers acquire to help identify the best technologies to support their students as they learn content. For instance if you wanted your students to recognise and understand the sequence of steps leading up to a hurricane (content) you would look for online hurricane tracking sites, allow them to find photographs that represented the formation of hurricanes and have them document the different stages in a timeline.

Importance of TPACK
TPACK is an essential part of the **education** system today as it incorporates the growing demand on the use of technology in the classroom as well as continuing the focus on the content and how we **teach** it. Therefore it sets up **education** for the future as well as setting up the students for their future.

TPACK and 21st Century Skills
John Dewey famously said, "**If we teach today's students as we taught yesterday's, we rob them of tomorrow."** This sentiment resonates deeply within today's educational climate. Educators must teach in a forward-thinking way.

Selecting Technology:

From a teacher's perspective, using an easy to learn and intuitive technology is key to success. Aside from learning and mastering the technology themselves, they must consider their students' diverse needs, accommodations, and affordances. Using a tool like TEDED is an efficient way to include multimedia, assessment, and customization in order to heighten student engagement. The platform is easily accessible and does not include fees thereby being accessible to all educators and learners.

Potential Barriers:
Three main factors that contribute to these barriers include **teacher perceptions of technology, school culture or policies, and physical access to technology**.

Suggested Solutions:
An important part of the TPACK model is cultivating a positive culture between educators where they can share their experiences with each other regarding their trials and errors associated with integrating technology within their classrooms. Each educator's experience, whether deemed to be a success or challenge, allows others to learn from the trials and tribulations and find other effective ways to integrate tools into their lessons. If their collective experiences are shared in an open and accessible forum, mistakes or challenges can be mitigated rather than repeated.
Creating this open dialogue also allows for educators to share tech-tools that are easily accessible and do not include monthly or annual fees to the user or institution.
These forms of dialogue help limit or remove the barriers associated with institutional policies and the need for expensive subscriptions and increase the overall accessibility to technology through smart integration of collaborative technological tools.

TPACK Toolkit: Successfully Unpacking TPACK
Considering the possible barriers and limitations associated with implementing new technologies within the classroom, it is important to mitigate these possible challenges in the planning stages when incorporating a meaningful technology.
It is crucial to **ensure that the tool being utilized does not detract from learning objectives due to burdensome features.** These features include excessive time needed for the educator and students to learn a new technology or platform, excessive fees associated with the tool, or issues with compatibility.
To decrease the likelihood of running into these challenges, it is important to **select a tool that is user-friendly and easily adapted to classroom materials.**

An example of an accessible tool to all classrooms is TEDED. This tool successfully balances the various contexts of the TPACK model. The platform integrates and balances the technological, content, and pedagogical contexts to ensure a meaningful learning process. TEDED provides specified content on a specific area of interest. This content is carefully curated into a concise lesson plan. The content is organized in digestible sections and follows the elaboration theory to ensure that student interaction with the material fulfills pedagogical principles. Educators can easily customize and manipulate the lesson plan to ensure the content fits classroom material relevant to students. The overall process strikes the unique balance suggested by the TPACK model in order to ensure seamless and meaningful integration of technology within a learning environment.
How to improve my Tpack?

- Create a learning and sharing culture where there are opportunities for staff to **develop** their technological skill.

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- Run workshops organised as school but run by colleagues or students who are already at Mastery or better level, to further support their development.

Conclusions and Future Recommendations

The TPACK model suggests the perfect combination of pedagogical, content, and technological competencies in order for educators to provide the most rounded educational experience. The model in alot of ways assumes that providing this level of educational experience can be obtained. However, there are various barriers and obstacles that inhibit the proper integration of technology within the classroom.

As it stands,

- Teachers are constantly being stretched thin to meet curriculum standards,
- Participate in extracurricular activities,
- Overcome institutional barriers, and
- Manage large classes to name a few of their daily burdens.

Teachers need to update their technological skills in a culture where new technologies are being developed and realized. Without this teachers will continue to have a negative perspective on the need or requirement to integrate new technologies into the classroom.
Aside from this demand, teachers who are innovative and embrace the use of technology are faced with institutional constraints including budgetary limitations and a lack of accessibility to technology. This disconnect creates frustration as their efforts to embrace 21st Century Skill building is railroaded.

It is important to recognize that the TPACK model represents an ideal scenario. In order to meet this ideal or come close to achieving this within a classroom, the standards for integration have to be attainable.
Incorporating technologies that are inexpensive or free to the user, as well as ones that are intuitive and easy to learn, are the cornerstone of successful integration of tech-tools within the classroom.
It is important for educators to vet and evaluate technology-based tools before implementing them into their classroom to ensure that learning is optimized through the use of technology rather than simply acting as a hollow expectation.
Moreover, inquiry learning approach, peer-coaching, authentic learning, problem-based learning, project-based learning, and learning activity types were employed in successful **TPACK** professional development programmes for in-service teachers.

SPECIFIC TEACHING AND LEARNING APPROACHES

The strategies outlined below can be used for many teaching and learning situations, with appropriate variations for subject matter (e.g., PCK), for student grade level, for various language-cultural contexts, etc.
Strategies included here are:

i. **Lecturing,**
ii. **Socratic Instruction,**
iii. **Concept Attainment,**
iv. **Concept Formation,**
v. **Cooperative Group Learning**.

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1. Lecturing

Lecture method is the oldest **method** of **teaching**. ... The teacher clarifies the content matter to the students by using gestures, simple devices, by changing voice, change in position and facial expressions. Teachers are more active and students are passive but the teacher also asks questions to keep the students attentive.

Lectures may or may not be effective, however depending on how the teacher crafts the instruction. Some, but not all, students enjoy being told about ideas, have good listening habits and attention span and language comprehension.

Pictures always have a lasting memory and therefore in order not to make lecturing boring, teachers can download related images which are numerous online and add them to their presentations to make them more interesting and deepen understanding.

2. Socratic Instruction

In the **Socratic method**, the classroom experience is a shared dialogue between teacher and students in which both are responsible for pushing the dialogue forward through questioning. The **Socratic method** uses questions to examine the values, principles, and beliefs of students.

The oldest, and still the most powerful, **teaching** tactic for fostering critical thinking is **Socratic teaching**. In **Socratic teaching** we focus on giving students questions, not answers. We model an inquiring, probing mind by continually probing into the subject with questions.

It is common to begin the instructional part of a lesson with an interactive discussion, in which the teacher asks students a series of questions - often based on concrete phenomena and/or a teacher demonstration.

These should be used with somewhat more student-directed activities, however, to consolidate the ideas.

3. Concept Attainment

This is a guided inquiry approach, in which students develop understanding through comparison of phenomena that have common characteristics with those that do not.

The **Concept Attainment Model** is based on the research efforts of Jerome Bruner.

This **model** is designed to lead students to a **concept** by asking them to compare and contrast examples that contain the characteristics or attributes of the **concepts** with examples that do not contain these attributes.

4. Concept Formation

Concept Formation is an inductive teaching **strategy** that helps students form a clear understanding of a **concept** (or idea) through studying a small set of examples of the **concept**.

Concept formation, **process** by which a person learns to sort specific experiences into general rules or classes. With regard to action, a person picks up a particular stone or drives a specific car.

Concept formation is a guided inquiry technique, in which students are asked to examine and classify phenomena *inductively*; that is, from specific instances to general principles. Theories of concepts and concept formation are those which try to understand and explain the principles and ways concepts are formed and how the thinking process as a whole develops.

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The four main steps involved in the formation of concepts. The steps are: 1. Observation 2. Generalisation 3. Discrimination or Differentiation 4. Abstraction.

Step # A. Observation:

The first stage in the formation of concepts is the observation of an event, object or an experience. This can also be called the stage of becoming aware. This can be either direct or indirect. The child can directly see a dog and become aware of it.

On the other hand, he also hears stories about devils and giants from his parents and grandparents; here the awareness is indirect. Thus, all of us have some knowledge or awareness of primitive people (or at least we believe we have) even though most of us have not seen them. Generally repeated experiences provide the basis for the development of concepts.

Step # B. Generalisation:

Repeated experiences or observations of different objects result in a tendency to form a general idea. Thus, a child first sees one dog, then another dog, then a third and so on and begins to form the general idea of a dog. This is called the process of generalisation. The process of generalisation explains how the child acquires many concepts like the concepts of gender, shape, number, etc.

Step # C. Discrimination or Differentiation:

Along with generalisation and the observation and organisation of similarities among things and objects, the child also becomes aware of the differences between them. Thus, all dogs are alike and all cows are alike. Dogs run on four legs and cows also do the same.

At the same time dogs and cows are different from each other and big dogs are different from small dogs, and bulls are different from cows. It is this type of sequential operation of generalisation and differentiation in interaction that leads to the formation of concepts.

Step # D. Abstraction:

From the description of the above processes the operation of abstraction becomes evident. The child has seen dogs and he happens to see a cow on a different occasion. He does not observe them at the same time but inwardly he compares his experiences on the two occasions.

The perceptions and the experiences are now inwardly analysed and re-experienced in the absence of the objects. This results in an appreciation of similarities and differences. This process by which the experience is analysed in the absence of actual situations is known as abstraction. It is abstraction which actually transforms comparable and contrasting experiences into concepts.

Concept formation is one of the basic terms in the theory of cognitive development of Jean Piaget.

The sociocultural theory of Lev Vygotsky seeks to explain persons' knowledge and the process of concept formation in terms of the guidance, support, and structure provided by the elders and the society as a whole, according to its social values and societal principles.

5. Cooperative (Group) Learning

Cooperative Learning, sometimes called small-**group learning**, is an instructional strategy in which small **groups** of students work together on a common task.

Individual and **group** accountability: Each student is responsible for doing their part; the **group** is accountable for meeting its goal.

This is the general term for a variety of approaches that encourage students to share their learning.

According to David Johnson and Roger Johnson (1999), there are **five basic elements that allow successful small-group learning:**

Positive interdependence: Students feel responsible for their own and the group's effort.

Face-to-face interaction: Students encourage and support one another; the environment encourages discussion and eye contact.

***Individual and group accountability*:** Each student is responsible for doing their part; the group is accountable for meeting its goal.

Group behaviours: Group members gain direct instruction in the interpersonal, social, and collaborative skills needed to work with others occurs.

Group processing: Group members analyse their own and the group's ability to work together.

Cooperative learning changes students' and teachers' roles in classrooms.

- The ownership of teaching and learning is shared by groups of students, and is no longer the sole responsibility of the teacher.
- The authority of setting goals, assessing learning, and facilitating learning is shared by all.
- Students have more opportunities to actively participate in their learning, question and challenge each other, share and discuss their ideas, and internalize their learning.
- Along with improving academic learning, cooperative learning helps students engage in thoughtful discourse and examine different perspectives, and it has been proven to increase students' self-esteem, motivation, and empathy.

Some challenges of using cooperative learning include:

- the control of learning,
- managing noise levels,
- resolving conflicts, and
- assessing student learning.

Note: Carefully structured activities can help students learn the skills to work together successfully, and structured discussion and reflection on group process can help avoid some problems.

Why Is Cooperative Learning Important?
Research shows cooperative learning helps to produce:

- Higher achievement.
- Increased retention.
- More positive relationships and a wider circle of friends.
- Greater intrinsic motivation.
- Higher **self**-esteem.
- Greater social support.
- More on-task behavior.
- Better attitudes toward teachers.
- Improved Academics

This type of learning has been highly researched throughout the years and has shown countless times that the concept improves student learning. That includes leading to better grades.

- Higher Level Thinking Skills

One of the key reasons this exposure to a broad array of classmates is important and leads to improved learning is due to the achievement of a concept known as “higher level thinking skills.”

These skills develop through encountering different ways of approaching a problem that vary from one's own. As students work together, they are able to experience the ways in which others think regarding the task at hand. Such exposure then leads to the individual to develop a higher level of thinking than previously possessed.

- Social skills

Cooperative learning encourages a number of social benefits. By working together, students learn more effective communication and interpersonal skills. They learn to listen to each other and to resolve conflicts. Collaborating in this way brings them together as a class, leading to overall better social relations and acceptance among the group.

- Personal Responsibility

Collaborative learning activities greatly increase responsibility in individual students. They know they must take part in some portion of the exercise in order for the entire team to succeed. Accountability is also gained, as students are aware they will feel the backlash from the group if they fail to pull their own weight and to do their part.

- Self-Awareness

Working with others allows for individuals to learn about themselves. Through participation in groups, students are able to discover such things as whether they are leaders, if they listen to others' ideas and if they struggle to share their ideas for fear of ridicule or rejection. Without these types of interactions, such discoveries cannot occur. These experiences also lead to improved self-esteem in students and feeling more confident in their own abilities.

The importance of images and video use in teaching and learning

Given below are some of the reasons why images and videos should accompany all the practices highlighted above should a teacher decide to use them:

i. The majority of people are visual learners.
ii. Pictures stick
iii. Metaphors can provide a language for people
iv. Pictures can accelerate understanding

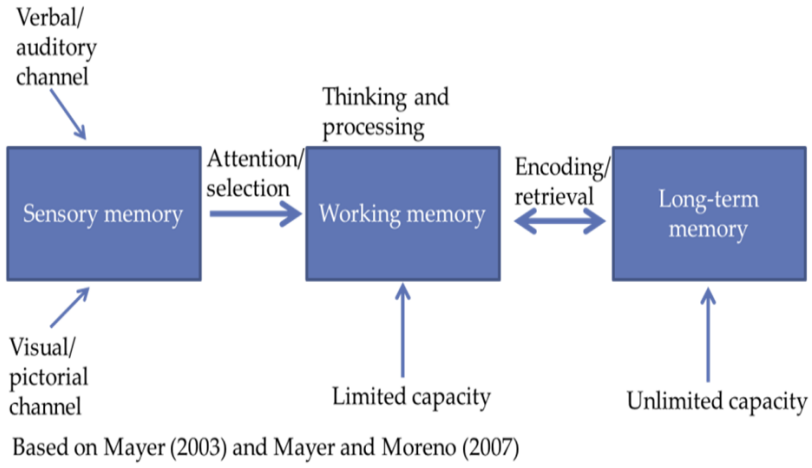
Effective educational videos for teaching and learning

Several meta-analyses have shown that technology can enhance learning and multiple studies have shown that video, specifically, can be a highly effective educational tool for instruction. In order for video to serve as a productive part of a learning experience, however, it is important for the instructor to consider three elements for video design and implementation:

1. cognitive load("**Cognitive load**" relates to the amount of information that working memory can hold at one time)
2. non-cognitive elements that impact engagement(**Non-cognitive skills** cover a range of **abilities** such as conscientiousness, perseverance, and teamwork. These **skills** are critically important to student achievement, both in and beyond the classroom. **Non-cognitive** skills are defined as the "patterns of thought, feelings and behaviours" that are socially determined and can be developed throughout the lifetime to produce value. **Non-cognitive** skills comprise personal traits, attitudes and motivations.
3. features that promote active learning

Cognitive load

One of the primary considerations when constructing educational materials for teaching, including video, is *cognitive load.* Cognitive Load Theory, initially articulated by Sweller and colleagues (1988, 1989, 1994), suggests that memory has several components (see the figure below). Sensory memory is brief, collecting information from the environment.



Based on Mayer (2003) and Mayer and Moreno (2007)

Information from sensory memory may be selected for temporary storage and processing in working memory which has very low capacity. This processing is a prerequisite for encoding into long-term memory, which has virtually unlimited capacity. Because working memory is very limited, the learner must be selective about what information from sensory memory to pay attention to during the learning process, an observation that has important implications for creating and using educational materials.

Based on this model of memory, ***Cognitive Load Theory suggests that any learning experience has three components.***
The first of these is **intrinsic load**, which is inherent to the subject under study and is determined in part by the degrees of connectivity within the subject.
The second component of any learning experience is **germane load,** which is the level of cognitive activity necessary to reach the desired learning outcome – for example to make the comparisons, do the analysis, clarify the steps necessary to master the lesson. The ultimate goal of these activities is for the learner to incorporate the subject under study into a schema of richly connected ideas.
The third component of a learning experience is **extraneous load**, which is cognitive effort that does not help the learner toward the desired learning outcome. It is often characterized as load that arises from a poorly designed lesson (e.g., confusing instructions, extra information). These definitions have implications for design of educational materials and experiences. Specifically, instructors should seek to minimize extraneous cognitive load and should consider the intrinsic

cognitive load of the subject when constructing learning experiences, carefully structuring them when the material has high intrinsic load.

Recommendations for using videos in teaching and learning
Several recommendations about educational videos have been made. Based on the premise that effective learning experiences minimize extraneous cognitive load, optimize germane cognitive load, and manage intrinsic cognitive lead, four effective practices emerge:

a. Signalling
b. Segmenting
c. Weeding
d. Matching modality

Signalling: This is also known as *cueing*, is the use of on-screen text or symbols to highlight important information. In contract theory, **signalling** is the idea that one party (termed the agent) credibly conveys some information about itself to another party (the principal).

Segmenting: Is the chunking of information to allow learners to engage with small pieces of new information as well as to give them control over the flow of new information. **It** means to divide the marketplace into parts, or segments, which are definable, accessible, actionable, and profitable and have a growth potential.

Weeding: Is the elimination of interesting but extraneous information from the video, that is, information that does not contribute to the learning goal.

Matching modality: Is the process of using both the audio/verbal channel and the visual/pictorial channel to convey new information, fitting the particular type of information to the most appropriate channel.

Process	Effect on cognitive load	Examples
Signaling: Highlighting important information	Can reduce extraneous load Can enhance germane load	Key words on screen highlighting important elements Changes in color or contrast to emphasize organization of information Changes in color or contrast to emphasize relationships within information Brief out-of-video text explaining purpose and context for video (e.g., learning objective for video)
Segmenting: Chunking the information	Manages intrinsic load Can enhance germane load	Short videos (6 minutes or less) Chapters or click-forward questions within videos
Weeding: Eliminating extraneous information	Reduces extraneous load	Eliminating music Eliminating complex backgrounds
Matching modality: Using the auditory and visual channels to convey complementary information	Can enhance germane load	Khan-style tutorial videos that illustrate and explain phenomena Narrated animations

Student Engagement

One of the most important aspects of creating educational videos is to include elements that help promote student engagement. Hence videos should be

1. Keep it short.

2. Use a conversational style

Called the *personalization principle* by Richard Meyer, The use of **conversational** rather than **formal language** during multimedia instruction has been shown to have a large effect on students' learning, perhaps because a conversational style encourages students to develop sense of social partnership with the narrator that leads to greater engagement and effort

3. Speak relatively quickly and with enthusiasm

It has been observed that student engagement is dependent on the narrator's speaking rate, with student engagement increasing as speaking rate increases. It can be tempting for video narrators to speak slowly to help ensure that students grasp important ideas, but including in-video questions, "chapters", and speed control can give students control over this feature—and increasing narrator speed appears to promote student interest.

4. Make sure the material feels like it is for *these* students in *this* class

One of the benefits for instructors in creating educational videos is the ability to reuse them for other classes and other academic school years.

5. **Match modality**

While this consideration is important for managing cognitive load, it is also relevant to promoting student engagement. When telling a story, it can be very effective to show the storyteller's face or to show an animation of the story. When solving a problem, videos are particularly helpful, showing students step-by-step with narration how to work through the problem. When teaching about an invisible phenomenon, it can be helpful to provide an illustration. In each case,

providing visual elements that add to the lesson can not only promote student understanding but also engagement with the lesson – for example, showing a video of how insects pollinate flowers in a plant reproduction class.

What research has to say on students' active learning using video
To help students get the most out of an educational video, it is important to provide tools to help them process the information and to monitor their own understanding. There are multiple ways to do this effectively.

- **Use guiding questions**: Lawson and colleagues examined the impact of guiding questions on students' learning from a video about social psychology in an introductory psychology class (2006). Building on work from Kreiner (1997), they had students in some sections of the course watch the video with no special instructions, while students in other sections of the course were provided with eight guiding questions to consider while watching. The students who answered the guiding questions while watching the video scored significantly higher on a later test. What does this mean to you?

- **Use interactive features that give students control**: Zhang and colleagues compared the impact of interactive and non-interactive video on students learning in a computer science course (2006). Students who were able to control movement through the video, selecting important sections to review and moving backwards when desired, demonstrated better achievement of learning outcomes and greater satisfaction.

- **Integrate questions into the video**: Tools like HapYak can allow instructors to incorporate questions directly into video and to give feedback based on student response.
- **Make video part of a larger homework assignment**: Faizan Zubair and Mary Keithly are each part of the BOLD Fellows program at Vanderbilt University, in which graduate students develop online learning materials for incorporation into a faculty mentor's course.

  The important thing to keep in mind is that watching a video can be a passive experience, much as reading can be. To make the most of our educational videos, we need to help students do the processing and self-evaluation that will lead to the learning we want to see. The particular way you do this should be guided by goals of the course and the norms of your discipline.

Summary
Videos can be an effective tool in your teaching tool kit. When incorporating videos into a lesson, it's important to keep in mind the **three key components of cognitive load, elements that impact engagement, and elements that promote active learning**. Luckily, consideration of these elements converges on a few recommendations:

- Keep videos brief and targeted on learning goals.
- Use audio and visual elements to convey appropriate parts of an explanation; make them complementary rather than redundant.
- Use signalling to highlight important ideas or concepts.
- Use a conversational, enthusiastic style to enhance engagement.

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- Embed videos in a context of active learning by using guiding questions, interactive elements, or associated homework assignments.

What are the main purposes of learning in the technologies?
Learning in the technologies enables children and young people to be informed, skilled, thoughtful, adaptable and enterprising citizens, and to:

• develop understanding of the role and impact of technologies in changing and influencing societies

• contribute to building a better world by taking responsible ethical actions to improve their lives, the lives of others and the environment

• gain the skills and confidence to embrace and use technologies now and in the future, at home, at work and in the wider community

• become informed consumers and producers who have an appreciation of the merits and impacts of products and services

• be capable of making reasoned choices relating to the environment, to sustainable development and to ethical, economic and cultural issues

• broaden their understanding of the role that information and communications technology (ICT) has in Scotland and in the global community

• broaden their understanding of the applications and concepts behind technological thinking, including the nature of engineering and the links between the technologies and the sciences

• experience work-related learning, establish firm foundations for lifelong learning and, for some, for specialised study and a diverse range of careers. Technologies: principles and practice

How are the technologies experiences and outcomes organised?
The technologies framework has been organised to offer opportunities for personalisation and choice using diverse contexts for learning. The technologies framework has six organisers, namely:
• technological developments in society
• ICT to enhance learning
• business
• computing science
• food and textiles
• craft, design, engineering and graphics.

The final four organisers are contexts for developing technological skills and knowledge. These organisers recognise the special contribution made by each context for learning, whilst enabling teachers to plan opportunities to reflect individual and local needs. The important purposes of the technologies depend upon effective interdisciplinary working through connections across and between subject boundaries. It is important that teachers do not feel constrained by the organisers but view them as opportunities for children and young people to experience the differing contexts for learning. In secondary schools, teachers of business education, computing, home economics

and technical education will recognise how they can make their specialist contributions within the framework. Schools and teachers will plan different combinations of the experiences and outcomes to provide programmes that meet young people's needs and provide a sound basis for more advanced study within an area of specialism. As in other curriculum areas, the fourth level experiences and outcomes provide possibilities for choice: it is not intended that any individual young person's programme of learning would include all of the fourth level outcomes. Teachers in their planning will use the framework to ensure that children and young people develop their understanding of important themes such as the impact of technology, informed attitudes to technology, sustainability, and social, economic and ethical issues. These will underpin and continually reinforce learning within the technologies. The framework contains some statements which span two levels.

What skills are developed in the technologies?

The technologies provide frequent opportunities for active learning in creative and work-related contexts. Learning in the technologies thus provides opportunities to continually develop, use and extend skills that are essential components for life, work and learning, now and in the future, including planning and organisational skills. Learning in the technologies therefore makes a strong contribution to achieving the aim clearly articulated in Skills for Scotland: a Lifelong Learning Strategy of '…ensuring that Curriculum for Excellence provides vocational learning and the employability skills needed for the world of work and is the foundation for skills development throughout life'. Well-designed practical activities in the technologies offer children and young people opportunities to develop:

• curiosity and problem-solving skills, a capacity to work with others and take initiative
• planning and organisational skills in a range of contexts
• creativity and innovation, for example though ICT and computer aided design and manufacturing approaches
• skills in using tools, equipment, software and materials
• skills in collaborating, leading and interacting with others Technologies: principles and practice
• critical thinking through exploration and discovery within a range of learning contexts
• discussion and debate
• searching and retrieving information to inform thinking within diverse learning contexts
• making connections between specialist skills developed within learning and skills for work
• evaluating products, systems and services
• presentation skills.

What learning and teaching approaches are useful in the technologies?

The experiences and outcomes are intended to tap into children's and young people's natural inventiveness and their desire to create and work in practical ways. They act as a motivation for progressively developing skills, knowledge, understanding and attitudes, and so maximise achievement. Effective learning and teaching will draw upon a wide variety of approaches to enrich the experience of children and young people, particularly through collaborative and independent learning.

What does ICT mean within this framework?

ICT refers to forms of technology that are used to transmit, store, create, display, share or exchange information by electronic means. This broad definition of ICT currently includes such

technologies as media, telecommunications, and computer hardware and software; it also includes equipment and services associated with these technologies, such as videoconferencing, email and blogs.

How can ICT enhance learning and teaching?
ICTs can enhance the quality of **education** in several ways: by **increasing** learner motivation and engagement, by facilitating the acquisition of basic skills, and by **enhancing teacher** training. **ICTs** are also transformational tools which, when used appropriately, **can promote** the shift **to** a learner-centered environment

What is the difference between computing and ICT?
ICT, as defined here, brings together different forms of technologies and applies them to communication and learning, whereas computing, as an area of specialised study, provides deeper theoretical and practical understanding of how hardware and software can be developed and applied in a range of contexts.

Computer science refers to the processes used to create usable computer programs and applications together with all theory behind those processes. Information technology on the other hand refers to the application of computer programs to solve business processes. It is the application of technology in business. Information technology is very vast in terms of scale because it is applied virtually to any type of process that may require automation, from business, scientific research to the music industry, telecoms and banking.

What are broad features of assessment in technologies?
Assessment in the technologies will focus on practical, problem-solving and collaborative activities which enable children and young people to show that they know, understand and can use technological skills and concepts across all the contexts for learning in the technologies.

Teachers can gather evidence as part of children and young people's day-to-day learning, and specific assessment tasks will also contribute to assessing progress.

For example:

• How well do they contribute ideas and suggestions and develop team working skills?

• How well do they collaborate and independently participate in learning activities which lead to products with real uses?

How can I make connections within and beyond the technologies?

Technologies are connected strongly with all other areas of the curriculum, through extending and applying the specialist knowledge and understanding developed in the sciences, through the creative use of technology in the expressive arts, through interdisciplinary learning, for example linking mathematics, science and technologies in an engineering context, and through the use of technologies to enhance learning. In order to foster deeper, more enjoyable and active learning, the technologies experiences and outcomes enable clear links to be made with all other curriculum areas.

Some Key 10 Key Principles for Implementing ICT in Education
Use ICT to Achieve Education and Development Goals

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Technology should be used to address areas where system capacity is poor, schools are underperforming or there are gaps in student learning. A well-designed technology solution can be used to disseminate resources, connect students to information, enhance teachers' practices and students' performance in all subject areas, improve school management and support data-driven policymaking.

Use ICT to Enhance Student Knowledge and Skills
If schooling is intended to be relevant to work and important to a society, success in school should be accompanied by the development of a broad body of knowledge and a complete range of skills—including literacy, numeracy, information literacy and independent-learning skills that contribute to achievement in later life. ICT should be used to help students build these skills.

Use ICT to Support Data-driven Decision Making
Regular and reliable data are essential to planning and policy, financial management, management of school facilities, decisions about school personnel (including teachers) and support for student learning.

Include All Short- and Longer-term Costs in Budget Planning
Estimating full capital and operating expenses of technology projects in schools requires consideration of all equipment and activities needed to ensure that hardware (and software) are installed, operated, maintained, repaired and replaced, and that teachers and other personnel have the skills and resources they need to use their new tools to meet project goals.

Explore Technology Alternatives to Find Appropriate Solutions
The proliferation of new tools and new approaches is accelerating in both developed and developing countries; these innovations challenge project developers to think creatively about emerging opportunities. Program designers should consider alternative ways of meeting proposed educational objectives, including broadcast or other technologies, low-cost/low-power computers, and mobile telephones.

Focus on Teacher Development, Training and Ongoing Support
In-service teacher professional development is frequently among the most important and complex components in an education-technology project. Teachers are essential to student learning outcomes.

Explore and Coordinate Involvement of Many Different Stakeholders
It is vital to engage multiple stakeholders in education technology projects, as they frequently cut across several sectors and entail great expense as well as technical and organizational complexity. Valuable contributions can be made by international and local organizations, including donor agencies, charitable foundations, NGOs, private-sector technology firms and government agencies, in addition to ministries of education.

Develop a Supportive Policy Environment
Establishing policies, plans, and central agencies to shape the use of technology in education can help ensure that initial expenditures and activities support government objectives and that high-impact activities receive ongoing funding.

Integrate Monitoring and Evaluation into Project Planning
Planning (and budgeting) for monitoring and evaluation of education-technology projects should begin during the first phase of project design. In most circumstances, it is important to emphasize using randomized studies and experimental statistics; such methods typically require collecting baseline data or collecting data from control-group samples. Advanced planning, budgeting and preparation are essential if these measures are to be put in place.

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“It takes capacity to build capacity”—System strengthening precedes system transformation

Developing-country school systems rarely have the capacity to effect substantial change in teaching, learning or school operations—whether technology is used or not. Schools and school systems that lack basic levels of management, leadership, teacher professionalism, resources and other core components must build the stable foundation needed for the equitable and effective delivery of public education.

Unit 2: Integration of computers in teaching and learning

Technology integration is the combination of all technology parts, such as hardware and software, together with each subject-related area of curriculum to enhance learning. Technology integration is using technology to help meet the curriculum standards and learner outcomes of each lesson, unit, or activity.

In other words it is the incorporation of technology resources and technology-based practices into daily routines, work, and management of schools.

Technology resources are computers and specialized software, network-based communication systems, and other equipment and infrastructure.

Practices include collaborative work and communication, Internet-based research, remote access to instrumentation, network-based transmission and retrieval of data, and other methods.

TECHNOLOGY INTEGRATION IN THE CLASSROOM

Technology integration is the use of technology tools in general content areas in education in order to allow students to apply computer and technology skills to learning and problem-solving.

The technology should become an integral part of how the classroom functions as accessible as all the classroom tools.

BENEFITS OF TECHNOLOGY INTEGRATION

Top 6 benefits of using technology in the classroom

- Improves engagement. When technology is integrated into lessons, students are expected to be more interested in the subjects they are studying
- Improves knowledge retention
- Encourages individual learning
- Encourages collaboration
- Students can learn useful life skills through technology
- Benefits for teachers

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BARRIERS TO TECHNOLOGY INTEGRATION

What are some of the barriers to integrating technology into the curriculum?

1. Teachers lack the necessary training and skills.
2. Technology integration is a slow process and needs time for integration.
3. Limited time for teacher planning.
4. Effective use of technology requires changes in teaching; in turn, the adoption of a new teaching strategy.
5. Each school needs easy access to professionals with expertise in technology and pedagogy to train the teachers.
6. Evaluation is often the weakest element of technology programs.
7. Lack of technology resources such as computers and specialized software, network-based communication systems for internet- based research, and other equipment.
8. Lack of infrastructure.
9. Lack of administration support
10. Computer placement in remote locations making access difficult.
11. Budget constraints
12. Basic resistance to change by many educators.

CREATING AN INTEGRATED LEARNING ENVIRONMENT

- Integrated classrooms create environments that invite students to fully engage in learning. By bringing together disciplines, people, communities, and institutions in meaningful ways, integration changes the complex of personal, social, and structural factors, which constitute the learning environment. Under these circumstances, learning activities closely resemble their uses in the community outside the classroom. Students expend effort because learning is authentic.
- As an example, instructors of the Dynamic Learning program typically assign students to integrate research writing, reading, communication, and computer usage. However, without motivation to combine these activities, students view integration as an extra, artificial chore. Therefore, the instructors restructure the assignment, making it more authentic, by asking students to use these general education skills to become change agents on issues they find personally meaningful communication are valuable tools for accomplishing their personal goals
- Once we do this, however, almost every aspect of our classroom changes, as well. Students find that they achieve their objectives better in cooperative teams. Time to meet and work in the community becomes more important than time in the classroom. Instructors are transformed from taskmasters to useful guides. Writing, reading, group

communication, and public speaking become practical means to relevant ends. As a consequence of integration, students find that research writing, reading, and group and public

CONCEPTS OF TECHNOLOGY INTEGRATION IN THE CLASSROOM

The Main Concepts of Technology Integration are:

1. **History of Technology**

Digital Technology has moved through four main eras:

Pre micro- computer era- 1950- 1970's,

micro- computer era- 1970- 1990's,

internet- 1990- 2000's

ubiquitous access 2000's to now.

2. **Perspectives that Define its Uses**

Perspectives may vary on technology uses. **There is Educational Technology, defined as a combination of tools and processes involved in addressing educational needs.** Integrating Educational Technology refers to the determination of the appropriate tools and methods to suit a particular scenario. **Instructional Technology deals directly with teaching and learning applications and is a sub set of Educational Technology.**

3. Resources

4. Justification for Technology Use

Technology facilitates and makes processes easier. It does not solve problems altogether. Teachers need to analyse their particular situation and choose what best suits their educational need. Teachers are not creators of technology and technologies are always changing. It is important that the teacher focuses on the lesson that is to be learnt and from this end, choose the appropriate means of integrating technology.

Technology should:

- **Be student centered**
- **Anchor/ situate learning into real life situations**
- **Encourage students to explore**

5. Impact of types of issues encountered on Education Technology

There are issues which impact the use of technology.

Chief among these are **social issues, cultural/ equity issues, educational issues and legal/ ethical issues.** Social issues such as fears associated with misuse and or overuse of technology,

the dangers that can arise from social networking as well as issues such as web viruses, spam, malware and spyware are just a few that impact technology users

Educational issues encountered include

1. Lack of funding- In Jamaica especially, most institutions depend on the private sector for donations.

2. Reliance on distance education- Issues arise out of the introduction of distance learning relating to its practicality in terms of cost and student teacher relationship.

3. Debates on best practices.

Where cultural/ equity issues are concerned, especially in Jamaica, students with special needs for example may get left behind because the appropriate technologies are not available for use in the classroom. There is also the issue of the digital divide, where students in the rural and inner-city areas may not have as much access to technologies except through an evening programme perhaps rather than being integrated in the curriculum.

Technology users may also encounter legal/ ethical issues such as hacking and software piracy. In situations where software is not affordable can be sourced online free, users will be prone to take advantage of this availability and in this instance legal and ethical issues arise.

Educators also face plagiarism in institutions but fortunately there are websites which allow detection of plagiarism and the verification of authenticity.

6. Skills and Literacy needed

The three main user groups of Technology, Teachers, Students and Administration require three different literacy skill sets.

In developing the correct technology for teachers to use, the portfolio requirements have to be determined firstly. Thereafter, the structure is put in place, whether it be on the web, PowerPoint, etc.

The components are then added. The product is monitored for quality control. Based on feedback, revisions are made if necessary.

7. Trends

Technology is fast evolving with this ever-changing world. Each day there are countless advancements in hardware and software; wireless connectivity, high speed communication, developments in portable devices and intelligent applications. Developers are making technology more user friendly and easily accessible.
In the educational sector learning is more flexible as one no longer has to be physically present in a classroom. There now exists technology to facilitate distant learning. Books and libraries can be accessed via electronic means. This is especially advantageous to persons with disabilities and those who have busy shedules. Technology integration engages students and captures their attention. It is able to facilitate collaborative learning. Technology can also engage students by

providing visual aids and real life applications where necessary to compliment the learning experience. Technology is an excellent tool for learning. It eliminates the need for paper in many instances in the teaching of some lessons, storing students' grades, etc.

LESSON PLANNING TO INTEGRATE TECHNOLOGY

Teachers must plan carefully for the use and integration of computers and technologies in the classroom. They must plan how they will teach the curriculum, what areas they need to cover for content, and where they can use technology to meet learning objectives. Whether teachers use one computer, two computers, or thirty computers, however, they must plan how and when to use the computers and how they will enable students to use the computers.

School district administrators must plan carefully for every aspect of curriculum integration, from purchase, to installation, to teacher and staff training. Almost every school district has a detailed technology plan for curriculum integration. A technology plan is an outline that specifies the school district's procedures not only for purchasing equipment and software, but also for training teachers to use and then integrate technology into their classroom teaching.

Develop an Integration Plan

- A plan helps the teacher purposefully select what integrated technology instruction will occur in his classroom. When planning lessons that use technology, teachers must consider the skills and knowledge level required for students to start and complete the lesson successfully. A KWL chart is a helpful planning tool in determining the skill and knowledge level of students prior to beginning almost any project. An instructional model is a systematic guide for planning instruction or a lesson. The ASSURE Model is a procedural guide for planning and delivering instruction that integrates technologies and media into the teaching process.

The following are involved in planning for Technology Integration in the Classroom:

1. Planning Lessons with Technology
2. The ASSURE Model
3. KWL Charts

- Putting It All Together - Creating an Integrated Learning Environment

a. Planning Lessons with Technology

To be successful when integrating technology, teachers must rethink and redesign activities and create new teaching and learning strategies.

New technology tools require new instructional lessons.

Teachers do not have to originate and create technology-enriched lesson plans and activities. They may find a multitude of lesson plans and activities at thousands of educational Web sites.

Many educational Websites provide search engines that allow teachers to locate curriculum-specific lesson plans and activities for almost most curriculum areas

b. The ASSURE Model

The ASSURE model is an ISD (Instructional Systems Design) process that was modified to be used by teachers in the regular classroom. The ISD process is one in which teachers and trainers can use to design and develop the most appropriate learning environment for their students.

You can use this process in writing your lesson plans and improving teaching and learning. The ASSURE model incorporates Robert Gagne's events of instruction to assure effective use of media in instruction.

- The ASSURE model involves the following steps:

i. **A**nalyze learners such as entry behaviour, learning styles and bio data;
ii. **S**tate objectives;
iii. **S**elect instructional methods, media, and materials that will suit lesson;
iv. **U**tilize media and materials;
v. **R**equire learner participation or active involvement; and
vi. **E**valuate and revise i.e. reflect upon all aspects of the lesson.

c. KWL Charts

K-W-L is an introductory strategy that provides a structure for recalling what students know about a topic, noting what students want to know, and finally listing what has been learned and is yet to be learned. K-W-L is also the creation of a 3-column chart that helps capture the Before, During, and After components of reading a text selection. Teachers activate students' prior knowledge by asking them what they already **K**now; then students (collaborating as a classroom unit or within small groups) set goals specifying what they **W**ant to learn; and after reading students discuss what they have **L**earned. Students apply higher-order thinking strategies which help them construct meaning from what they read and help them monitor their progress toward their goals. A worksheet is given to every student that includes columns for each of these activities.

K stands for **Know** i.e. what do students already **know** about this topic?

W stands for **Will or Want** i.e. what do you think students will learn about this topic?
What do I want to know about this topic?

L stands for **Learned** i.e. what have I learned about this topic?

What is its purpose? The K-W-L strategy allows students to take inventory of what they already know and what they want to know. Students can categorize information about the topic that they expect to use.

INTEGRATING TECHNOLOGY INTO TEACHING & LEARNING

As students begin to play a more active role in the learning process, the teacher's role must change. Teachers are transitioning from the conventional lecture-practice-recall teaching methods to being the facilitator of learning. Rather than dictating a learning process, a facilitator of learning motivates students to want to learn, guides the student learning process, and promotes a learning atmosphere and an appreciation for the subject.

To help meet the constant challenge of motivating students to learn, teachers must change their traditional roles to become facilitators of learning. Instructional strategies help teachers integrate technology into a one-computer classroom, a multi-computer classroom, and a computer laboratory.

The following strategies should be used:

1. One-Computer Classroom
2. Multi-Computer Classroom (computer laboratory)
3. Classroom Management Plan

ONE-COMPUTER CLASSROOM

The one-computer classroom is a classroom with one multimedia computer, most commonly used for classroom presentations and demonstrations. The most important advantage of using a computer laboratory is that all students are provided hands-on experience with using computer technology. The computer in the one-computer classroom may be used in the following ways:

1.Administrative tool / Use the Computer as Teacher Tool

Word processor- letters, class notes, quizzes, word searches

Test generator

Attendance and grade book

Communications- e-mail other teachers, join educational listservs

Research tool- educational CDs, Internet

2. Presentation tool (Use the Computer as Multi-media Chalk Board or Flip Chart:

(whole class on TV monitor or overhead or small group on the computer monitor**)**

For teachers: Display notes, quizzes, video clips, etc., Science/math class to create graphs,

charts, Demonstrate computer basic skills/training, Review information/drill facts

For students: Use with oral reports, Show multimedia projects

3. Communication station E-mail other students/classrooms, other teachers, subject experts.

http://www.askanexpert.com Quick Cam to take pictures of students or communicate face to face

4. Information station Use CD-ROM encyclopedia for research, pictures, video and sound clips, etc.

Use Internet to access libraries, projects, databases, addresses, etc.

5. Publishing tool

Monthly class magazine, newsletter, anthologies Classroom journal, Ongoing story center, Brochure for project, Web publishing

6**. Learning center Specific content software to reinforce or remediate skills** (drill and practice) Use templates for student projects

7. Simulation center Use specialized software to create simulations (i.e. Tom Snyder's software)

Form teams of students Students complete worksheet as they work through the program students make predictions.

8. Use the Computer as Cooperative Learning Tool:

(Use for writing, organizing, synthesizing, brainstorming, comparing, contrasting, etc.)

9. Have Students Use the Computer to do Individual Work for Practice or Assessment:

Correct a sentence, Practice typing a pattern

Type part of a final copy for a project - for example: the bibliography or outline for a research paper, Take a quiz

MULTI-COMPUTER CLASSROOM

A multi-computer classroom is a classroom with several computers and will have computers available whenever the students need them, enabling "teachable moments" throughout the day. Many researchers agree that a minimum of three computers in the classroom is needed to ensure that every students gets some time at the computer during a single classroom period -- obviously, the more computers, the better -- especially if the class is large. The number of computers and students in your classroom will determine how large the groups must be or how many rotations of groups it will take for every group (or every student) to have time on the computer. While students are waiting for their group's turn at a computer, they can work on related, non-computer tasks.

For example, some groups may be collecting data, while others are inputting the data into spreadsheets.

1. Create collaborative learning situations-four or five students on each computer. This will be difficult if the computers are lined up tightly along one wall. A better classroom arrangement is to spread the computers around the room using all four walls. This configuration allows room for groups of students to work collaboratively on each computer.

2. Take advantage of small-group instruction by visiting each group individually and guiding. Provide for individualized learning by facilitating the activities of each group.

Multi-Computer Classroom Versus Computer Laboratory

COURSE FACILITATOR: ANTHONY MAWUENA KUADEY

1. Unlike a computer lab, a classroom with several computers will have computers available whenever the students need them, enabling "teachable moments" throughout the day.
2. In addition, students will be able to leave projects that are "in progress" on classroom computers, knowing that other classes will not be using the computers.
3. Computers in the classroom provide more flexibility than going to a computer lab, but less flexibility than having laptops available for students.

CLASSROOM MANAGEMENT PLAN

Classroom management plan involves preventing the frequent occurrence of problems and also responding effectively when problems occur. The most effective decisions in classroom management are based on a clear concept of the Goals and **Intended outcomes that a teacher wishes to accomplish.**

Classroom management plan entails the following:

1. Organization
2. Communication
3. Monitoring
4. Delivery of Instruction

Organization

These are the rules and procedures that should be developed in conjunction with teaching strategies that help students meet their personal and academic needs.

- Arrange seating in a U-shape, rows or a circle, so that you can see and easily move close to students.
- Post a daily schedule and discuss any changes each morning.
- Engage students until you have given clear instructions for the upcoming activity.
- Encourage students to take responsibility for their learning by determining not to do tasks that can be done by students.
- Establish routines for collecting homework, distributing papers, etc.
- Move around the room and attend to individual needs.
- Provide simple step-by-step directions.
- Remind students of key procedures associated with the upcoming lesson.
- Use group competition to stimulate more orderly transitions.
- Develop transition activities--Implement structured activities that help students make transitions between active

2. ***Communication***

Effective communication is the foundation for good classroom management. Communication skills can be divided into two categories: sending and receiving

A. Sending Skills (skills used when speaking to someone):

- Deal in the present. Information is more useful when it is shared at the earliest appropriate opportunity.
- Talk directly to students rather than about them. When teachers do this, students are shown respect, and receive
- accurate information about adults' feelings.
- Speak courteously. This creates positive role models for students.
- Take responsibility for statements by using the personal pronoun ``I." Example: ``when I'm interrupted, I get distracted
- and have difficulty helping other students."
- Make statements rather than asking questions. When dealing with students' behaviors, questions often create defensiveness.

b. Receiving Skills (techniques for becoming a more effective listener):

- Use empathetic, non-evaluative listening. This makes the speaker feel that he or she has been clearly heard and that the feelings expressed are acceptable.
- Use paraphrasing, active listening, or reflecting in order to make the speaker feel heard. This allows the listener to become involved in the dialogue.
- Make eye contact and be aware of nonverbal messages.
- Suggest strong leadership by using body language, facial expressions, and gestures

Monitoring

- Often misbehavior occurs because students find ``acting out" more interesting than a boring lesson or more rewarding than another failure experience. Students may also misbehave when they are not involved in the learning activity, do not understand the task, or cannot obtain assistance when it is needed. The following are useful techniques for responding to minor classroom disruptions:
- Scan the class frequently in order to notice and respond to potential problems.
- React calmly and quickly to a student's disruptive behavior in order to create a positive ripple effect.
- Make positive initial contact with students by praising the positive behavior that competes with the negative behavior.
- Remind students of the classroom rule or procedure that they are not demonstrating.

- Make students clearly aware of the rules and procedures and the consequence for violations.
- Give students clear cues indicating that continuation of a behavior will evoke the specified consequences.
- Employ consistent consequences for misbehaviours.
- Inform students that they are choosing the consequence of their behaviour.
- Use consequences, which are educational in nature.
- When one or two students are being very disruptive, focus other students in the class on their task. Then find a time to talk quietly with the disruptive students

Delivery of Instruction

- Leading educators over the past several years have emphasized that quality of instruction is a key factor influencing students' behaviour and achievement. Response to student misbehaviour is most effective when it maintains or enhances the student's dignity and self-esteem and encourages the student to be responsible for his or her own behaviour.
- Involve students in evaluating their own work as well as your instruction.
- Hand out an outline, definitions, or study guide to help students organize their thoughts and focus their attention.
- Ask the question and give ample wait time before calling on the student.
- Vary style as well as the content of instruction in order to address diverse student learning styles.
- Provide work of appropriate difficulty to complement varying ability levels.
- Relate materials to students' lives whenever possible.
- Be animated, create anticipation, and use activities to catch student interest or increase student motivation to participate.
- Engage student learning through cooperative group work, competitive teams, group discussions, debates, and role playing.

The key to successful technology integration is identifying what you are trying to accomplish within your curriculum. Teachers must consider what the curriculum standards and benchmarks are, identify an appropriate technology, and develop innovative ways to teach a diverse population of learners with different learning styles. A learning style refers to how individuals learn, including how they prefer to receive information, express themselves, and process information.

The conditions necessary in a school to support the integration of technology are the physical facilities, capacity, and conditions, curricular connections, teacher actions and characteristics, student activities, and support.

- The success for teaching with technology depends on the adoption of new teaching strategies. Strategies vary with respect to the level of educands, and the type of subject to

be taught. Initial strategy can focus on encouraging teacher training in new technologies and the provision of hardware in schools. The curriculum identifies a core set of IT capabilities and stresses that applying them across subject areas should develop these. Software packages, Physical facilities, Furniture, and Supplies must also be made available through government funding, PTAs, NGOs and other stakeholders.

It is amazing how much a learning environment can change when technology is added to the traditional classroom! While technology is not essential to creating authentic, learner-centred instruction, it offers a powerful resource for engaging students in authentic experiences, typically increasing both their motivation and their learning. Authentic instructional methods can support the development of creative thinking skills by providing opportunities for students to engage in holistic, complex, and challenging activities that promote learner autonomy and active learning; how directed instruction can support authentic learning; how content standards can be taught through authentic learning experiences; and how technologies could support both authentic learning and directed instruction. In this unit, you will begin to think about designing learning experiences that incorporate digital tools and resources to promote student learning and creativity.

There are three primary roles that the computer can serve: *computer as tutor*, *computer as mindtool*, and *computer as a support for reflection and conversation.* This categorization provides us with a starting point for thinking about different ways we can use technology to engage our students in creative thinking. Although we use the word computer we are not just talking about a desktop or laptop computer. Many of the applications and activities described in this unit are supported by a range of technologies, from handhelds (PDAs), to calculators, and even to some cell phones. And since we often use the web to locate instructional resources, we will also discuss strategies to assist in locating reputable resources that can be used as tutorials, mindtools, and supports for conversations.

THREE PRIMARY ROLES THAT THE COMPUTER CAN SERVE:

- *computer as tutor*
- *computer as mindtool*,
- *computer as a support for reflection and conversation*

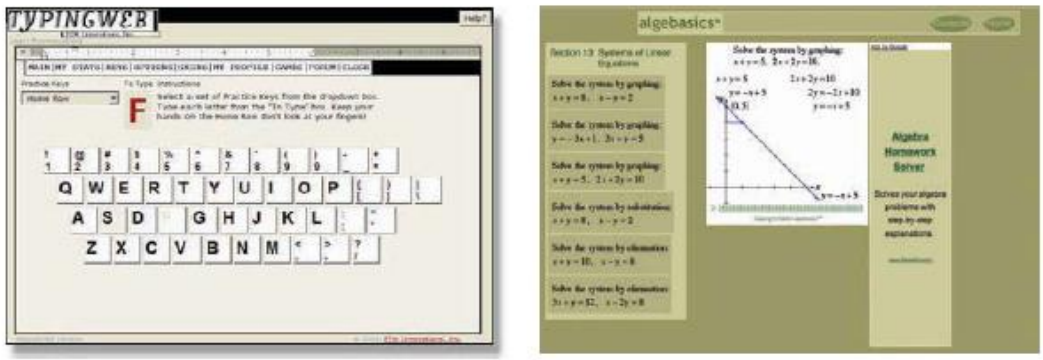
Computer as Tutor

In the role of a tutor, the computer is typically used as a teaching machine, that is, to teach new content to students. If you have ever set up a new computer system using the CD-ROM that comes packaged with it or have worked your way through a tutorial to learn a new piece of software, then you have used the computer as a tutor. Although this role for technology is typically associated with directed instruction in which the goal is for students to master new skills or to improve retention of new information, the tutor model can be adapted to teach more abstract and complex reasoning skills.
In addition, many existing computer tutorials can be used to prompt student inquiry or to frame student discussion and reflection, even though this was not the original purpose for the software program.

Computer-Based Tutorials
Computer-based tutorials typically provide a complete lesson on a specific topic

Including:
1) presenting new information
2) providing practice
3) evaluating student learning

Computer tutorials, especially when delivered via intelligent tutoring systems, have the advantage of being able to provide sophisticated feedback at the level needed by individual students. **An intelligent tutoring system (ITS) is a type of educational software that can track student responses; make inferences about his/her strengths and weaknesses;** and then tailor feedback, provide additional exercises, or offer hints to improve performance. **The software is said to *act intelligently*, not actually to be intelligent. Other names for this type of software include *integrated learning software* (ILS) and *computer-adapted instruction* (CAI).** Because an ITS uses sophisticated language and branching (i.e., sequencing the way information is presented based on students' previous responses), it can promote the kind of creative thinking desired. For example, ***Cognitive Tutor* is a mathematics intelligent tutoring system, developed by researchers at Carnegie Mellon University, to help middle and high school students learn math.** According to the authors (Carnegie Learning, 2006), **Cognitive Tutor provides students with the benefits of individualized instruction, ample practice, immediate feedback, and coaching**. As an intelligent tutoring system, the program combines individualized computer-based lessons with collaborative, real-world problem-solving activities. To get a sense of how this type of software works, try out *Mrs. Lindquist: The Tutor*, an ITS designed to help students learn how to write algebraic expressions for algebra word problems. Pay attention to the type of feedback the software provides when you make an error and you will see how "intelligent" it appears to be.



(a) (b)

Figure 4.1
Computer tutorials cover many subjects, including typing (a) and mathematics (b), shown here.
Source: Courtesy of TypingWeb.com; Mark Basse, Algebasics

With the right teacher input and software design, a computer tutorial can be an effective way to infuse activities that require and develop creative thinking into the curriculum. For example, the teacher can ask students to work in groups around a computer and then when the software prompts them with a challenge or a question, they can discuss the issue together before reaching consensus about what the response should be. Just like a teacher, computer tutorials can initiate or frame a meaningful discussion. Unlike a teacher, however, the software will never be intolerant or

pass judgment on students' responses. When used as intended, computer tutorials provide opportunities for students to learn new knowledge or skills. When used in more open-ended ways, they can provide additional opportunities for students to engage in activities that support creative thinking (e.g., reflection, meaningful conversations).

Computer as Mindtool

Mindtools are computer applications that enable learners to represent, manipulate, or reflect on what they know, rather than to reproduce what someone else knows. By requiring students to think about what they know in different, meaningful ways, mindtools engage students in critical thinking about the content they are studying. By functioning as intellectual partners with students, mindtools enable them to act smarter than they would without the tools. For instance, in order for students to create databases, they must engage in analytical reasoning; in order to create a web page, they must actively construct representations of their thinking. Students cannot use mindtools without thinking deeply about what they are doing.

There are a number of different types of mindtools including databases and concept-mapping tools (also referred to as semantic-organization tools); simulations and visualization tools; and hypertext and hypermedia (referred to as knowledge-building tools). Although other computer applications may also be used as mindtools (e.g., programming software, expert systems, modeling tools), our goal is not to present an exhaustive description of all the possibilities, but to introduce you to the idea of how you can use common software applications as mindtools to promote creative thinking among your students.

Databases and Concept-Mapping Tools

Database and concept-mapping software are computer applications that help students think about, and then communicate, the underlying structure of a content area. Since structure is intrinsic to all knowledge, tools that require students to identify that structure can help increase their understanding of the content. Have you ever made a list of items you want to buy from a supermarket and then organized it by categories in the store so that you could find the items you needed more readily? On a relatively simple level, you structured your list based on your understanding of two things:

1) how the store (content) was organized (e.g., by food types) and

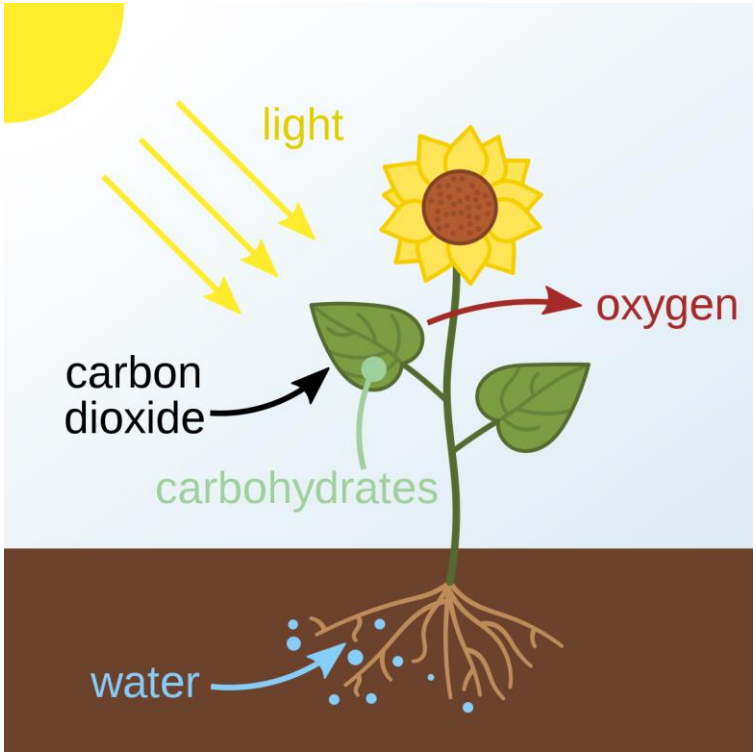
2) how to classify the items on your list into the different categories.

Now, if there were many different ways to classify the items on your list (by quality, supplier, brand names, etc.), and all of them were relevant to your shopping needs, then you would have to think more carefully about how to organize your list.

Databases

Databases are a type of computer software that organizes information. When we use a computer database, we can search for information in a variety of ways and receive the results almost promptly. Although databases are most often used for the purposes of organization and retrieval of information (i.e., as productivity tools), they can also function as mindtools, especially when students are asked to create them. That is because in order to build a database, you must first

understand which relationships facilitate its use and then search for, and locate, the information needed to fill it. This requires the integration and organization of a content domain, which requires creative thinking skills. For example, if you were asked to create a database of all the educational videos available in your school library, what are some of the categories you would use to classify each video? Of course, you would want to be able to locate a video by its title and subject area, and also by grade level. But would it also be important to know the release date or the production studio? And what about being able to relate the information in the video database to information in a teacher database that would allow you to find out if a teacher in an earlier grade level had already used it? As you can see, the planning stage of designing a database is one of the most crucial parts of the process, and it is this aspect that requires students to engage in the creative thinking skills of analysis and evaluation.



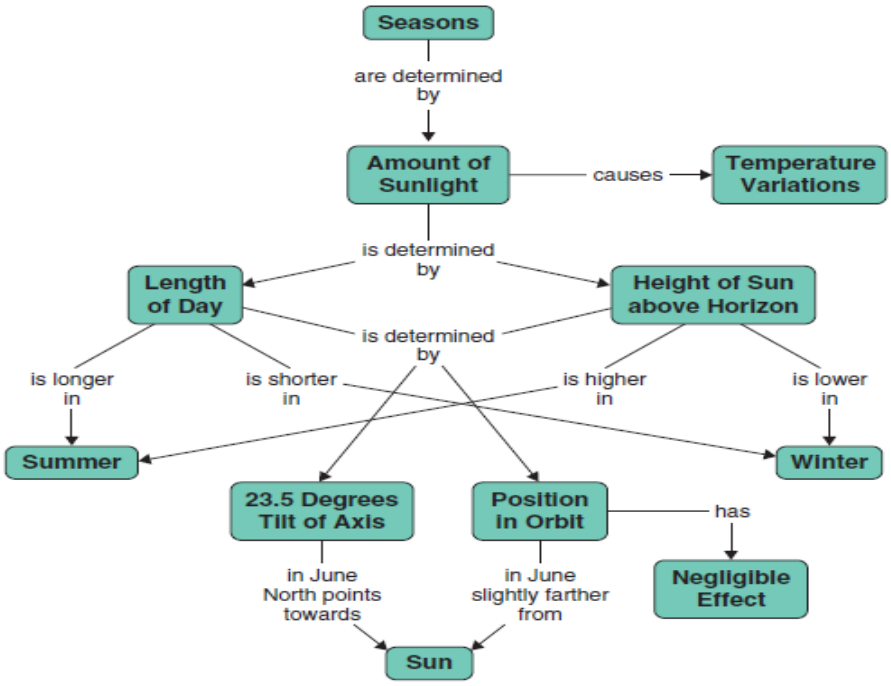
Databases have been used to help students understand the organization of a range of content areas in many subjects and can be used to teach thinking skills. The youngest students probably need help actually developing a database, but you can guide them through the planning process during a group activity. For example, students in a second- or third-grade class can help you classify different types of clip art images you typically use that are then stored in a database. Students from upper elementary grades, and higher, can access, and sometimes add to, a range of databases online.

Collaborative databases are a special type of database that supports a shared process of knowledge building. The goal is to engage students as scientists in the problem-solving process. That is, students generate hypotheses about a given problem situation; gather information through research and observation in order to confirm, modify, or refute their hypotheses; and then seek feedback from others who either collaborate in the investigation or review their published work. An example of this type of collaborative database is the *Knowledge Forum*, formerly known as CSILE (Computer Supported Intentional Learning Environments). To help you understand why this is called a collaborative database, picture an environment that consists of text and graphical

notes, all produced by students, and accessible through typical database search procedures. Students are given a question, search for and find information, and then record it via notes in the database. Other students then comment on the notes and add new notes. Before students can send a message, however, they must label the message using a limited set of categories (e.g., claim, evidence, counterargument). So, for example, if students post an opinion, they are prompted to support that opinion with evidence, an example, or reasoning. Teachers have used *Knowledge Forum* effectively in many different areas of the curriculum.

Concept Maps

Concept maps are "graphical tools for organizing and representing knowledge". For example, the figure below presents a sample concept map about the seasons.



Concepts (e.g., seasons, amount of sunlight) are included inside of circles or boxes, relationships between the concepts are represented by lines or arrows, and labels are used to describe the relationships (e.g., causes, is determined by). The concepts may also be referred to as nodes and the relationships as links. There are many ways to use concept maps: Students can use them to access prior knowledge, to organize and represent current knowledge, and to explore new information and relationships. Creating a concept map involves:

1) identifying the important concepts in a domain of knowledge,
2) arranging those concepts spatially,
3) identifying relationships among the concepts, and
4) labelling the nature of the relationships among those concepts.

Because students have to manipulate information, and think about the relationships among different concepts, creating a concept map encourages convergent thinking. Students are forced to

think about how concepts in a domain fit together and to identify additional ideas or concepts that need to be included. There are a variety of software tools that facilitate concept-mapping including MindMap, Inspiration and Kidspiration, and SemNet. Interestingly, even though Inspiration was developed for teachers and students, many scientists, engineers, and other professionals have adopted it as a powerful way to visualize their thinking.

Visualization Tools

Visualization tools allow learners to picture, or represent, how various phenomena operate within different domains. While these tools are often used to help students visualize scientific phenomena, other tools are available that help students understand other types of phenomena, such as the structure of an argument. For example, computer tools are available that enable students to manipulate complex data sets as a way of gaining understanding of statistical arguments. Graphic organizers are a type of visualization tool that can help learners sort or record information. There are many different types of graphic organizers including data grids, tables, diagrams, flowcharts, storyboards, and Venn diagrams.

Concept mapping tools, described earlier, can also be used as graphic organizers. While most of these organizers have been used long before computers were invented, today we have computer software that can simplify the creation of many of them. For example, the *ReadWriteThink* organization makes a tool available on their website that allows users to create Venn diagrams and the popular *Inspiration* concept-mapping software includes a Venn diagram template. Organizations that create visualization tools often provide a number of descriptions of how their tools can be used in the classroom. Inspiration Software's newer tool, InspireData, is a data visualization tool that allows you and your students to easily map and manipulate data, such as what you might collect from a survey, and then share that information with the concept-mapping software.

Hypertext

Hypertext is text displayed on a computer display or other electronic devices with references (hyperlinks) to other text that the reader can immediately access. Hypertext documents are interconnected by hyperlinks, which are typically activated by a mouse click, keypress set, or by touching the screen. Apart from text, the term "hypertext" is also sometimes used to describe tables, images, and other presentational content formats with integrated hyperlinks. Hypertext is one of the key underlying concepts of the World Wide Web where Web pages are often written in the Hypertext Markup Language (HTML). As implemented on the Web, hypertext enables the easy-to-use publication of information over the Internet.

For over 40 years, technological "solutions" have been offered to the teaching profession in order to improve their effectiveness, ranging from programmed text and teaching machines through to the modern fascination with computers. Areas such as computer-based learning (CBL) or computer aided instruction (CAI) aim to provide some of the functions of the teacher. The technologist's dream, of course, was the provision of a workstation for every learner so that they may proceed at their own pace, and to some extent the dream remains today. However, between the earliest teaching machines and the latest hypermedia environments, there has been a radical shift in prevailing pedagogy, from the repetitive reinforcement schedules of the behaviourists through the cognitivist movement and latterly the constructivists. Each movement has sought to make the technology its own and can make a case for the use of hypertext in its own terms. Within education, hypertext has been seen by some as a valuable new constructivist tool for

supporting teachers and students. The perceived advantages of hypertext as an educational medium are usually ascribed to its nonlinear property. This is often contrasted with the assumed linearity of traditional text, for example: In contrast to hypertext, most standard text documents are constructed to be read linearly, from beginning page to ending page. Hypertext has certainly become a popular term to be discussed about in education, not surprisingly since it is relatively new, technically impressive, and, until the novelty wears off, often fun to use. A brief search of the literature using the search terms *hypertext* OR *hypermedia* AND *learning* will yield over 100 references.

The "hype" in hypertext stands for a structural feature: Hypertext-systems are computer-based systems that consist of nodes and links. Each node contains some amount of text or other information, and the nodes are connected by directed links, suggesting the conceptual model of a graph. A hypertext system provides a mechanism for moving along the links. So, a broader definition for hypertext describes a system of nodes of information through which people can move non-linearly by following the links. Thus, the participation of the reader in the information access process is an important feature for hypertext: "True hypertext should . . . make users feel that they can move freely through the information according to their own needs". Some authors differentiate between hypertext, hypermedia, and multimedia, in the sense that hypertext is text with links, multimedia is synchronized media, and hypermedia is multimedia with links. Differing from this conception, the term "hypertext" is used to refer to the mentioned structural feature of a graph, consisting of nodes and links-regardless of the media that present the information in the nodes.
Considerable interest has emerged in the role that hypertext-systems play in a learning context. Slogans, like that of the "hyperlearning-revolution," appear more and more. The cornerstone of what is claimed to be a hyperlearning revolution is the assumption that, because of its structure, hypertext facilitates active, **exploratory learning**. This means that the learner is engaged through his or her perspective, following his or her interests and preferences. The system encourages inquiry and discovery and so enhances learning. The promises for educational benefits of hypertext are considerable. However, the theoretical and empirical base is (still) relatively weak.

The advantages of hypertext

We usually use the term hypertext to refer to a computerized document displayed on a computer screen. Using hypertext users can explore information in a more flexible way than possible with conventional text. Hypertext is a facility for organizing and linking information in an associative non- linear way. Hypertext systems allow users to move rapidly and flexibly between information sources of various kinds. They are able to learn faster, find information quicker, or put stored knowledge to use more effectively. There are many advantages that hypertexts have compared to paper alone. First of all, the reader can follow hyperlinks at high speed. He can link to more detailed explanations, pictures, from parts of pictures to explanatory text, to reference information or to a glossary.

Some additional benefits of hypertext, that paper documents do not have, are that the hypertext documents can have complex and interesting structures. The document could be structured around diagrams so that the reader has the ability to link from the diagram structure to the text. The

reader can navigate logically, as opposed to physically, around the document, at high speed. Also, the reader can very rapidly expand and contract areas of the document.

Furthermore, hypertext can have intelligence built into it. When a hyperlink is followed rule-based processing may occur, computations may be performed or the document may ask the user questions. The document may assist solving user problems, for example by relating issues to their possible solutions. A hypertext document can adapt itself to the reader. It can indicate what the reader has already looked at; moreover, the document can adapt itself to the likes and skills of the reader. The computer can recognize the reader's skills and the reader can mark whether he liked what he has read.

The user of hypertext can also mark the document in interesting ways. He can use electronic bookmarks, he can indicate what parts of the document he might want to revisit. Furthermore, he can effectively delete what he does not find useful in order to simplify his view of the document, and he can leave annotations anywhere in the document.

Hypertexts are also more flexible than conventional text because they can be designed for ease of updating. With large paper documents, updates sent out periodically are often not inserted, as they should be; to do so is tedious work. With electronic documents the updates do not have to be inserted by the user. They can be distributed electronically, or new disks can be sent out periodically. Additionally, in a hypertext many documents can be linked. Documents may have references to one another that can be automatically followed by the reader. Multiple documents may have hyperlinks to a common glossary, diagram, and sets of concepts or common nuggets of information. Another benefit of electronic text is that documents may include sound, animation, or video. Finally, the cost of digital storage is much cheaper than the cost of paper. Today this cost is realizable only with large documents. A vast amount of information can be stored on a CD-ROM. A CD-ROM can hold the equivalent of hundreds of books and be mass-produced usually for the price of one book.

Disadvantages of hypertext

As we have seen a hypertext system allows non-sequential, non-linear, user-driven access to information. On the other hand, this powerful flexibility can result in problems such as information overload and user disorientation where users feel or become lost in hyperspace. Without a good knowledge of the primary text, hypertext moves may simply disorient the reader. Hypertext systems might promote over- complexity.

Some of the most common cases of user disorientation are when a user does not know where to go next. Moreover, when he knows where to go but does not know how to go there. Also, when a user does not know where he is within the overall structure. Information overload results when the user is swamped with details, which may not be relevant to current needs and can, result from disorientation. There are probably two main ways of overcoming these problems. The first is to develop better navigational tools so that users always know where they are and are given an indication of where a particular link will take them. The second is to introduce users to the hypertext concept gradually. Users should be introduced to smaller; more structured systems so

that they can become familiar with the process of navigating through materials before they progress to larger, unstructured systems.

Although, to a degree, all these problems can be the result of poor system design they are also inherent characteristics of the hypermedia systems. Books are usually read sequentially; from a hypertext page it is often possible to access many pages next. This is of course a simplification, it is quite possible to access a book via an index or to flip from topic to topic, however, printed text is essentially linear and the problems cited against hypermedia are not often levelled at printed material.

Hypermedia

Hypermedia, an extension of the term hypertext, is a nonlinear medium of information that includes graphics, audio, video, plain text and hyperlinks. This designation contrasts with the broader term *multimedia*, which may include non-interactive linear presentations as well as hypermedia.

It is multimedia packaged as educational computer software where information is presented and student activities are integrated in a virtual learning environment. It is a computer-based information retrieval system that enables a user to gain or provide access to texts, audio and video, photographs or computer graphics related to a particular subject. It refers to a kind of software environment that combines the characteristics of both hypertext and multimedia.

Ways to Use Hypermedia in Learning

1. Learners as Audience of Hypermedia: Students use, explore and interact with hypermedia environments developed by others. In these hypermedia environments, students are enabled with non-linear access to vast amounts of information –not only texts, but also pictures, audio and video—by following links to the related topic.

2. Learners as Authors in using Hypermedia: Students develop their own hypermedia projects. The one who creates the hypermedia document learns more about the topic than the one who uses the finished product.

Characteristics of Hypermedia Applications

1. Learner Control

−the learner makes his own decision on the path, flow or events of instruction.
−he has control on such aspects as sequence, pace, content, media, feedback, etc.
−it supports the principle that learning is an active process.

2. Learner Wide Range of Navigation Routes

−the learner has the option to repeat and change speed, if desired.
−the learner may choose the learning activities he prefers.
−the learner can work on concepts he is already familiar with.
−he can develop his technical skills with the computer.

3. Variety of Media

−hypermedia includes more than one media.

Limitations of Hypermedia

Hypermedia does not replace authentic experiences.
It does not and CANNOT replace the teacher in the teaching-learning process.
The computer has zero (0) I.Q. and depends on what man can input or make of it.

Useful Instructional Events with the Use of Hypermedia

- Get the learners attention.
- Recall prior learning.
- Inform learners of lesson objectives.
- Introduce the software and its distinctive features.
- Guide learning, eliciting performance.
- Provide learning feedback.
- Assess performance.
- Enhance retention and learning transfer.

Digital Storytelling

Another popular use of computers as mindtools is through the creation of digital stories. As with other mindtools, digital stories enable learners to reflect, represent, and communicate what they know. Based on the premise of oral storytelling, digital storytelling involves students' creation of a short movie/video that presents a compelling personal perspective. It may be a story from their own experiences, such as describing the importance of a place or how they overcame adversity or from their research as when they "become" settlers in the new world. This can be used in multiple ways such describing how they solved a mathematical problem or handled a troubleshooting experience to resolve computing issues so that others can learn from it. Typically, stories are told from a personal perspective to allow the viewer to see an event, moment, or place from another's point of view; yet effective digital stories also have a theme to which viewers can relate. It has as its basis the writing of a strong personal narrative that begins with a "hook" or "lead" to draw the viewers into the story. They proceed through illuminating specific events or moments in time and conclude with a wrap-up that often is presented in terms of lessons learned.

Throughout the years, digital storytelling has evolved into a recommended series of steps and procedures. Students first develop a personal narrative, then select the most powerful point in their written work to develop into a script. Based on the storyboard, students select images needed to supplement their scripts. Although students may create their own images through digital photography, videotaping, or scanning images, they often select images from those available on the web or from royalty-free clip art collections. The next step involves recording the narration often the most challenging step. Using readily available software such as iMovie or GarageBand on the Mac or MovieMaker on the PC, students arrange their images, synchronize them with their recorded narration, and output the file as a movie.
Some teachers may use more widely available presentation software, such as Microsoft PowerPoint or Apple's Keynote software, for supporting digital storytelling activities, especially with younger students. Presentation software allows even very young students to insert pictures, text, and record audio in support of digital storytelling.

Merits of digital storytelling

As a mindtool, digital storytelling helps students learn to write more effectively through visualizing their stories. As such, it provides authentic, personal learning experiences for your students. Additionally, throughout the process, students learn skills that are important to a variety of content areas such as writing for an audience, researching information, communicating effectively, as well as technology and information literacy skills.

The opportunity to develop a personal story is extremely motivating for students, and the tangible outcome of the process contributes to confidence-building necessary for creative thinking. Students need to be self-directed in their efforts to plan their actions, monitor their progress toward achieving the goals of their projects, and evaluate their efforts. You can help students in the evaluation process by providing them with rubrics in advance that allow them to self-assess their projects. And viewing digital stories can help students identify with the perspective of others.

Computer as a Conversation Support

While the previous sections focused primarily on how the computer can be used to increase individual learning outcomes, in this section we discuss how the computer, as an interactive tool, can contribute to conversations among learners, and thus contribute to group and community learning outcomes. That is, when used as a support and resource for the communicative processes of teaching and learning, the computer can be used to increase creative thinking processes among groups and communities.

In the next sections, we talk more specifically about how the computer can be used to promote collaborative learning outcomes among learners who are both near and far.

Computer as a Collaborative Learning Tool

Imagine two students working at the computer to complete a simulation game, such as the Oregon Trail or Sim City. As the pair work together, they engage in a heated debate about the pros and cons of different decisions. They make predictions about potential outcomes and then, after some discussion, come to agreement about which steps to take next. In this scenario, the computer acts merely as a prompt or resource for students' conversations, and therefore, as a means to illuminate their thinking. It is this use of the computer, as a mediator of conversation, we discuss here. Whereas in traditional classrooms, teachers may have discouraged students from talking to each other during individual seatwork, here we recognize some of the positive outcomes that can result from the conversations that occur among students as they work through complex problem-solving situations. For example, in a study conducted in the early 1990s, Teasley and Roschelle (described in Wegerif 2002), observed pairs of students using a simulation, called the "Envisioning Machine," that was designed to teach Newtonian physics. The authors described how the computer program provided a shared focus, the means to uncover the true meaning of the language used to represent the physics concepts being addressed (velocity, acceleration), as well as the means to resolve conflicts by testing out alternative views. In interpreting the results, the authors claimed that it was the conversation between the learners, as prompted by the computer simulation, which led to the observed learning gains.

When used as a collaborative learning tool, computers are used not only for stimulating effective language use but also for focusing children's learning activities on specific curricular tasks. What seems to be important here is not the computer software, per se, but the quality of the conversation that occurs around it. This, then, prompts us to think about the teacher's role in an "engaged" classroom and how she/he is responsible for supporting high levels of meaningful conversation.

It is important that teachers prepare students to work together effectively, whether around the computer or not. Through these activities, students learn not only to work together, but also to use language as a tool for collaborative reasoning, problem-solving, and knowledge construction. Research suggests that, in combination with the right instructional strategies, the computer can support the development of transferable creative thinking skills.

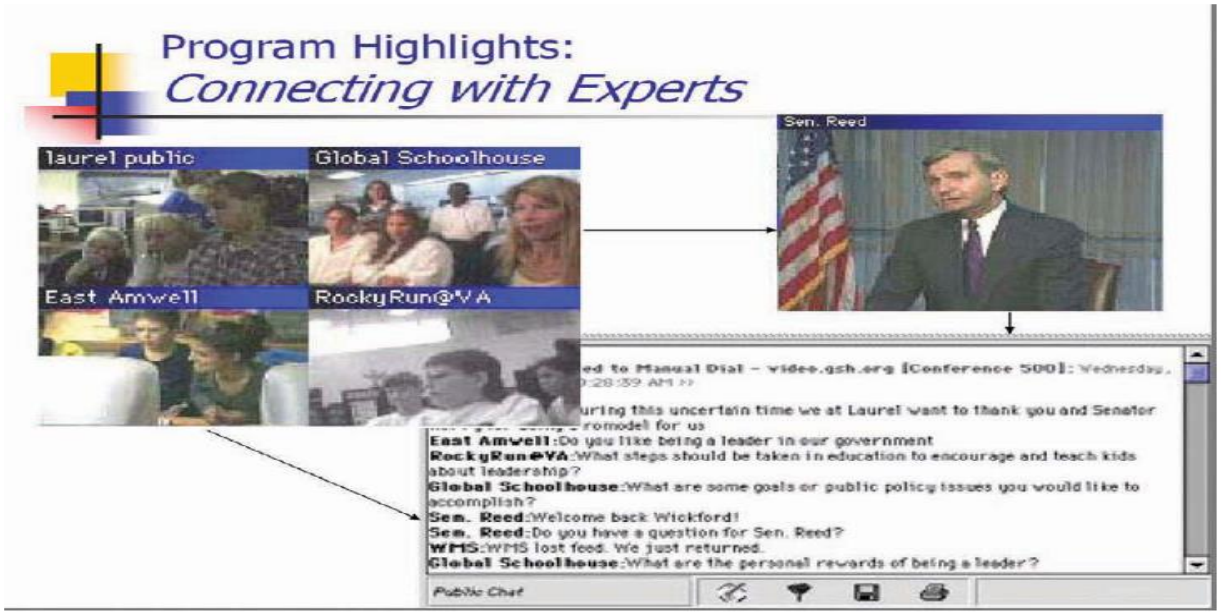
Computer as a Conferencing Tool

Communication in an online forum is different from face-to-face (F2F) communication; in some ways worse, and in some ways better. While we lose important information (facial expressions, body language, tone of voice, etc.), we also eliminate information that can cause bias or prejudice (knowledge of age, gender, disabilities, etc.).

Computer conferencing can open up many new possibilities for participation. There are many claims that electronic conferencing can be an effective support for the development of creative thinking skills.

The reasons for this tend to relate to **1)** the ease with which everyone can participate, and **2)** the ability to be able to think through your responses before responding. Furthermore, having several conversations occurring simultaneously can prompt more metacognitive reflection. Think about the relative ease with which you participate in multiple conversations with your friends using instant-messenger software. Now, put that into a context where you are all focused on making a decision, or solving a problem, and you can see the potential for developing good thinking (as well as communication and management) skills.

There are a variety of ways in which you can use the computer as a conferencing tool with your students. E-mail, listservs, blogs, wikis, newsgroups, and forums all offer additional possibilities. For example, e-pals can connect your students with students in other countries through written exchanges on topics of mutual interest. In a similar fashion, but on a classroom level, Kidlink offers a network run by 500 volunteers in over 50 countries who provide free educational programs related to helping children understand themselves, identify and define goals for life, and collaborate with peers around the globe, individually or through school. Interaction between participants takes place through hundreds of discussion rooms, mailing lists, chat channels, and Kidlink's website. The Global Schoolnet is another example of using the computer to connect students from around the world to explore community, cultural, and scientific issues that prepare them for the workforce and help them to become responsible and literate global citizens.



Additional conferencing activities that can support collaboration among students include those that focus on the joint collection, analysis, organization, and presentation of information. Typically, students at geographically dispersed sites collect local data and then compare and contrast patterns (e.g., related to health, climate, plant and animal species) across locations. This, then, allows students to look for overarching patterns in the data, requiring creative thinking. For example, Journey North engages students in a global study of wildlife migration and seasonal change. Students share their own field observations with classmates across North America. As one example, students followed the migration of the monarch butterfly as it journeyed north from Angangueo, Mexico toWashington, DC. Other seasonal changes that students have helped track include the first frog heard singing and the first maple syrup sap run.

Videoconferencing and Webconferencing

Videoconferencing and webconferencing tools are becoming more affordable and can be found in many classrooms. Videoconferencing tools can connect teachers and students across designated networks designed specifically to support video or increasingly over a high-speed Internet connection. Virtual schools were some of the first schools to employ videoconferencing, especially when the real-time interaction between teacher and student was critical, as when learning a foreign language. Webconferencing tools such as Zoom and Google Meet also offer opportunities for synchronous communication. Often supported by common web browsers, teachers or students can host sessions over the Internet that allow others to view presentations, share documents across computers, chat, or take polls. Some webconferencing tools also support live video through the use of inexpensive web cameras, or webcams. Webconferencing tools vary as to whether they support audio through the computer or whether participants use a phone line. Computer conferencing allows students to engage directly in knowledge creation with others who are not physically present. By providing access to multiple perspectives, students are challenged to think more deeply about the topic at hand. And while it is not intrinsically superior to think together with those outside the classroom, than with those within, it can be more motivating.

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Summary

We described how computer software could serve as a tutor, mindtool, and as a support for conversation. When technology is used as a tutor, the software explicitly teaches or provides practice with a specific body of content. When technology is used as a mindtool, it serves as an organizational tool, simulation and visualization tool, or knowledge-building tool. As a support for conversation, the computer software contributes to conversations among learners, and thus facilitates group and community learning. Since the web is a popular way to access computer-based tutorials, mindtools, and conversation supports, we also discussed techniques for productive web searches and evaluation strategies.

Although there are many ways that technology can be used to promote creative thinking skills among students in your classroom, it should be fairly clear from our discussion that simply using technology will not accomplish this goal. Rather, technology needs to be used purposefully in the ways discussed and in an environment that explicitly supports students' efforts to be good thinkers. For example, computer tutorials, by themselves, will rarely have enough depth to develop students' creative thinking skills, but when used as the basis for a discussion, students can achieve these higher levels more readily. The same is true for computer tools such as concept maps and simulations: effectiveness as a thinking tool depends on how the tools are used. As you can see, the effectiveness of a lesson will depend, to a large degree, on you, as the instructional leader in the classroom.

Some ICT Teaching aids which can be applied on active learning strategy:

1. MOODLE is a learning platform designed to provide educators, administrators and learners with a single robust, secure and integrated system to create personalized learning environments. MOODLE provides many features such as taking attendance were a transparency is maintained in between mentor and learner, quiz can be easily conducted, question bank, learning material can be easily shared and provided to the learner by mentor which is a paper less way. Active leaning strategy mentioned above can be easily implemented in MOODLE.
2. Wikispaces is an open classroom management platform where teachers and students can communicate and collaborate. Wikis support the diverse needs of the classroom, from project based learning, and event planning, to parent communication, and more.
3. Padlet (formerly Wall wisher) is a free application to create an online bulletin board that you can use to display information for any topic. Easily create an account and build a new board. You can add images, links, videos, and more.
4. Google Classroom is a learning management system developed by Google for schools that aim to simplify creating, distributing and grading assignments in a paperless way. It boosts collaboration, and fosters seamless communication to make teaching more productive and meaningful

Innovative trends in ICT Education

1. Mobile Learning. New advances in hardware and software are making mobile "smart phones" indispensible tools. Just as cell phones have leapfrogged fixed line technology in the telecommunications industry, it is likely that mobile devices with internet access and computing capabilities will soon overtake personal computers as the information appliance of choice in the classroom.

2. Cloud computing. Applications are increasingly moving off of the stand alone desk top computer and increasingly onto server farms accessible through the Internet. The implications of this trend for education systems are huge; they will make cheaper information appliances available which do not require the processing power or size of the PC. The challenge will be providing the ubiquitous connectivity to access information sitting in the "cloud".

3. One-to-One computing. The trend in classrooms around the world is to provide an information appliance to every learner and create learning environments that assume universal access to the technology. Whether the hardware involved is one laptop per child (OLPC), or – increasingly -- a net computer, smart phone, or the re-emergence of the tablet, classrooms should prepare for the universal availability of personal learning devices.

- **4. Ubiquitous learning**. With the emergence of increasingly robust connectivity infrastructure and cheaper computers, school systems around the world are developing the ability to provide learning opportunities to students "anytime, anywhere". This trend requires a rethinking of the traditional 40 minute lesson. In addition to hardware and Internet access, it requires the availability of virtual mentors or teachers, and/or opportunities for peer to peer and self-paced, deeper learning.

- **5. Gaming**. A recent survey by the Pew Internet and American Life Project per the Horizon Report found that massively multiplayer and other online game experience is extremely common among young people and that games offer an opportunity for increased social interaction and civic engagement among youth. The phenomenal success of games with a focus on active participation, built in incentives and interaction suggests that current educational methods are not falling short and that educational games could more effectively attract the interest and attention of learners.

6. Personalized learning. Education systems are increasingly investigating the use of technology to better understand a student's knowledge base from prior learning and to tailor teaching to both address learning gaps as well as learning styles. This focus transforms a classroom from one that teaches to the middle to one that adjusts content and pedagogy based on individual student needs – both strong and weak.

7. Redefinition of learning spaces. The ordered classroom of 30 desks in rows of 5 may quickly become a relic of the industrial age as schools around the world are re-thinking the most appropriate learning environments to foster collaborative, cross-disciplinary, students centered learning. Concepts such as greater use of light, colors, circular tables, individual spaces for students and teachers, and smaller open learning spaces for project-based learning are increasingly emphasized.

8. Teacher-generated open content. OECD school systems are increasingly empowering teachers and networks of teachers to both identify and create the learning resources that they find most effective in the classroom. Many online texts allow teachers to edit, add to, or otherwise customize material for their own purposes, so that their students receive a tailored copy that exactly suits the style and pace of the course. These resources in many cases complement the official textbook and may, in the years to come, supplant the textbook as the primary learning source for students. Such activities often challenge traditional notions of intellectual property and copyright.

9. Smart portfolio assessment. The collection, management, sorting, and retrieving of data related to learning will help teachers to better understand learning gaps and customize content and pedagogical approaches. Also, assessment is increasingly moving toward frequent formative assessments which lend itself to real-time data and less on high-pressure exams as the mark of excellence. Tools are increasingly available to students to gather their work together in a kind of online portfolio; whenever they add a tweet, blog post, or photo to any online service, it will appear in their personal portfolio which can be both peer and teacher assessed.

10. Teacher managers/mentors. The role of the teacher in the classroom is being transformed from that of the font of knowledge to an instructional manager helping to guide students through individualized learning pathways, identifying relevant learning resources, creating collaborative learning opportunities, and providing insight and support both during formal class time and outside of the designated 40 minute instruction period. This shift is easier said than done and ultimately the success or failure of technology projects in the classroom hinge on the human factor and the willingness of a teacher to step into unchartered territory.

Unit 3

Multimedia for Teaching and Learning

Multimedia learning is the process of learning, usually in a classroom or similarly structured environment, through the use of multimedia presentations and teaching methods. ***Multimedia*** is the integration of multiple forms of media

Whenever text, audio, still images, animation, video and interactivity are combined together, the result is **multimedia.** Multimedia is a representation of information in an attractive and **interactive manner with the use of a combination of text, audio, video, graphics and animation.**

Multimedia means that computer information can be represented through audio, video, and animation in addition to traditional media (i.e., text, graphics/drawings, images). Multimedia is the field concerned with the computer controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

A Multimedia Application is an application which uses a collection of multiple media sources e.g. text, graphics, images, sound/audio, animation and/or video.

Multimedia learning is often closely connected to the use of technology in the classroom, as advances in technology have often made incorporation of multimedia easier and more complete.

In general, the term "multimedia" is used to refer to any type of application or activity that utilizes different types of media or formats in the presentation of ideas.

Some terminologies
Hyperlink *A* ***hyperlink*** *is a word, phrase, or image that you can click on to jump to a new* ***document*** *or a new section within the current* ***document****.* ***Hyperlinks*** *are found in nearly all Web pages, allowing users to click their way from page to page. Text* ***hyperlinks*** *are often blue and underlined.*

Hypertext *is text which is not constrained to be linear.* ***Hypertext*** *is text which contains links to other texts.* ***Hypertext*** *is text that links to other information. By clicking on a link in a* ***hypertext*** *document, a user can quickly jump to different content.*

HyperMedia is a term used for ***hypertext*** *which is not constrained to be text: it can include graphics, video and sound , for example.* ***Hypermedia documents*** *are simply hypertext* ***documents*** *with multimedia capabilities in addition.* ***Hypermedia documents*** *in general can include many more types of multimedia information than simply images. The* ***most common type of hypermedia*** *is an image link. Photos or graphics on the Web are often linked to other pages.*

HyperMedia is not constrained to be text-based. It can include other media, e.g., graphics, images, and especially continuous media – sound and video.

Difference
Hypertext *refers to the system of managing the information related to the plain text.*

Hypermedia *refers to connecting* ***hypertext*** *with other media such as graphics, sounds, animations*

A Multimedia system has four basic characteristics:

- Multimedia systems must be computer controlled.
- Multimedia systems are integrated.
- The information they handle must be represented digitally.
- The interface to the final presentation of media is usually interactive.

The benefits of multimedia learning:
With regard to education, multimedia learning usually means the use of different types of media to teach a lesson or enhance a lesson with further examples or activities for students.

This type of multimedia learning can also include a teacher seamlessly incorporating video clips or interactive presentation software on the computer into a lesson as well.

Multimedia learning goes beyond passive learning, however, and can also allow students to interact with computer software and video or audio presentations to further enhance their learning.

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Some students, for example, may be able to learn about the human body through lectures and images in books that demonstrate the various systems within the body. For other students, however, the ability to use a computer program that provides a digital model of the human body and how each system is interrelated can be far more powerful.

Especially as the students are able to interact with the model and see each system separately and together from various angles and points of view. This effort to give the tools of learning to students, then allow them to learn in the way that is most meaningful for them, is one of the cornerstones of multimedia learning.

1. **Deeper understanding** .
   According to research, a benefit of **multimedia learning is that it takes advantage of the brain's ability to make connections between verbal and visual representations of content, leading to a deeper understanding, which in turn supports the transfer of learning to other situations**. All of this is important in today's 21st century classrooms, as we are preparing students for a future where higher-level thinking, problem solving and collaborative skills will be required.
2. **Improved problem solving**
   A large percentage of the human brain dedicates itself to visual processing. **Thus, using images, video and animations alongside a text stimulates the brain. Student attention and retention increase**. Under these circumstances, in a multimedia learning environment, students can identify and solve problems more easily compared to the scenario where teaching is made possible only by textbooks.
3. **Increased positive emotions**
   According to psychologist Barbara Fredrickson, experiencing positive emotions makes people see more possibilities in their lives. **Using multimedia during instructions impacts student's mood during the learning process. With a positive attitude they learn better and tend to be more proactive.**
4. **Access to a vast variety of information**
   With computers, tablets, smartphones and the internet, students are today better equipped than ever to search and find the information they need. A study revealed that 95% of students who have access to internet, use it to search for online information. Sharing the information and participating in class discussions is done in a more confident way when access to information is as easy as today.
5. **World exploration**
   There is no surprise here. With the help of multimedia children can explore and learn about places they would never been to. In a geography class, students can explore different cities of the world, the tallest mountains and the most dangerous jungles. In a science class, space and planets exploration is now possible. In a biology class, the dissection of rare animals and different habitats exploration are like a walk in a park for students benefiting of a multimedia learning environment.
6. This is a very user-friendly. It does not need the number of energy users, in this sense, you can sit down to watch the demo, you can read the text and hear the sound.
7. It is a multi-sensory. It uses the senses of many users, while the use of multimedia, such as hearings, see and talk.
8. It is a comprehensive and interactive. Through different media in the process of digital integration. The possibility of interaction easy feedback are greatly increased.
9. It is flexible. Digitalization, this media can easily be changed to adapt to different situations and audiences.

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10. It can be used for a variety of audiences, ranging from one person to the whole group.
11. Creative Industries: the creative industries, including advertising, media and news, they use multimedia fun and interactive way to express their thoughts. Organization of advertising agencies and other creative work across a creative way of information, ideas and news. Path information in an interactive visualization of these ideas, multimedia plays a vital role.
12. The latest developments in the enterprise: technology and multimedia environment has made it possible for entrepreneurs to come up with an attractive company website or presentation, including information about their products and services to the interpretation of text, audio and video.
13. Marketing: construction in the site text, images, video shows the general idea of the product is very popular. To explain the links with the media, social networking sites to promote our ideas is inevitable. Customers can easily visualization and link to website, in a good way to understand the message.
14. Telecommunications industry: Today, everyone is clear Multimedia Messaging Service (MMS). This service makes it possible to audio and video content from our mobile phones to send text. Previously, it was limited to only a certain number of text messages. In the phone's multimedia applications area in 2012 will only increase with the daily development of the function, such as playing music, games, watching movies, and our mobile news.
15. It can be seen in the entertainment industry entertainment: multimedia use one. With the latest technology research and invention, the annual multimedia range has been expanded. We like to see a 3D movie in the cinema theaters and on television – and enjoy the movie special effects would not have been no multimedia possible.
16. Running on a multimedia platform for video games. Multimedia range is the frequent introduction of a wide range of new video game every other day. In short, it can be said that increased consumer support and positive feedback from the range of digital multimedia, and only increase in 2012. Has become more technology-friendly in the world. Network marketing, the popularity of the use of computers, mobile phones and video games is expanding its door in 2012 of multimedia opportunities.
17. Improves over Traditional Audio-Video **Presentations**: Audiences are more attentive to **multimedia** messages than traditional **presentations** done with slides or overhead transparencies.
18. Gains and Holds Attention: People are more interested in **multimedia** messages which combine the elements of text, audio, graphics and video.
19. Multimedia approach facilitates the task of attaining desired teaching **learning** objectives on the path of teaching- **learning** in a quite effective way.
20. Multimedia empowers students to create and design rather than absorb representations created by others.
21. It improves reflective thinking.
22. It also provides students with suitable learning resources according to their learning styles and abilities.
23. **Multimedia** content helps to vary and enhance the learning process, and leads to better knowledge retention.
24. **Educational** video can provide more opportunities for students to engage with the content
25. It motivates students to learn through audio video and 3d animation support.
26. Students around the world can learn from course content made available through video.
27. Multimedia activities encourage students to work in groups, express their knowledge in multiple ways, solve problems, revise their own work, and construct knowledge.

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The advantages of integrating multimedia in the classroom are many. Through participation in multimedia activities, students can learn:

- The value of teamwork
- Effective collaboration techniques
- The impact and importance of different media
- The challenges of communicating to different audiences
- How to present information in compelling ways
- Techniques for synthesizing and analyzing complex content
- The importance of research, planning, and organization skills
- The significance of presentation and speaking skills
- How to accept and provide constructive feedback
- How to express their ideas creatively

The Five Elements of Multimedia

One or any combination of this content can be used to enhance your website or social media platform.

Dynamic elements-video, animation, audio

Static elements-text, graphics

1. Text

As a multimedia option, text can easily be overlooked, but it is still the most fundamental element and most effective way to communicate in multimedia. Text is used as headlines, subtitles, and slogans.

It's purpose is to express specific information or reinforce information in other media.

It involves the use of text types, sizes, colours and background colour.

For example, you can choose the font and it's size and colour to set a tone or project an image, or you can choose the mood you want to evoke with background colour.

Text can make the intended message you want to convey through multimedia more understandable, it can be used as an alternative in case a digital image is not available in a visitor's browser, and other media or related information can be accessed by clicking on text links.

Presentational characteristics of text

- Text is particularly good at handling abstraction and generalisation, mainly through written language
- Text enables the linear sequencing of information in a structured format
- Text can present and separate empirical evidence or data from the abstractions, conclusions or generalisations derived from the empirical evidence
- Text's linear structure enables the development of coherent, sequential argument or discussion
- At the same time text can relate evidence to argument and vice versa

- Text's recorded and permanent nature enables independent analysis and critique of its content
- Still graphics such as graphs or diagrams enable knowledge to be presented differently from written language, either providing concrete examples of abstractions or offering a different way of representing the same knowledge

2. Graphics

Graphics are an important part of multimedia because humans are visually oriented. Images including photographs, illustrations, drawings, clip art, icons or any other non-text elements on a website or in social media are an example of graphics.

Graphics make the multimedia application attractive. In many cases people do not like reading large amount of textual matter on the screen. **Therefore, graphics are used more often than text to explain a concept, present background information etc.**

There are two types of Graphics:

- **Bitmap images**- Bitmap images are real images that can be captured from devices such as digital cameras or scanners. Generally bitmap images are not editable. Bitmap images require a large amount of memory.
- **Vector Graphics**- Vector graphics are drawn on the computer and only require a small amount of memory. These graphics are editable.

There is no movement in these types of pictures.

Still/static pictures typically accompany text to illustrate the point or ideas the text makes.

Photos in a multimedia application go beyond using them just as decoration.

In a multimedia context graphics may consist of slide shows or galleries that a website or social media visitor can view.

They may have clickability that leads the viewer to another element, such as audio or video.

Graphics appear in many multimedia applications providing communication through attractive visual affects.

Ways to Use Graphics for Learning

Virtually everyone has an opinion on how to use graphics in their training materials. The criteria most people use for selecting visual elements is typically based on surface features—things like style, colouring, degree of realism, etc.

It is much more important for a graphic to clearly communicate your message regardless of how it looks.

Representational graphics are used to represent the actual appearance of something. These types of visuals are best for presenting things learners will encounter when transferring their learning to actual tasks.

3. Animation

Animated elements are common multimedia applications. Animation is a series of images put together to give the effect of movement. In multimedia, 2D and 3D digital animation is used. Movement, rather than just viewing a still image, is especially useful for illustrating concepts that involve movement.

Animation is used to add visual interest or bring attention to important information or links.

It can illustrate how things work or present information in entertaining ways. Animation can also include interactive effects allowing visitors to engage with the animation action using their mouse and keyboard.

Animation is a dynamic and media-rich content that stays within one container on a page – a very powerful form of communication.

Animation is a process of making a static image look like it is moving.

An animation is just a continuous series of still images that are displayed in a sequence.

The animation can be used effectively for attracting attention.

Animation also makes a presentation light and attractive.

4. Audio

Sound can enhance your website design and social media platforms. It is a multimedia application that uses dialogue, recorded narration, music and sound effects. These are called the audio or sound elements. .

Featuring related music and special sound effects are also very effective multimedia applications that can add to the visitor's experience.

A multimedia application may require the use of speech, music and sound effects. These are called audio or sound element of multimedia. Speech is also a perfect way for teaching. Audio are of analog and digital types. Analog audio or sound refers to the original sound signal. Computer stores the sound in digital form. Therefore, the sound used in multimedia application is digital audio.

5. Video

Video is a visual multimedia application that combines a sequence of images to form moving pictures and sound.

The video can stimulate interest and if it is relevant information on the other pages, and not too far. Video of one of the most compelling reasons, may be its dramatic ability to induce emotional responses from individuals.

Video can have an impact on websites and on social media platforms in a very unique and powerful way. You can inform the world that your company exists, spread the word about your company, grab attention to show your visitors how to do something, showcase a new product, build brand awareness, or even promote an upcoming event.

Why teach with video? Benefits of video

1. **When students have access to video content to watch outside of class, class time can be used for comprehension checks, discussion, and reinforcement of content.**
2. **Multimedia content helps to vary and enhance the learning process, and leads to better knowledge retention.**
3. **Educational video can provide more opportunities for students to engage with the content.**
4. **Students around the world can learn from course content made available through video.**
5. **Video can sometimes demonstrate complex ideas and access other times and places better than speaking can.**
6. **Video can help instructors overcome limitations like large class sizes and limited time.**

What can we do with video?
Instructors can use video to provide supplemental materials for their students. This can help reinforce content and give students resources to prepare for assessments.

NOTE: Flipped classroom is a "pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter"

Many teachers have benefitted from using video to flip their classroom. A flipped course is one in which students absorb new material largely outside of class time. Instructors benefit from flipped classrooms. When a course is flipped, teachers have more time available to engage with their students, rather than racing through introductions to new content. Once an instructor has created or found a suitable video content, they possess a permanent library of learning resources which can be reused for new students in various learning contexts. Students benefit from flipped classrooms. In a flipped course, students have more opportunities to engage with their instructor and peers. Students also can take greater ownership over their education, and are allowed a level of flexibility that is unavailable in traditional class structures. Massive Open Online Courses, or MOOCs, are created largely through video. These courses consist of a series of learning modules that explain content, punctuated by comprehension checks at the end of each section. They are valuable for students around the world learning in diverse contexts.

How is video best used in the classroom?

A. Video may be used at the beginning of a unit to whip up interest, during a unit or lesson to bring demonstrations into the classroom that might not otherwise be possible, or as a means of reviewing or reinforcing content.
B. Supporting students to engage with video as active learners requires creating the right setting for such learning to occur.

The following are suggestions of positives to look for when evaluating videos:
• Variation in the presentation

• Humor
• Age-appropriate narration and developmentally-appropriate thinking skills
• Chunking, or organization in sections
• Provision of meaningful examples
• Posing of open-ended questions
• Opportunities for students to carry out individual thinking
• Opportunities for extension
• Teacher guides outlining possibilities for previewing or extension activities.

Identify some constraints in using multimedia in the classroom or disadvantages using multimedia

- Technological resources, both hardware and software
- Technological skills, for both the students and teacher
- Time required to plan, design, develop, and evaluate multimedia activities
- Acquiring the resources are very expenses
- The expense associated with quality projectors or computers for every student can be quite high, and the number of images and videos in a lesson can slow down the delivery and pace of the class as a result.
- Student access to computers at home may also cause problems, and varying quality of student electronic devices can create inequity in projects and presentations. When designing a multimedia learning experience, the role of the teacher shifts from instructor to facilitator.
- If a lesson allows students to complete learning at their own pace as they move through stages of learning, classroom management becomes increasingly difficult. This is particularly true if students work in groups to view multimedia sources or share computers.
- Additionally, students who are not as proficient with technology may have to spend more time learning computer skills to access information than focusing on course materials.

Outline the new ways of using multimedia in classroom as suggested by educators

Personalized Learning using Multimedia Resources*:*

Multimedia resources help different learners meet their learning needs. As we know, different students have different learning styles, educators can easily provide them with suitable learning resources using multimedia.

Educators use YouTube to provide visual learners with online videos, podcasts for auditory learners and interactive games for tactile learners.

Multimedia resources make everything easy for students to learn in their comfortable learning style.

Unlike traditional approaches, in which only the teachers used to lead the entire classroom delivering long lectures at the same pace, the use of multimedia results in personalization of learning.

Group Learning:

Multimedia tools such as blogs, social networks and wikis enable students to work together in learning a particular concept.

Students use these to share their works with others, give feedbacks on others' works and discuss among others a particular topic.
It can be done through either blogging or micro blogging (Tweets).
Using these multimedia tools, educators can engage students in several works and watch them collaborating with each other, peer assessing each other's works and learning as a group.

Improve Presentation skills:
Using storyboarding, videos and slideshows is a great way to improve student learning, because it allows them to engage with text in a very visual way aided by multimedia.
Multimedia tools enable students to express their ideas and works in concise ways that capture the attention of the audience and they develop an ability to communicate thoughts and concepts through a variety of resources, including text and recorded narrations.

Giving students a wider choice of software and tools to present their work is an effective approach as it allows learners to decide on the style of presentation that best suits their personality. This is also a way to allow the learners to engage in their education in a more personalized way and also improve their creativity, critical thinking and reflective thoughts.

Multimedia storage
Multimedia storage is an important concern in developing multimedia products because a huge amount of storage is required due to the presence of streaming media like audio and video, in addition to static media. Even static media like images consume a substantial amount of memory space. There are two aspects of storage, namely, **devices for storage** as well as storage of data in **databases.**

They are the data **storage devices** that are used to store the data. Usually, multimedia storage is thought of in terms of what types of items the storage unit will hold. The secondary **storage devices** are usually as follows: hard disk drives this is the most common type of **storage device**. The other ones include the floppy disk drives, the CD ROM, and the DVD ROM. The flash **memory**, the USB data card etc.

Unit 4

Knowledge and Skill in Lab Management

After reading this unit you will understand

- The term computer lab
- Evolving technology and evolving classroom
- Consideration for setting up a computer lab
- Computer laboratory design
- Maintenance and management of computer lab
- Managing instruction and behaviours in the computer lab
- Duties of a computer lab tutor
- Computer lab safety rules for teachers and students

Introduction

With the development of learning technologies in the late 20th century, education system has changed rapidly. This is due to the capability of technology to provide a proactive, easy access and comprehensive teaching and learning environment. Nowadays, ministries of education all over the world encourage the provision of a lot of facilities and training in order to enhance the use of advanced technologies in the countries' teaching and learning process.

A high budget has been placed in order to provide the equipment needed by teachers to improve the education system. Despite all the efforts, most of the countries are facing similar problems whereby the teachers are not maximizing the usage of the technology provided. This has become a serious matter as many previous researches have proven the usage of ICT in teaching and learning process could improve students' achievement. Many, researchers have taken an effort to analyse the factors that affecting teachers' acceptance of ICT usage in the classrooms. It shows that, the major barrier of the implementation was the teachers' belief as the teachers are the persons who implement the change in their teaching and learning process. Moreover, previous research shows that the correlation of teachers' belief and the use of ICT are high. Teachers' role is getting more important especially in usage of ICT in pedagogy which could increase the achievement of the students, their creativity and thinking skills.

What is a computer lab?

A computer lab is a space which provides computer services to a defined community. Computer labs are typically provided by libraries to the public, by academic institutions to students who attend the institution, or by other institutions to the public or to people affiliated to that institution. Users typically must follow a certain user policy to retain access to the computers.

This generally consists of the user not engaging in illegal activities or attempting to evade any security or content-control software while using the computers. In public settings, computer lab users are often subjected to time limits, in order to allow more people a chance to use the lab, whereas in other institutions, computer access typically requires valid personal login credentials, which may also allow the institution to track the user's activities. Computers in computer labs are typically equipped with internet access, while scanners and printers may augment the lab setup.

Computers in computer labs are typically arranged either in rows, so that every workstation has a similar view of one end of the room to facilitate teaching or presentations, or in clusters, to facilitate small group work. While computer labs are generally multipurpose, some labs may contain computers with hardware or software optimized for certain tasks or processes, depending on the needs of the institution operating the lab. These specialized purposes may include video editing, stock trading, 3-D computer-aided design, programming, and GIS. Increasingly, these have become the main purposes for the existence of traditional desktop-style computer labs, due to rising ownership of inexpensive personal computers making use of the lab only necessary when the expensive, specialized software and more powerful computers needed to run it are required.

Evolving Technology, Evolving Classrooms

Technology has impacted every facet of daily life and educators are responsible for teaching the next generation how to harness the power of computers across numerous fields, such as graphic design, accounting, computer animation, engineering, architecture, math, and programming. Students are no longer simply learning basic word processing. They are now using professional-grade and industry-standard software programs, designing apps, and preparing for a dynamic and computer-rich post-graduation experience. As a result, computer labs themselves have evolved to meet both the specific demands of technological hardware and classroom layouts required by the teachers. Different academic disciplines require different lab layouts — some are more traditional with workstations in lecture rows, others need partitions to ensure testing privacy; others have students working in small groups, while still others need flexible work areas for project planning.
The layouts are as varied as the subjects taught, as are the specific needs of conutry, teachers, and the actual physical space.
The following pages introduce you to some of the many possible technology layouts which will hopefully initiate a conversation or kick-start thinking about what might work for your programs, teachers, and students. We shall look at layouts for as many different computer lab classrooms as you may want to have, and show you how our furniture allows for growth, reconfiguring, and the evolution of technology itself so an institution’s investment will last for years.

Considerations for Setting up a Computer Lab

When planning your computer labs, considering the following questions will help in designing the best rooms for your school.

Building considerations

- What is the size of your new or existing learning space?
- How many students will be utilizing the space?
- Will power be accessed from the floor, the ceiling, the walls, or from the furniture itself?
- Are there doors, windows, columns, heater vents, and other items that need to be designed around?
- Are dimmable lighting or light-blocking window treatments required for some classrooms?

Classroom considerations

- Will computers or technology equipment be placed on top of work surfaces, or mounted below?
- What items will be used individually or shared? How many are needed? Computers, CAD stations, tablets?
- Do the lessons emphasize students working independently or as part of a group? What size groups?
- Will students gather at a staging area, or a central location, before breaking into groups for project work?
- Are accessories like monitor arms, CPU holders, or keyboard trays desired?

Teacher considerations

- What type of desk does the instructor need? A desk with student meeting space? Built-in outlets or accessible power?
- Will the teacher present lectures, requiring a bookstand, or is all instruction collaborative — or is there a blend of the two?
- What type of technology will the instructor employ regularly? Whiteboard, computer, or projection technology?

Student considerations

- What age are the students? Five, eleven, seventeen? What seat or workstation heights will work best?
- Do students have backpacks or other materials with them that require classroom storage?
- Can students see everything clearly? From the population's average height, are their sight lines clear?
- Do students have portable devices that require charging?

When planning your computer labs, considering the following questions will help in designing the best rooms for your school.

Computer Laboratory Designs

Many schools use computer labs to allow student access to the software necessary to complete coursework and learn ICT. Computer labs are also used to instruct students on computer use, programming, and related subjects. However, many institutions give little thought to the design and layout of the lab. Too often, they simply fill a room with computers and set up the machines any way they fit inside the room.

Why Computer Lab Design and Layout is Important

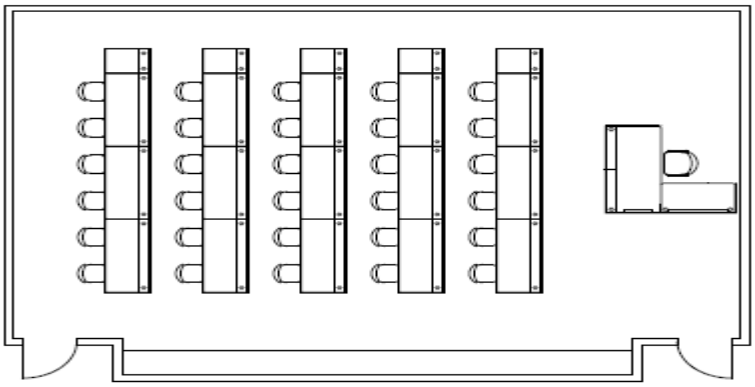
Computer labs must be designed intelligently and serve the purpose they were intended to serve. Imagine if parking lots did not have lines telling you where to park and everyone just drove in and parked wherever they wanted. Soon no one would be able to enter or exit. The lines in parking lots create important rules about how you should park in the lot. Similarly, the design and layout of a computer lab creates rules and defines how the lab can be used. Thought given to the layout

of a computer lab dictates the usefulness of the lab and increases user satisfaction which justifies its expense and assists in future investments in upgrades. Certainly, the layout of the lab depends on the equipment, the furniture, and space available.

The classic classroom computer lab design

The classic classroom computer lab design serves as the default layout in many High School and Colleges. However, it does have two major advantages. First, it serves as a great instruction room where students learn computer topics from an instructor at the front of the room.

With everyone facing the same direction, it allows instructors to see the faces of the students with which to read non-verbal cues as to whether students are learning the material or need more help. Second, it is similar to the layout of other classroom environment emphasizing that the students are there to learn.

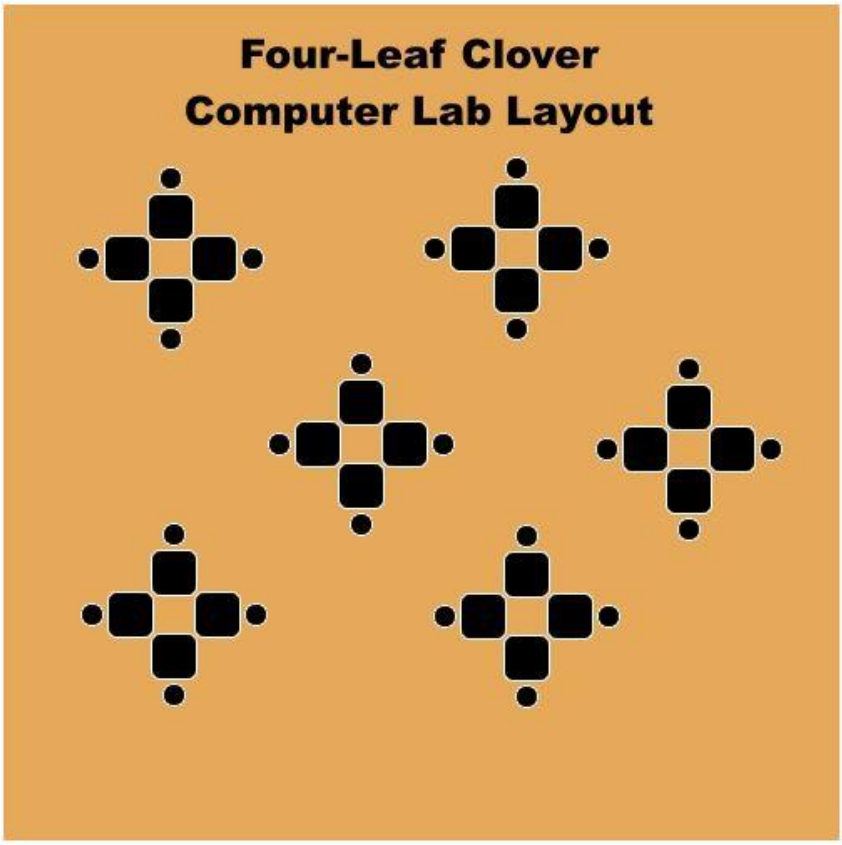


One disadvantage of the classroom layout is the need to disturb other students along the rows of computers as students enter and exit the lab. For labs where students are coming and going, the classroom layout is not ideal. In addition, the classroom layout is not conducive to team work. It

is difficult for students to work together, especially on collective projects and in peer-assist teaching models.

Four-Leaf Clover Computer Lab Layout

The four-leaf clover design offers the most privacy for students and reduces to a minimum the possibility of cheating during tests or exercises. It also eliminates the need for students to disturb others when entering and exiting the lab and allows instructors to go from student to student to address individual problems and concerns.

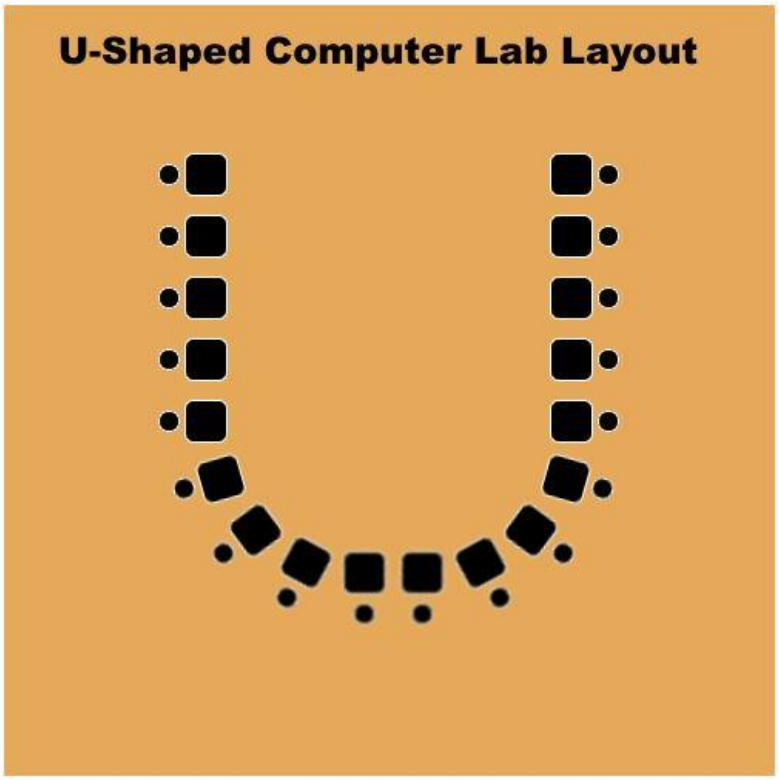


One disadvantage of the four-leaf clover design has to do with attention spans. When students are sitting at their own computers, instructors will not be able to see what each student is doing at his/her workstation. Students may not be paying attention to lessons or may be surfing to inappropriate websites in labs equipped with Internet access. Four-leaf clover designs can also be more expensive if each computer sits on its own table. Some computer lab furniture is made specifically for this design offering space for four computers on one table or desk.

U-Shaped Computer Lab Designs

The U-shaped computer lab layout encourages engagement between instructors and students. Instructors can enter the U and engage with students one-on-one. This design also serves as the

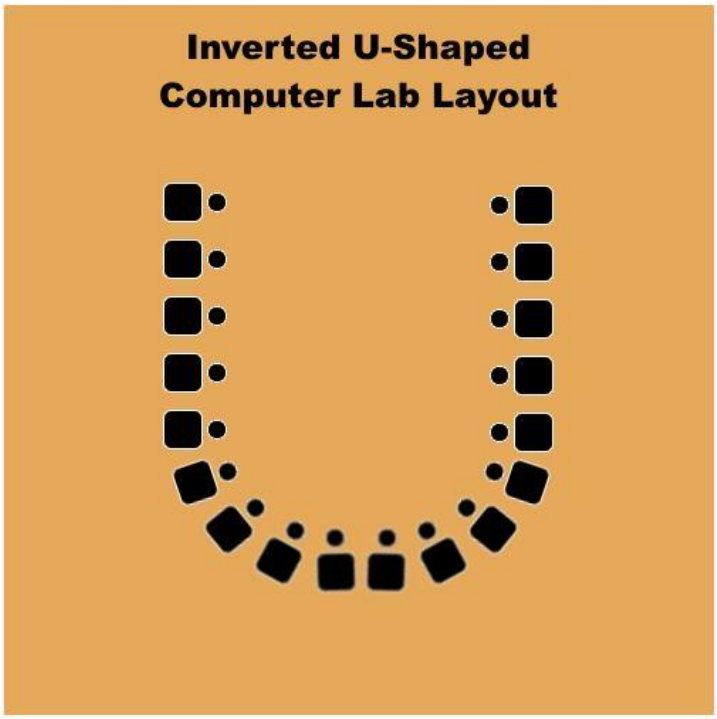
most conducive layout for computer maintenance as technicians do not have to disturb others to gain access to the computers. In addition, students will not interfere with other students' work while entering and exiting the lab.



Unfortunately, the U-shaped design offers little opportunity for instructors to monitor what students are doing and looking at on their monitors. This design is not compatible with test taking and requires many assistants to monitor students. Furthermore, this design often takes up more space that other layouts.

Inverted U-Shaped Computer Lab Layouts

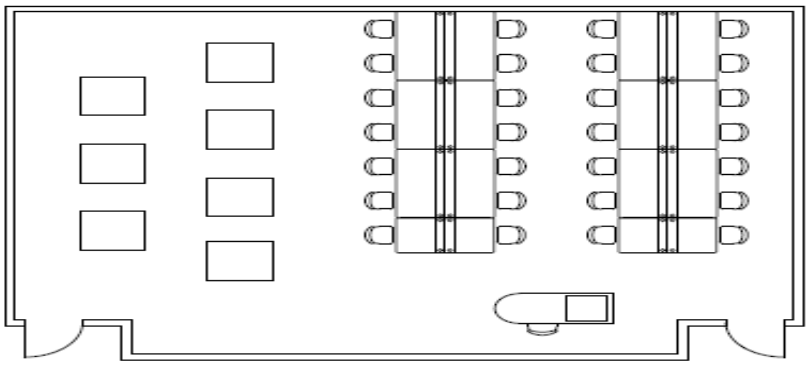
Like the U-shaped layout, the Inverted U-shape also offers engagement between instructors and students. In addition, the layout allows for the most convenient method of monitoring students. For individual learning, this layout minimizes the distance instructors must walk to move from workstation to workstation and student to student.



Like the classroom layout, traffic into and out of the Inverted U-shape can become constrictive especially when all of the students must enter and exit at the same time. This congestion is reduced if students are entering and exiting individually as in an open lab paradigm where students can come and go as they please. In addition, this layout takes up the same amount of space as the U-shaped design. If space is not a consideration, either of the U-shaped layouts is appropriate.

Back-to-back computer lab design

Back-to-back layouts are similar to classic layouts, but allow many students to fit in a relatively small space. Often, these labs have split uses — one area for non-computer-based work, and another for working with technology. Teachers might not do much teaching because some students may be facing away from them, but the students do have the ability to easily interact with fellow classmates.



Back-to-back labs fit courses where students work primarily on their own, at least for part of the curriculum, such as computer animation, drafting, fashion design (note the sewing carts tucked under the worksurface in the middle image), or a research lab.

There are many options when designing the layout of a computer lab. The key is to make sure form is following function. Thought and planning at the beginning of designing the lab ensures that students and instructors are satisfied with what the lab offers. Choosing a sub-optimal layout can negatively affect student learning and reduce the engagement between instructors and students.

Maintenance and Management of Computing Laboratories

Computing laboratories are increasingly used in schools and other educational institutions. To keep these laboratories in working conditions is a challenge, especially considering the lack of people with the needed expertise. Most of the schools in Ghana lack laboratory aides to assist in the care and maintenance of the computer laboratories in schools. Only a few of the labs in Ghana can boast of aides. Therefore, where the teacher acts as the technician/aide, it is proposed that whilst minimizing downtime due to factors such as external attacks, failures in software components, bad configuration of the system or its applications and the lack of preventive

maintenance of hardware, we carry out these protocols to keep the labs safe and in good working conditions at all times. It considers that the hardware, operating system and main applications of these laboratories is fairly the same. Tasks needed to install and manage such a computing laboratory are crucial for the institution.

Computer labs, or computer clusters, give many students and teachers access to computer programs and the Internet. Schools and public libraries set up computer labs that contain a large quantity of computers, printers, scanners and other equipment. These computers are usually hooked up to a central server and maintained by an IT person. Lab computers are used often by students with varying degrees of computer training and expertise. This means they are at risk from viruses, corrupt files, spyware and malfunction. You must maintain lab computers regularly in order to ensure that they do not crash prematurely. Computer lab maintenance procedures may differ slightly depending upon whether you have Apple or PC computers. Read more to find out how to maintain lab computers.

The following are a few guidelines for maintaining the computer laboratories:

1. Establish the perimeters of your computer lab according to your organization's rules. You may need to decide what search terms or websites you want to deny to your lab users if you are connected to the internet. You will also want to establish the criteria for your firewall.

2. Seek the help of an IT service, if you are not so technically knowledgeable about computers. Ask the students to seek the help of the administrator/teacher if they have a problem.

3. Post a "Computer Lab Rules" sheet that clearly states computer lab restrictions. These may include prohibition of food and drink, downloading software, opening attachments, removal of equipment, access to illicit sites and more. Many labs maintain that anyone caught breaking the rules is removed from the premises.

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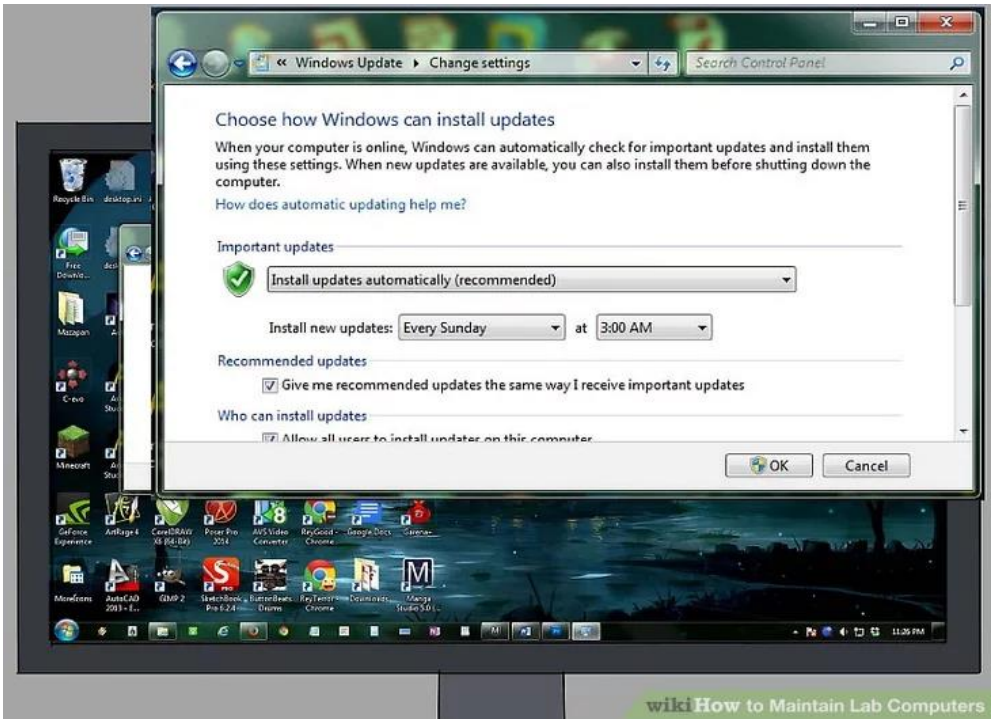
4. Plug all your computer equipment into a surge protector. Spikes and surges in electrical power can break or damage electrical equipment, as well as lose lab users' data. This is especially important in country computer labs and places that are prone to lightning storms. Use UPS to protect lab equipment.

5. Set up a firewall. This is a protections system for your computer lab. Choose a network layer firewall that will deny access to sites or programs that do not fit into the acceptable criteria you have chosen.

6. Set up weekly updates or automatic updates for your lab computers. Many computer programs, such as Microsoft Office Suite, update their software and protection regularly. You will want to schedule these updates for a time when the computers are not in public use, and you may be able to do them from 1 central computer.



7. Install an anti-virus program on the computers and/or network. This will usually stop a program from downloading if it suspects a virus. You can run daily or weekly reports on the computers to check more carefully for viruses.

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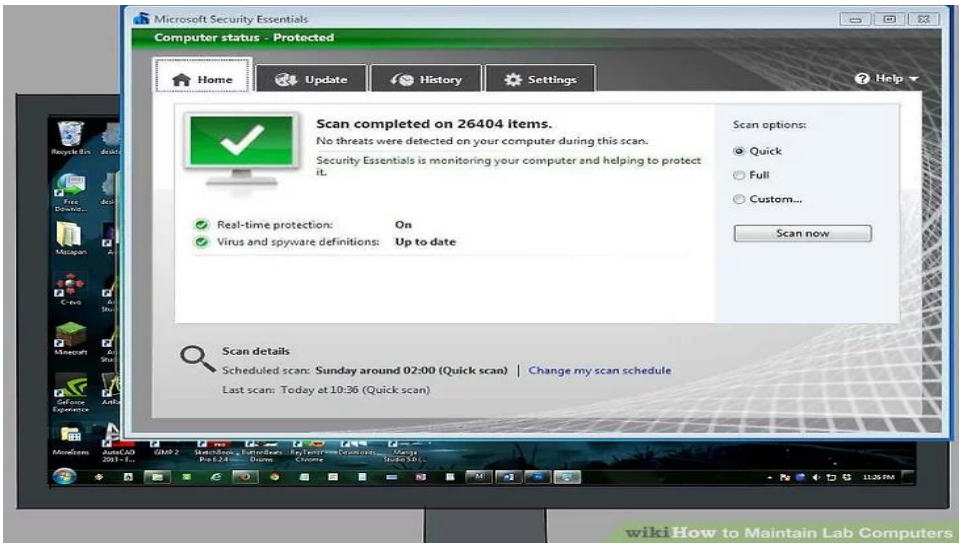
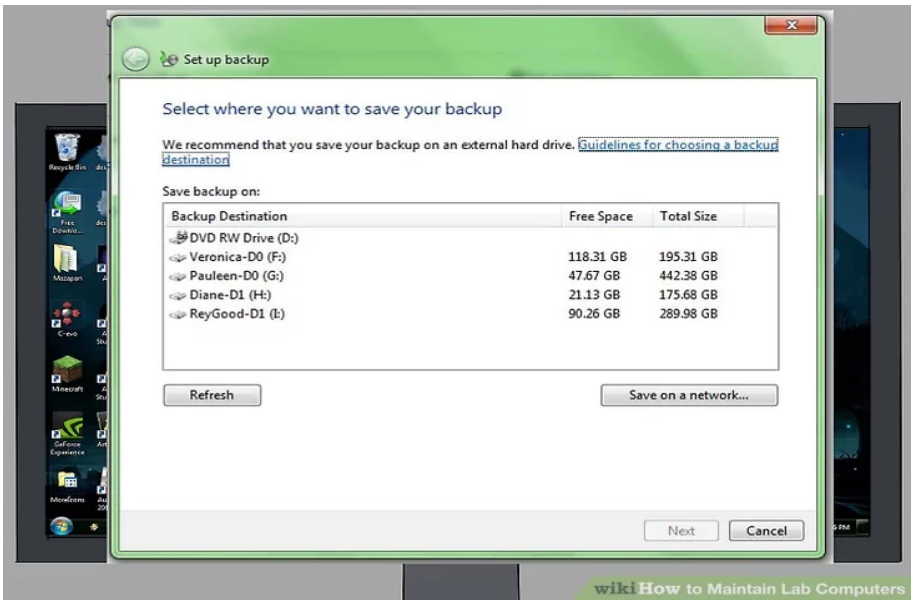


8. Install an anti-spyware program on your computers and/or network. Spyware programs install themselves onto computers to gather personal information. Anti-spyware programs can stop these harmful programs from corrupting or filling up your computer.

Some computer labs choose to download a spyware program purposefully onto their lab computers. These programs are sometimes called "keyloggers," and they can gather data about how the lab computers are being used for the system administrators.

Anti-virus and anti-spyware programs are especially important for Windows operating systems. Schedule scans on both programs every week. Apple computers have been less susceptible to viruses in the past; however, they are increasingly under threat.

9. Back up your computers on a regular basis. If your computer lab becomes corrupted by a virus, you can return to the previous backup to restore it.



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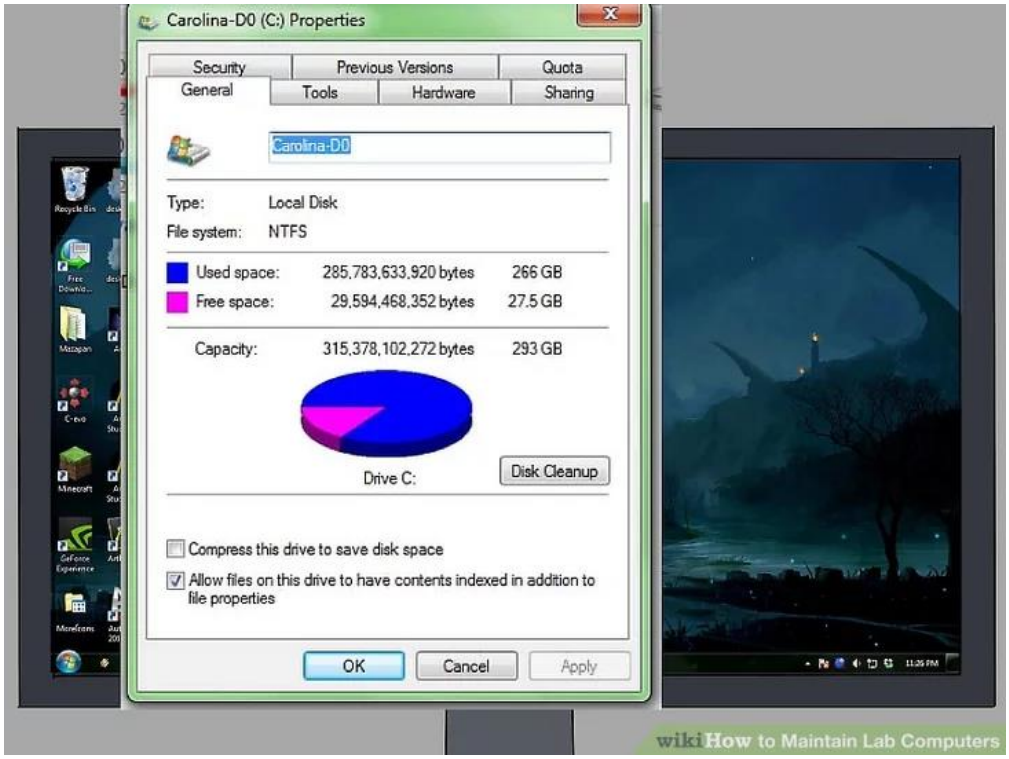
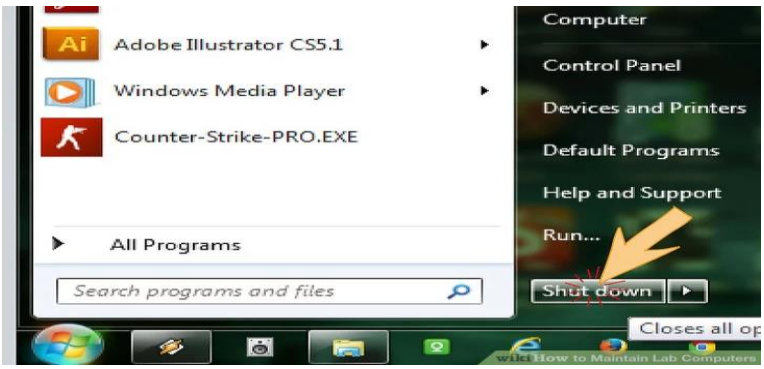
10. Use the hard disc cleanup and defragmentation utilities regularly. These Windows utilities regularly remove temporary files and keep the hard drive from fragmenting. If done on a weekly basis, the processes will be shorter than if you do it on a monthly basis. Go to "My Computer" and right click on the "Local Disk" icon. Under "Properties" select "Disc Cleanup."



11. Do not unplug printers, scanners and other connected machines when the computers are on. Eject any USB devices before unplugging them. You may need to post this on your "Lab Rules."

12. Turn off all computers by selecting the shutdown option on the desktop. Avoid pressing the "Power" button to turn off computers. If this is necessary, run the computer in safe mode until you know what the problem is.

Ask your users to press the "Control," "Alt" and "Delete" buttons if their computer freezes, rather than shutting it down with the "Power" button.



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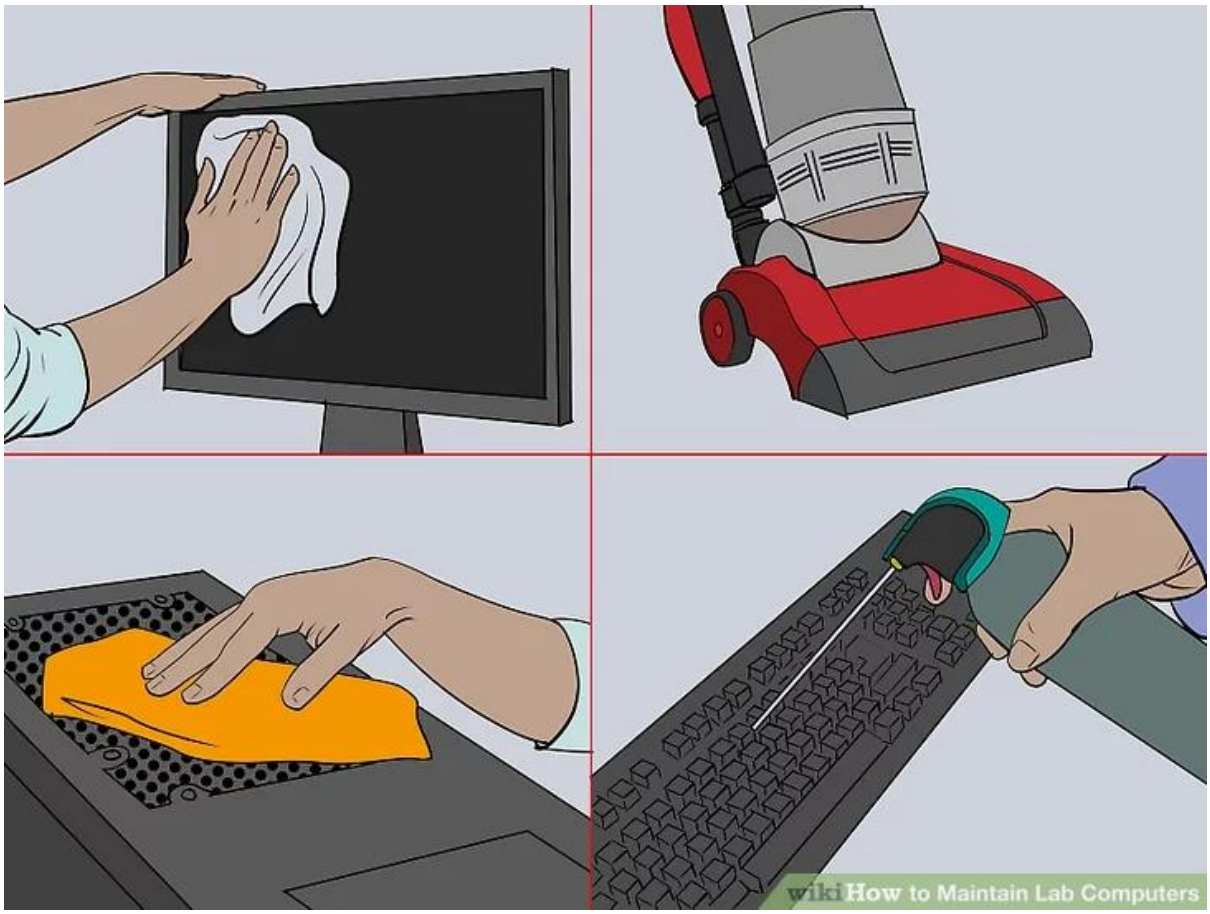
13. Clean your computer lab regularly. The following are effective ways to clean a computer lab:

Dust computer screens using a thin, soft microfiber cloth. Dedicate 1 cloth to be used only on the screens. If dirt and debris from other surfaces gets caught in the cloth, it can scratch the computer screen.

Vacuum the floor every day, if possible, so dirt and debris is less likely to gather around the computers.

Dust all surfaces of the computer. If the fans in the Central Processing Unit (CPU) fill with dust, the computer can overheat. Use a thicker microfiber cloth to pull the dust from the surface. Some types of microfiber cloth have been shown to attract and trap dust.

Use compressed air to clean out keyboards. You may also choose to use a disinfectant sprayed on a lint-free cloth on the keyboard and mouses, for sanitary purposes.



4.7 Managing Instruction and Behaviour in the Computer Lab

Here are a few tips for both computer lab teachers and regular classroom teachers who bring their students to the computer lab:

1) Give instructions BEFORE students come to the lab.

Once they have a computer in front of them, kids won't want to listen to you. If you are a classroom teacher, show the websites/activities on your classroom projector and give the directions, then bring the class immediately to the lab. Remind students of what to do when they are in the hall outside the computer lab door ("Remember, when you enter the room, you are going to open the web browser and go straight to www.whatever.com"), then send them in.

2) Teach students to sit in their same seat, turn on the computer, and begin working as soon as they enter the room.

students are anxious to use the machines and will play around and be disruptive if you force them to sit in front of a computer and not touch it. You have a short period in the lab: start using it right at the beginning of the period.

3) Make sure important websites and passwords are displayed.

Then when students say, "Which site are we on?" "How do I login?", you can just gesture at the sign. This does not have to be a major production: view the slideshow above to see how simply appropriate signs and reminders can be posted. If you are a classroom teacher and not allowed to leave posters up in the lab, assign a student helper to be in charge of bringing them back and forth for as long as the class needs to reference the posters. It is worth the extra effort, because you are training students to be independent problem solvers!

4) When giving directions in the lab, move quickly.

Do not ask "Is everyone on this web page? Everyone got it?" Just look around: if most screens are at the right place, give the next direction. Students will eagerly help one another out as needed, and once the class is settled, you can circulate to troubleshoot with the ones who have fallen behind. But if you try to troubleshoot before the rest of the class is engaged in their task, the ones who are ready will become restless and disruptive. If you are consistent with this procedure, students who are not keeping up will learn to wait patiently, because they know as soon as you have got the rest of the class on task, you will help them out.

5) Always have something for students to do when they finish early.

Students should not have to ask what to do, or worse, find their own form of entertainment. When they complete their task, they should have a list of fun educational games or other things they can do.

6) Have an alternate activity planned in case something goes wrong with your lesson.

What if the internet is down or too slow? What if a site is blocked? What if your subscription to a site is no longer valid? Have at least two other things students can do, preferably things that are similar to past assignments so it will not take a lot of explanation. Then you can say, "OK, the site appears to be down. I'm going to troubleshoot, and while I work, I'd like you to go to this website instead. In five minutes, I'll either tell you to resume the original assignment, or stay on the other site."

7) Give meaningful, engaging assignments, preferably ones that allow students to work at their own pace.

Remember, the goal is to minimize time off task. Do not make the entire class sit passively at ANY time. If you make them wait while three students struggle to get online, and then again while you reprimand a few students for being off task, and then again to make sure everyone has gotten to the right website, the learning environment will be chaotic because the students are frustrated. Give the assignment in the beginning–preferably before students even enter the lab–and allow them to stay focused on their work. They will be much more engaged and productive if they do not have to keep pace with the whole class, so whenever possible, give projects and assignments that are open ended or student directed.

Duties of a Computer Lab Teacher Aide/ The tutor as a Lab Manager

Working as a computer lab teacher aide can be a launching pad to careers in software engineering, telecommunication and system analysis because it improves your experience in computer operations. You must be knowledgeable in software packages, computer equipment, and maintain workplace discipline to fulfil your various duties as a computer lab teacher aide or assistant.

1. Technology Maintenance

Computer teacher aides undertake maintenance of computers in the labs to ensure they are in proper working condition. This includes simple troubleshooting with software and hardware to working with other peripheral equipment, such as printers and scanners. Sometimes, an aide must engage the assistance of a computer technician. In this case, you must arrange for these repairs and contact any required vendors beforehand.

2. Education and Support

Computer teacher assistants help lab users with various software and hardware system problems. For example, an aide may set up keyboard and monitor accessibility options for a visually impaired lab user, or adjust the height of a monitor for a wheelchair user. An aide may also teach students advanced research techniques for new software.

3. Records Maintenance

Computer teacher aides maintain a catalogue system for a software library. Such a record includes the type of malfunction, possible causes, and suggested actions to rectify the problem. As a computer lab teacher aide, you maintain a timetable for computer lessons. You may also assign each student a particular computer by setting up user names and passwords.

4. Monitor Students

While students are in the computer lab, you should monitor their behaviours and activities to ensure they follow the rules and regulations of the computer lab. Executing this responsibility requires you to read, understand and adhere to the set procedures and policies of the computer lab. Monitoring students ensures that their actions do not jeopardize their safety and that of others in the computer lab.

Computer Lab Safety Rules for Staff and Student

There are a number of safety rules for a computer lab that are enforced around the country. These precautions are devised with the intention of the safety of the individual and the protection of the equipment inside. Every school and college around the country has a computer lab, and there are certain rules that need to be followed when this lab is being used. There are a lot of machines and other equipment items kept in these labs and it is absolutely necessary to ensure that no one carries out some actions that could potentially damage the equipment inside.

Rules for Protecting Yourself

- Do not run inside the computer lab.
- Take a note of all the exits in the room, and also take note of the location of fire extinguishers in the room for the sake of fire safety.
- Keep bags and coats in the designated area, as they can cause people to trip if they are simply lying around the room.
- Try not to type continuously for extremely long periods.
- Look away from the screen once in a while to give your eyes a rest.
- Do not touch any exposed wires or sockets.
- Avoid making loud noises and speaking loudly.
- Do not attempt to open any machines, and do not touch the backs of machines when they are switched on.
- Do not spill water or any other liquid on the machine, in order to maintain electrical safety.
- There is a lot of equipment in computer labs that could short circuit itself or cause electric shocks, so one needs to be very careful.

Rules for Protecting Equipment

- Do not bring any food or drinks near the machine.
- Turn off the machine you were using, when you are done using it.
- Do not access external devices without scanning them for computer viruses.
- Ensure that the temperature in the room stays cool, since there are a lot of machines inside a lab, and these can overheat easily. This is one of the many ways of ensuring computer safety.
- Try not to touch any of the circuit boards and power sockets when something is connected to them and switched on.
- Always maintain an extra copy of all your important data.
- Dust can affect computers adversely. Ensure that the machines are cleaned on a regular basis.

Needless to say, the laboratory equipment that is present inside a computer lab is very expensive, and it is your responsibility to ensure that this equipment is kept safe and sound. If some damage

is incurred by this equipment, the cost of repairing or replacing it will be very high indeed. Hence, the importance of following these lab safety rules for high school cannot be stressed enough.

With this information in mind, you will know the etiquette to be followed inside any computer lab. With the right precautions and safety measures, everyone can have a good experience inside the lab, and the equipment can also stay safe from damage.

TRIAL QUESTIONS

Unit 1

Principles and Practices of Computers in Teaching and Learning

- Briefly describe TPACK model of Integration
- What is Technological Knowledge as used in TPACK?
- What is Pedagogical Knowledge as used in TPACK ?
- What is Content Knowledge as used in TPACK ?
- Explain *Ideal Overlap* as used in TPACK
- How do you intend to apply TPACK in your classroom teaching?
- How is TPACK applied into 21st Century Skills of teaching?
- Briefly explain the following Teaching and Learning approaches
    i. Lecturing,
    ii. Socratic Instruction,
    iii. Concept Attainment,
    iv. Concept Formation,
    v. Cooperative Group Learning
- Outline and explain some importance of images and video use in Teaching and Learning
- How will you recommend video for teaching in classroom?
- What approaches can be used to get students engaged when using video in classroom for teaching?
- What are the main purposes of learning in the technologies?
- How are technologies experiences and outcomes organized?
- What skills are developed in the technologies?
- What learning and teaching approaches are useful in the Technologies?
- How can ICT enhance learning and teaching?
- What is the difference between computing and ICT?
- What are broad features of assessment in technologies?
- How can I make connections within and beyond the technologies?

Unit 2

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Integration of Computers in Teaching and Learning

- Why do we refer to a computer as a tutor?
- What is Computer Based Tutorial?
- What is WebQuests?
- Briefly explain Computer as Mindtool
- Explain Databases and Concept-Mapping Tools?
- What is Wikis?
- What is Concept Maps?
- Identify and explain six (6) tips for Using Educational Wikis
- What are Simulation and Visualization Tools? How do they help in classroom teaching and learning?
- What is hypertext? How can it be used to enhance teaching and learning?
- Outline five (5) advantages of using hypertext
- What is hypermedia? How can it be used to enhance teaching and learning?
- Explain three (3) characteristics of Hypermedia Applications
- Does hypermedia have limitations? Outline them
- What is Digital Storytelling?
- What are merits of Digital Storytelling?
- Computer as a Conversation Support. Explain
- How can a computer serve as a Collaborative Learning Tool?
- How can a computer serve as a conference Tool?
- What is Video conferencing and Web conferencing?
- What are the impact of technology on teaching and learning?
- What are some ICT teaching aids which can be applied on active learning strategy?
- Identify and explain innovative trends in ICT in Education

Unit 3

Multimedia for Teaching and Learning

- Identify and explain the five elements of Multimedia
- Why teach with Video?
- What can we do with video as teachers in the classroom?

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- How is Video Best used in the Classroom?
- What must be considered in selecting Video Content for teaching?
- Identify the merits of using Multimedia in the Classroom
- Identify disadvantages of using Multimedia in the Classroom

Unit 4

Knowledge and Skills in Lab Management

- What is a computer lab?
- What is the influence of evolving Technology with evolving Classrooms?
- What are the Considerations for Setting up a Computer Lab?
- Are Computer Lab Design and Layout Important?
- What are the guidelines for maintaining the computer laboratories?
- How should the teacher manage Instructions and Behaviour in the Computer Lab?
- What are the Duties of a Computer Lab Teacher/ Aide as a Lab Manager?
- How will you fashioned your school Computer Lab Safety Rules for Staff and Student?

Sample Objectives – Unit 1, Unit 2, Unit 3

Unit 1:

Principles and Practices of Computers in Teaching and Learning

1. A research study claims that a group of students who used a computer-based technology product tended to perform better on standardized tests than students who did not use the product. In analyzing the scientific validity of this study, which of the following is the most important question to ask *first*?

A. Did the students have the same amount of preparation time prior to taking the standardized tests?
B. Did the two groups consist of students who were equivalent in terms of ability and background?
C. Were the students instructed using a student-centered or a teacher-centered approach to learning?
D. Were both groups of students allowed to use the product while taking the standardized tests?

2. A teacher is interested in using technology to expand students' understanding of the process of scientific inquiry. Which of the following student activities would most effectively meet this goal?

A. using simulation software to design and conduct investigations
B. using the Internet to participate in virtual field trips

C. using the Internet to research recent scientific discoveries
D. using database software to organize scientific data

3. A middle school teacher has one computer in the classroom that is connected to the Internet. Which of the following would be the most effective plan for student use of this computer?

A. having students use the computer as a reward for superior performance
B. having students use the computer to practice basic computer skills
C. having students use the computer to complete drill-and-practice activities
D. having students use the computer for research activities

4. A social studies teacher is introducing students to the Internet as an information resource. The teacher begins by presenting a lesson on how to use a Web browser. Which of the following would be the most effective next step for this teacher to take?

A. Have students find and download software that relates to the class.
B. Have students post a question to a social studies newsgroup.
C. Have students do a "treasure hunt" in which they search for answers to questions from a prepared list.
D. Have students begin doing independent research on topics of their choice.

5. Which of the following activities would be most effective in improving students' skills in critically analyzing Internet-based information?

A. using an electronic dictionary to look up vocabulary words
B. evaluating news-related Web sites for objectivity
C. using an online encyclopedia to find information for a research paper
D. learning to use Web-browsing software

6. A student who has difficulty concentrating and has a low tolerance for frustration is planning a science research project that will include a final presentation. Which of the following educational technologies is most likely to benefit this student?

A. an assistive listening device
B. text-to-speech software
C. a large keyboard for input
D. graphic organizer software

7. In a classroom in which educational technology has been effectively integrated, which of the following is the most appropriate role for student portfolio assessment?

A. using students' work to examine their progress in meeting learning objectives
B. assigning grades to individual projects using a weighted grading system
C. reinforcing decisions based on more traditional methods of student assessment
D. determining whether computer-based instruction has improved students' content knowledge

8. When evaluating software designed to be used independently by students, it is most important to determine whether the software:

A. has multiplatform capabilities.
B. has an abundance of graphics.
C. is easy to navigate.
D. integrates audio, text, and video.

9. Which of the following is the most important factor to consider when selecting a digital encyclopedia for classroom use?

A. the copyright status of the included material
B. the capability to display full-color graphics
C. the ability of the software to block access to objectionable material
D. the ease of use and effectiveness of the search capabilities

10. A high school math class includes several students who are academically gifted. Their school is purchasing a tutorial package to help these students learn at an accelerated pace. Which of the following is the most important factor to consider in selecting the tutorial?

A. Supplemental printed materials and access to online assistance should be included in the package.
B. The package should integrate multimedia and other motivational resources.
C. The program should prescribe that student performance on built-in assessments will determine the pace and direction of learning.
D. Students should not be able to obtain correct answers from the program, but should be required to solve problems on their own.

11. A sixth-grade teacher is evaluating a software program that requires students to design a riverboat and use it to successfully complete a journey. Along the way, students must obtain supplies and overcome a variety of obstacles. This type of program is most useful for fostering students':

A. ability to use abstract reasoning.
B. critical-thinking and problem-solving skills.
C. ability to reason by analogy.
D. cooperative learning and teamwork skills.

12. A group of teachers is evaluating online subscription databases for use by students. The most important factor in selecting a database from among several that have similar content is whether the:

A. teacher can restrict student access to material in the database.
B. reading level of the material is age-appropriate for the students.
C. software provides interpretive feedback.
D. content can be downloaded as a variety of file types.

13. Which of the following features of computer-assisted instruction is likely to be most beneficial to students preparing for standardized tests of reading comprehension?

A. the presence and effectiveness of built-in assessment tools
B. the presence of reading material with which students are familiar
C. the ability of the teacher to alter the format of the material
D. the ability of students to navigate the system independently

14. Which of the following is the most important factor to consider when evaluating the graphics in an instructional game for a middle school science class?

A. Graphics should avoid using representations of any specific gender, age, or cultural group.
B. Graphics should be used to replace written or narrated text whenever possible.
C. Graphics should depict real-world objects that students are likely to encounter in their daily lives.
D. Graphics should fulfill an important purpose related to the learning objectives of the game

15. Which of the following software products would be most appropriate to use in implementing an inquiry-based instructional strategy?

A. a simulation that requires users to manipulate variables in order to keep a virtual mouse alive and train it to do specified tasks
B. an instructional game that rewards users by allowing them to interact with engaging animations when they master a new arithmetic skill
C. a virtual tour that uses multi- media components to simulate the experience of walking through a tropical rain forest
D. a tutorial that explains how recent scientific knowledge and technological developments may impact society in the future

Technologies in Teaching and Learning

1. Which of the following statements does **NOT** describe educational technology?

A. It is a profession composed of various job categories.
B. It refers to the efficiency of teachers in using computers.
C. It includes audiovisual materials, interactive multimedia and self-instructional materials.
D. It is the development, application, and evaluation of systems, techniques and aids to improve human learning.

2. Which group of technologies has the highest degree of abstraction?

A. book, imaginative literature, programmed instruction
B. digital video, film, versatile compact disc
C. video, pictures and television
D. realia and computers

3. Which of the following is **NOT** an advantage of real objects and models in teaching and learning?

A. They are more concrete.
B. They pose problems on storage.
C. They provide hands-on learning experiences.
D. They are readily available in the environment, around school, and in the home.

4. Ms. Abigail, a fresh graduate teacher was hired to teach in a basic school where there are enough resources for instruction. The Headteacher asked her to start preparing her instructional materials. Which of the following processes would you suggest her in using an educational technology?

A. design – utilization – evaluation – development
B. design – development – utilization – evaluation
C. development – design – utilization – evaluation
D. development – utilization – evaluation – design

5. Mr. Forson is planning to integrate the use of technology in his Science class. Which of the following would be his second step?

A. Set the objectives
B. Analyze the learners
C. Utilize the materials with showmanship
D. Evaluate the performance of the students

6. Which of the following should Ms. Komenco primarily consider in determining her teaching-learning objectives and use of instructional media?

A. the learner
B. the teacher
C. instructional activity
D. instructional strategy

7. Which is the best reason why teachers state the objectives before using instructional media?

A. To be able to practice how to operate the equipment.
B. To determine which media to use the best.
C. To prepare the materials beforehand
D. To secure available materials.

8. Ms. Villegas is thinking of an educational technology that can relay information clearly to her class. Which principle will guide in her in the selection of the material?

A. interest
B. meaningfulness
C. cost effectiveness
D. communication effectiveness

9. Mrs. Quansah presented real samples of rocks when she discussed the different forms of rocks. What principle in the selection of instructional material did she apply?

A. interest
B. authenticity
C. cost effective
D. responsiveness

10. Which is an incorrect statement about the contributions of technology to the learning process?

The quality of learning can be improved
B. The delivery of instruction can be more interesting
C. The role of the teacher can be changed into a demonstrator
D. The method of teaching and learning becomes more interactive

11. Which is the pervasiveness of technologies nowadays, a learner-centered instruction can be promoted. Which of the following statements support this approach to teaching?

I. It focuses on transformation of facts.
II. It supports the use of lecture and drill methods.
III. It gives emphasis on collaboration and authentic assessment.
IV. Students work on a task determined and controlled by the teacher.

A. I and II only
B. I and III only
C. II and IV only
D. III and IV only

12. Ms. Irene's students use cooperative learning, inquiry based and project-based learning approaches in creating their digital units plans. What can be developed among the learners through these approaches?

A. repetition and active learning
B. repetition and information delivery
C. information processing and active learning
D. construction of knowledge and information exchange

13. Which of these technologies are arranged from the most symbolic to multisensory?

A. real objects, print, audio-visual materials, and visual materials
B. visual materials, audio visual materials, print and computers
C. visual materials, print, audio-visual materials and regalia
D. print, audio, visual materials, and computers

14. Which of the following is inappropriate in using printed visuals such as charts, graphs, and drawings?

A. provide written or verbal cues to highlight important aspect of visuals.
B. allow the students to pass the materials from one person to another.
C. use materials that everyone can see.
D. present the material one at time.

15. Prof. Kwofie would like to use audiocassette tape in teaching a lesson in English. In which activity is audiocassette tape very effective in the teaching-learning process?

A. in developing listening skills
B. in teaching creative writing
C. in composing poems
D. in building concepts

Teaching Principles and Practices

1. Devices can make a lecture more understandable and meaningful. What is the most important thing a teacher should consider in the selection and utilization of instructional materials?

A. Objectives of the lesson
B. Availability of instructional materials
C. Attractiveness of instructional materials
D. Degree of interest on the part of the students

2. Educational objectives are arranged from simple to complex. Why is this?

A. Each level is built upon and assumes acquisition of skills from the previous level
B. Objectives are broad and value-laden statements that lead to the philosophy of education
C. Be idealistic and ambitious to begin with grandiose scheme for using taxonomy in all levels
D. These are guidelines to be taught and learned where teachers and students evaluate learning.

3. In Bloom's taxonomy of educational objectives, the domains are stated from lowest to highest level. Which of the following objectives belongs to the lowest level?

A. To identify the characters in the story
B. To differentiate active from passive voice
C. To give the available resources that could be recycled to useful things
D. To explain the procedures in changing improper fraction to nixed number.

4. In Math, Teacher G presents various examples of plane figures to her class. Afterwards, she asks the students to give the definition of each. What method did she use?

A. Inductive
B. Laboratory
C. Deductive
D. Expository

5. In Music, Teacher K want to teach the class how to play the piano in the Key of C. Which of the following should be his objective?

A. To play the piano in the key of C chords
B. To improve playing the piano in the key of C
C. To interpret property the chords of Key of C in the piano
D. To exhibit excellent playing of piano in the key of C

6. Learners must be developed only in the cognitive, psychomotor but also in the affective aspect. Why is development of the latter also important?

A. It helps them develop a sound value system
B. Their actions are dominated by their feelings
C. It helps them develop an adequate knowledge of good actions
D. Awareness of the consequences of their action

7. Pictures, models and the like arouse students interested on the day's topic. In what part of the lesson should the given materials be presented?

A. Initiating activities
B. Culminating activities
C. Evaluation activities
D. Developmental activities

8. Teacher C gives the class specific topic as assignment which they have to research and pass the following day. However, the students could not find any information about it. What method should Teacher C use to teach the assignment?

A. Project method
B. Discovery approach
C. Lecture method
D. Demonstration method

9. Teacher D teachers in a remote high school where newspapers are delivered irregularly. Knowing the importance of keeping the students aware of current affairs, what is probably the best way to keep the students updated?

A. Gather back issues of newspapers and let pupils compile them.
B. Urge the pupils to listen to stories circulating in the community
C. Encourage the pupils to listen to daily broadcast from transistor radio
D. The teacher should try all available means to get the newspaper delivered to the school

10. Teacher E asks student A to identify and analyze events, ideas or objects in order to state their similarities and differences. In which part of the lesson does the said activity take place?

A. Preparation
B. Generalization
C. Application
D. Comparison and abstraction

11. Teacher F wants the class to find out the effect of heat on matter. Which method will help him accomplish his objective?

A. Project method
B. Laboratory method
C. Problem method
D. Expository method

12. Teaching Tinikling to I-Maliksi becomes possible through the use of:
A. Inductive method
B. Expository method
C. Demonstration method
D. Laboratory method

13. The class of Grade 6- Einstein is scheduled to perform an experiment on that day. However, the chemicals are insufficient. What method may be then used?
A. Project
B. Laboratory
C. Lecture
D. Demonstration

14. The class of IV-kalikasan is tasked to analyze the present population of the different cities and municipalities of the National Capital Region for the last five years. How can they best present their analysis?
A. By means of tables
B. By looking for a pattern
C. By means of a graph
D. By guessing and checking

15. The strategy of teaching which makes use of the old concept of "each-one-teach-one" of the sixty's is similar to.
A. Peer learning
B. Independent learning
C. Partner learning
D. Cooperative learning

16. These are several reasons why problem-solving is taught in math. Which is the **least** important?
A. It is the main goal for the study of Math
B. It provides the content in which concepts and skills are learned and applied
C. It provides an opportunity to develop critical and analytical thinking
D. It provides pupils an opportunity to relate Math with the real world

17. To ensure that the lesson will go on smoothly, Teacher A listed down the steps she will undertake together with those of her students. This practice relates to.
A. Teaching style
B. Teaching method
C. Teaching strategy
D. Teaching Technique

18. What is the implication of using a method that focuses on the why rather than how?
A. There is best method

B. A typical one will be good for any subject
C. These methods should be standardized for different subjects
D. Teaching methods should favor inquiry and problem solving

19. When using instructional material, what should the teacher primarily consider?
A. The material must be new and skillfully made
B. It must be suited to the lesson objective
C. The material must stimulate and maintain students' interest
D. It must be updated and relevant to Filipino setting

20. When using problem solving method, the teacher can:
A. Set up the problem
B. Test the conclusion
C. Propose ways of obtaining the needed date
D. Help the learners define what is it to be solved

21. Which of the following attributes characterizes a learner who is yet to develop the concept?
A. The learner can identify the attributes of the concept
B. The learner can summarize the ideas shared about the concept
C. The learner can distinguish examples from non-examples
D. The learner gets a failing grade in the test given after the concept has been discussed.

22. Which of the following characterizes as well-motivated lesson?
A. The class is quit
B. The children have something to do
C. The teacher can leave the pupils to attend to some activities
D. Here are varied procedures and activities undertaken by the pupils

23. Which of the following is **not** true?
A. Lesson should be in constant state of revision
B. A good daily lesson plan ensures a better discussion
C. A student should never see a teacher using a lesson plan
D. All teachers regardless of their experiences should have daily lesson

24. Which part of the lesson does the learner give a synthesis of the things learned?
A. Motivation
B. Application
C. Evaluation
D. Generalization

25. Which part of the lesson is involved in the giving of situation or activities based on the concepts learned?
A. Preparation
B. Generalization
C. Application
D. Comparison and abstraction

TPACK Model of Integration

1. TPACK refers to
A. Teachers' Pedagogical Content Knowledge
B. Teachers' Pedagogical Creative Knowledge
C. Technological Pedagogical Creative Knowledge
D. Technological Pedagogical Content Knowledge

2. TPACK is a conceptual framework for high school math and science teachers to integrate technology into classrooms. This framework is not applicable for other subject areas.
A. True
B. False

3. TPACK can be applied in any grade levels.
A. True
B. False

4. Teachers must know what specific technology is suitable for addressing particular subject matter materials. This is ...
A. TK
B. TCK
C. PCK
D. CK

5. Teachers should be able to transform the subject matter for teaching, such as finding multiple ways to represent materials and adapting them to meet the need of their students.
A. TK
B. CK
C. TCK
D. PCK

6. In his research, Park (2018) claims that in the early childhood education context, affective elements such as teachers' beliefs and attitudes also need to be included in the TPACK model.
A. True
B. False

The importance of images and video use in Teaching and Learning

Unit 2:
Computer as Tutor

1. What is PC stands for?
A. Philippine Constabulary

B. Personal Chairman
C. Personal Computer
D. Personal Chaperone

2. What is CAI means?
A. Computer-Assistant Instructor
B. Computerized Assisted Instruction
C. Computer- Assisted Instruction
D. Computer as Instructor

3. With the availability of computer and CAI software, the teacher must have the following roles, except?
A. Decide the appropriate learning objectives
B. Plan the sequential and structured active to achieve objectives
C. Evaluate the students' achievement by ways of tests the on specific expected outcomes
D. Apply the knowledge and rules during the process of computer learning

4. In CAI, the following are the roles of students as learners except?
A. Receive information
B. Act as a sort of tutor
C. Understand instructions for the computer activity
D. Retain/keep in mind the information and rules for the computer activity

5. During the computer activity proper in CAI the following are the roles of computer, except?
A. Provides a learning environment
B. Provides feedback
C. Acts as a sort of tutor
D. Receive information

6. What is an example of simulation software which allows students to artificially manage a city given an imaginary city environment?
A. IslandCity
B. SIMCity
C. CarmenCity
D. SinCity

7. It is a huge database with text, images, animation, audio and video, wherein students can access any desired information by the use of this source?
A. Almanac
B. Britannica Book
C. Multimedia Encyclopedia
D. Youtube

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8. What are e-books?
A. Encapsulated Books
B. Environmental Books
C. Electronic Books
D. Encyclopedia Books

9. In instructional games, what are the low-level objectives?
A. Symbolic logic and thinking
B. Recognition and reflection
C. Drill and practice
D. Basic spelling and math skills

10, In multimedia encyclopedia and electronic books, the following are examples of types of multimedia information except?
A. Spoken words
B. Pictures
C. Written words
D. Animation

Computer as a Conversation Support

1. Printer resolution is measured by the number of _____.

A. Characters per second (cps)
B. Dots per inch (dpi)
C. Pages per minute (ppm)
D. Spots per centimeter (spc)

2. Who is original developer of Linux, the free Unix clone on the PC?

A. Bill Gates
B. Richard Stallman
C. **Dennis Ritchie**
D. Linus Torvalds

3. On a disk drive, seek time is:

A. The time to seek out the next sector
B. The time required to move the access arm to the proper cylinder
C. The time waiting for data to show up under the read/ write heads
D. All of the above

4. What is the difference between a Virus and a Worm?

A. A worm is bigger in size

B. A virus attaches itself to another file, while a worm exists independently
C. A virus can replicate, a worm can't
D. A virus can damage data, a worm can't

5. What is the difference between an Internet and Intranet?

A. Internet is used to access worldwide information via computers & modems and Intranet is used to access information within a particular environment.
B. Intranet is used to access worldwide information via computers & modems and Internet is used to access information within a particular environment.
C. Intranet is more global compared to Internet.
D. Internet and Intranet are the same.

6. What does ISP stand for?

A. International Service Protocol
B. Internal Service Port
C. Internet Service Provider
D. nternet Search Program

7. Which of the following lists is in increasing order of magnitude?

A. mega, kilo, giga, tera
B. kilo, mega, giga, tera
C. kilo, tera, mega, giga
D. mega, tera, giga, kilo

Unit 3
Multimedia for Teaching and Learning
For questions 1 to 6, circle the appropriate answer on the question paper

1. The process of learning, usually in a classroom or similarly structured environment, through the use of multimedia presentations and teaching methods is referred to as……
   a. E-learning
   b. Collaborative learning
   c. Multimedia learning
   d. Assure learning
2. The elements of multimedia that enables the linear sequencing of information in a structured format is
   a. Graphics
   b. Animation
   c. Text
   d. Video
3. The following are dynamic multimedia elements except
   a. Graphics
   b. Video
   c. Audio
   d. Animation

4. GUI stands for……..
   a. Graphics uniform interaction
   b. Graphical user interaction
   c. **Graphical user interface**
   d. None of the above
5. A(n) ……. is a series of images put together to give the effect of movement.
   a. Graphics
   b. **Animation**
   c. Text
   d. Illustration
6. The multimedia components that uses dialogue, recorded narration, music and sound effects.
   a. Graphics
   b. Animation
   c. **Audio**
   d. Text

For each of the following statements for questions 7 to 10, indicate whether they are True(T) or False(F)

7. Multimedia learning is often closely connected to the use of technology in the classroom ……..**TRUE**/FALSE
8. Multimedia learning is akin to passive learning……. TRUE/**FALSE**
9. Video is a visual multimedia application that combines a sequence of images to form moving pictures and sound……**TRUE**/FALSE.
10. When students have access to video content to watch outside of class, class time can therefore not be used for comprehension checks, discussion, and reinforcement of content. TRUE/**FALSE**

Provide short answers to following questions below

1. State three benefits of using videos in the classroom
   Answer
   A. Instructors can use video to provide supplemental materials for their students.
   B. This can help reinforce content and give students resources to prepare for assessments.
   C. Educational video with instructional strategies and cognitive modelling traits embedded in the video itself can aid in student comprehension.
   D. Videos with closed captioning can further promote learners' reading fluency and motivation to read.
   E. Video may be used at the beginning of a unit to whip up interest, during a unit or lesson to bring demonstrations into the classroom that might not otherwise be possible, or as a means of reviewing or reinforcing content.

2. Outline three importance of using flipped classroom style of learning
   Answer
   A. Teachers have more time available to engage with their students, rather than racing through introductions to new content.
   B. It provide permanent library of learning resources which can be reused for new students in various learning contexts.
   C. Students have more opportunities to engage with their instructor and peers.

D. Students take greater ownership over their education, and are allowed a level of flexibility that is unavailable in traditional class structures.

3. Clearly list four advantages of using multimedia in the classroom

Answer

A. Multimedia empowers students to create and design rather than absorb representations created by others.
B. It improves reflective thinking.
C. It also provides students with suitable learning resources according to their learning styles and abilities.
D. **Multimedia** content helps to vary and enhance the learning process, and leads to better knowledge retention.
E. **Educational** video can provide more opportunities for students to engage with the content
F. It motivates students to learn through audio video and 3d animation support.
G. Students around the world can learn from course content made available through video.
H. Multimedia activities encourage students to work in groups, express their knowledge in multiple ways, solve problems, revise their own work, and construct knowledge.
I. The challenges of communicating to different audiences is lessen
J. It create the opportunities to present information in compelling ways

4. Identify four constraints in using multimedia in the classroom

Answer

A. Time required to plan, design, develop, and evaluate multimedia activities
B. The expense associated with quality projectors or computers for every student can be quite high, and the number of images and videos in a lesson can slow down the delivery and pace of the class as a result.
C. Student access to computers at home may also cause problems, and varying quality of student electronic devices can create inequity in projects and presentations.
D. If a lesson allows students to complete learning at their own pace as they move through stages of learning, classroom management becomes increasingly difficult.
E. Educators and learners who are not as proficient with technology may have to spend more time learning computer skills to access information than focusing on course materials.

5. Outline two new ways of using multimedia in classroom

Answer

A. ***Personalized Learning using Multimedia Resources****:*
Multimedia resources help different learners meet their learning needs. As we know, different students have different learning styles, educators can easily provide them with suitable learning resources using multimedia.
Educators use YouTube to provide visual learners with online videos, podcasts for auditory learners and interactive games for tactile learners.
Multimedia resources make everything easy for students to learn in their comfortable learning style.

B. Group Learning:

Multimedia tools such as blogs, social networks and wikis enable students to work together in learning a particular concept.

Students use these to share their works with others, give feedbacks on others' works and discuss among others a particular topic.

It can be done through either blogging or micro blogging (Tweets).

Using these multimedia tools, educators can engage students in several works and watch them collaborating with each other, peer assessing each other's works and learning as a group.

C. Improve Presentation skills:

Using storyboarding, videos and slideshows is a great way to improve student learning, because it allows them to engage with text in a very visual way aided by multimedia.

Multimedia tools enable students to express their ideas and works in concise ways that capture the attention of the audience and they develop an ability to communicate thoughts and concepts through a variety of resources, including text and recorded narrations.

GOOD LUCK

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