

Introduction to E-Learning and principles

Introduction

E Learning is in regards to the practice of the effective use of visual and auditory senses, using multimedia content such as images, animation, videos and audio or a combination to vividly describe to the learner what they need to know about the subject matter at hand. Multimedia content developers need to be fully aware of the principles of e learning to be able to deliver the best user experience to the learner. It is theorised that humans may process information using dual channels, one for listening and the other for sighting [Mayer, 2005:34]. in contrast to Mayers hypothesis Baddeley came to a conclusion that not only do we use dual channels for processing but also they are limited in resources and both channels cannot be used to the full efficiency at any one time[Baddeley, 2003, 87]. It's also theorised by Mayer that humans learn through active processing of information [Mayer, 2003:45]. Those conjectures form the basis for content developer for achieving optimal learner comprehension and engagement. They also aid in defining design principles and frameworks. E learning contents are usually deployed through computers, via websites or as a computer application. E learning has become the de facto way to learn without a human tuition in the modern day as its cost effective and allows for flexibility and is virtually accessible from everywhere (e.g. on the airplane for a business trip) . E learning content can and should be tailored for different ages and abilities, as content for kids would be more colourful than the ones for adults.

Chapter 1 - Principles of e learning

1.1 graphical content placement and contiguity

study shows that placement of graphical and textual components can have profound effect on the effectiveness of pedagogy. The separation of graphic and its corresponding text leads to poor performance as the learner has to switch between looking at one location to another which can cause discomfort and significantly

slow down the learning process because the information retained from the graphic will somewhat be forgotten as the learner searches for the corresponding text. a more better approach would be to place the text adjacent to the graphical content therefore the learner would not have to waste precious visual processing time searching for the text.

when taking the contiguity approach Its imperative that we don't obstruct the graphical content with the text as that could cause annoyance to the learner and deem counter effective. Instead wrap the text around the graphic in a readable fashion. but what if the graphic requires a large amount of space and the text simply cannot be contiguous? there are a number of ways this can be handled. as depicted by Clark and Mayer, the content can be made transformational in which the text is submerged into the graphical interface and changes overtime as different graphical elements come to attention of the learner. With the advent of HTML5 this can be easily achieved using technique such as parallax scrolling whereby the whole page is a graphical interface and the text changes as we scroll down. This will be elaborated in later chapters.

1.2 Modality, Speech and contiguity

The same applies for content which have speech within them. The interface should be such that narrations are synchronous with the content being depicted in the graphics. Failure to do so will 'extraneous processing' on working memory resulting in information being spatial in the learners mind which will in turn greatly reduce comprehension and they may have to replay the audio several to fully comprehend. this claim is brought to attention by Balram and Dragicevic. Its also a good practice to replace text with speech rather than having on screen text which could distract the user from the main focus.

The effect of modality is fairly insignificant for highly knowledgeable students whom are studying complex subjects such as maths that may have symbols or highly technical terms (mayers 1997). The speech might even slow down the progress for high performing students as they may be able to read faster. This also applies for foreign students that may not know the language very well and in cases where there may be difficulties in understanding the accent and pronunciation of complex words. in this case it would be better to use on screen text.

1.2 Redundancy principle

The redundancy principle discusses how having graphics, on-screen text and audio is bad practice versus just having audio and graphics [Mayers]. Sometimes situations arise whereby different formats of content delivery is needed for example being able to teach deaf people and people of poor eyesight. it might seem the only way to achieve this is by using all three methods at once, whilst we can do this due to the limited capacity assumption it would cause information overload. One way we can counter this is by only displaying the keywords in the onscreen text that way the audio is somewhat different from the text but information is not as overloaded. There has been critiques of the redundancy principle such as from Sorden who suggested that it depends on the learner and the extra information may benefit beginners whilst it would become redundant for the more experienced learner.

There are exception in cases were we may want on screen text for a periodic amount of time for example when describing complex details such as equations, it will then be much more beneficial to have on screen text to strengthen what we mean.

1.3 Coherence principle

Have you ever been a lecture where the teacher had limited time to explain a complex topic and all the information just goes right over your head? Less is more is the epitome of the coherence principle (clark/ Mayor). according to Mayer content creators should avoid the use of extraneous information that may not be relevant to the current material being pursued as this would serve as a distraction and would prove challenging for the learner to stay engaged and focused. for example we should be careful in adding instrumentals to narrations as this could overshadow the narration therefore being counter active. we should also avoid seductive details that may takeaway the leaners attention. Whilst the seductive detail may be graphically appealing and may aid in explaining further contents to come, we should avoid them at all times to keep the learners attention focused on the current content as beginners may not yet be advanced enough to understand the later content. so we should keep our words concise and straight forward.

Some other research by [Kalyguga, 213] suggested that the coherence principle is subjective to the type of learner present. With novice learners benefiting more from the principle whilst their more experienced counter part may benefit from the extra information added.

this is perhaps one of the most important principles in e-learning but many designs simply ignore it and it can have profound effects on the effectivity of their content.

Personalisation principle

the personalisation principle dictates that using a virtual tutor and perhaps a conversational type of communication approach. engages the learner and grabs their attention which in result increases comprehension. [Mayer]. an ideal conversational approach would be one that is not overly formal as this relaxes the mood of the learner and makes the interaction more realistic to the fact that its indistinguishable from a computer.

this principle was testes by mayer in 2004 in which two identical versions of an educational game where produced one with a informal conversational style and the latter with a more formal style. This test proved mayers principle as the game with the conversional style was more favoured by the students and taught the students more than the latter. another study by Moreno came with the same conclusion.

This principle also applies for spoken word as people can learn better with a natural sounding speech rather than a computerised voice which can put the students off and they not even be able to understand the pronunciations. there was some studies by Naas and Brave that proved that natural sounding narration can have profound effect on the learners ability to learn.

as we all know learning can be a stressful and boring activity but it doesn't have to be that way. in some cases it could prove beneficial to use light humour. to reduce tension and lighten up the learning experience and keep learners engaged. its important that we keep the humour to a professional level as we have to remember that the main aim is to educate and not entertain. the overuse of humour could prove counter effective and perhaps annoying especially on content that is serious.

Decorative graphics is a form way we can add humour to the experience, for example having a picture of crazy computer programmer typing code on a computer with a desk full of coffee would give the appeal of a typical computer programmers. in my case this form of humour would not be excessive and the learner may relate to it as a fellow computer science student.

1.4 Asynchronous learning

It is important to consider what resources the student has when using the service, therefore it's crucial to have a way of communicating or learning. This is where asynchronous technologies come into play. Where people are not in the same location or unable to get hold of it's impossible to have a synchronous communication. Therefore we must have way of obtaining the same information asynchronously. as defined by Allan Jeong 'asynchronous technologies can be at the most basic level, defined as a tool that facilitates and mediates communication between instructors and students separated by both time and place' [A.Jeong, 2015, 56]. With the advancement of technology it is fairly feasible to achieve a level asynchronous communication such that response time is not much longer than if it was synchronous. There are number of ways we can achieve this. One way is by email therefore it's vital that we leave contact detail to support the learner whatever the support may be. We can also have group discussion forum for learners along with some moderators this will not only serve as a place for the learner to go for support, it could also become a place where the learner can discuss related matters and make connections with other learners. This is crucial as it greatly increases learner engagement. With the advancement of artificial intelligence we can achieve a level of synchronicity whereby we can have an AI bot that can directly answer the learner's questions. These systems sometime prove disastrous in the case that the bot breaks a rule such as using profanity. As AI gets better so will the quality of the answers.

1.5 User interface

The most important of all is the user interface, the user interface acts as an intermediary link between the content and placement of content. Therefore if we want our content to be accessed effectively we need a solid user interface that can do it justice. You could have the most accurate content yet the user won't be able to access it properly if the user interface is poor which will result in poor compression from the user. The user interface should be designed in alignment with cognitive load theory as suggested by Adrian Taylor 'Working memory has a limited capacity, so additional processing required by an interface can reduce knowledge transfer and retention'[Taylor, 2006:4].

Chapter 2 - Design and Implementation

In this chapter you will see an example of an e learning tool and my critical analysis

2.1 Review of original work

The original convolution e learning tool was originally made in 2005, in this chapter i will be talking about the bad and how i can improve on it.

click anywhere on the image

pixel coordinate: 124, 73

zoom:

147	144	143
157	154	154
171	168	166
147	154	155
157	165	167
170	179	179
140	133	134
148	142	145
161	156	159

We obviously need the pixel's RGB value. But we also need the values of the pixels around it so that we can work out what its new value will be.

Filters process each pixel one by one, changing its value in relation to its neighbours. So for any given pixel, we need to know the values of its neighbours.

Move over the image a few more times, and examine the surrounding pixel values. Make sure you understand what is represented above and above left

the web interface begins when the user hovers over the the image in top left corner this brings up 2 other graphic windows, the pixel and its neighbours window which is adjacent to the image as well as the image zoomed in directly below the image. text is also displayed that talks about what is going on.

one thing i noticed is that some of the text is not displayed correctly therefore the user cannot see the bottom text.

violation of contiguity principle

this page clearly violates the contiguity principle because the text is not contiguous with the graphics. therefore putting strain on the reader, having to at the graphical element and to look away again to try the find the text.

we can fix this by introducing the modality principles which means we should get rid of all the text if it can fit properly across the page. instead we should add a voice over instead that way the learner can focus their visual channel on the graphical content and utilise their auditory channels. for the technical text such as the pixel coordinates we can keep that as a on screen text.

violation of the coherency principle

Now drag the 'mask' of values over the grid of pixels above, and drop it on. This will process one pixel, so remember to centre it on the central pixel (highlighted red).

74	73	71
75	74	72
62	60	57
76	78	75
77	80	78
60	62	58
81	85	87
83	85	88
66	68	69

$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$
$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$
$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{9}$

R

G

B

As we can from this section, it violates the coherency principle because theres simply too many distractions. we still have the original image from previous steps, i feel like its no longer needed and is only causing distraction. So we should get rid of the image or make a rollover such that the image is displayed when the user rolls over it.

over all i would say this tool could've been better maybe it wasn't because of the year it designed and the limitations there could've been at that time, for example it could've made better use of space.

The diagram illustrates the convolution process. It consists of several components:

- Input Image:** A photograph of a white house with a thatched roof.
- Pixel Grid:** A 3x3 grid of pixel values extracted from the input image. The values are:

85	82	77
85	83	78
80	76	70
76	76	78
76	76	78
67	65	66
77	76	74
72	74	75
61	62	62
- Weighting Mask:** A 3x3 grid of weights, all equal to $1/9$, enclosed in a dashed red border.
- Output Image:** A blurred version of the input image, showing the result of applying the convolution mask.
- Text:**
 - "Weightings such as these decide how much say each of the surrounding pixels will have in determining the new colour value for the pixel."
 - "Such a weighting scheme is called a 'convolution mask'."
 - "Next we apply the weightings in the mask to the pixel values."
- Navigation:** Two yellow arrows pointing left and right at the bottom right.

there is quite a lot of white space as you can see. i will try to avoid this in my design and make use of the full page so i can include more information. due to the small use of the page this has resulted in having very small text. which is barely readable. this will

Abstract

Mayer suggests that a thorough understanding of how the human brain works is essential in having success with e learning content. He then went on to say 'The cognitive theory of multimedia learning is based on three cognitive science principle of learning: the human information processing system includes dual channels for visual/pictorial and auditory/verbal processing (i.e., dual-channel assumption); each channel has limited capacity for processing (i.e., limited capacity assumption); and active learning entail carrying out a coordinated set of cognitive processes during learning (i.e., active processing assumption)'[Mayer, 2005:31]. Mayer's assumption have been supported by earlier papers by psychologists but that is out of scope in this paper. Those conclusions have formed the basis for effective e learning. In order to achieve success and be effective we must adhere to those rules. In this paper I will be discussing vital principles that must be adhered to have success.

References

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