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2d and 3d Visuals in Increasing Retention Capacity of the Learners

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ABSTRACT

Visual representation played a vital role in all fields and creates greater impact among the human beings. Visual representations are effectively used in the educational sector at various levels. Complex contents are simplified with the use of visuals for easy understanding of various categories of learners. A study was conducted among school children to find out what and which type of visual representation has more effectiveness on learners. Visuals are grouped in two categories one is control group- comprises of static visuals (pictures, illustrations, line drawing, 2 D graphics and photographs) and the other is experimental group- comprising of animated visuals (3D graphics, video, animation). Then the E-learning visuals are showed to test the knowledge perception of the students. The result proves that the animated visuals have greater impact than the static visuals in terms of retention and impact among the learners. Some of the previous study found that role of animated visual representation gives significant impact on the end user.

INTRODUCTION

The importance of media in terms of visual form has an enormous and growing impact of every ones life. Have problem with conveying information. For example giving guidance to a travelling person about a root direction, who needs to be explained with various types of information. To visualize similar types of information are highly challenging. To solve these problems visual representation in digital media are useful. Visual media is not only limited to the entertainment, news, reports and education etc. Mainly it has the social responsibility to enrich the younger minds for their better understanding and retention. Greater role played by the visuals in delivering the content effectively to the viewer. Here the visual elements referred as that specifically to illustrate towards the content. Talking about visuals that represent directly complement, illuminate, illustrate and enhance the total content. Various types of visuals like Graphs, Illustrations, Line Drawing, Colour Drawing, 3D graphics, Real Picture and Photographs are the 2D forms with illusions are used to explain the content. Normally the drawings are in abstract and simplified in nature. Norman McLaren suggests 'Animation is not the art of drawings that move, but rather the art of movements that are drawn'. On the other hand animation and movies are 3D forms with time and movements are the other dimensions. Animation is omnipresent and it is still challenging other forms of visual media. Mostly the static visual and animated visuals were used to support the content to reduce the complexity of the understanding level. The use of Animation has attracted and welcomed by all kinds of audience. Its real effects make the people delighted. A great Filmmaker Marjane Satrapi states "The reason we used animation instead of real images is because drawings have an abstract quality."

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II. Objective and methodology:

To study what are the possible ways through the visual representation for focused learning. To study the use of various types of visuals. To study which type of visual representation create greater impact among students. Analyze and find the impact and reach of visuals among the end user. Sample sizes of 100 in the age group of 16 to 20 were taken from higher secondary school, Kanchipuram district. An analysis has been done with a self-administered questionnaire as a tool. For this research an experimental design method is applied to find the results. To study the influence of effective role of visual representation, the students were grouped into two categories as follows.

- Control group-static visual representation [comprising pictures, illustrations, line drawing, 2 D graphics and photographs]
- Experimental group-animated visual representation [comprising 3D graphics, video and animation]

To find the percentage, average and correlation few test were applied on the data collected and the tables prepared with the help of data analysis software for easy understanding.

III. Literature review:

Kellner (1998) states Van Gogh "A good picture is equivalent to a good deed". As studies show a shift in technique is required in addition to traditional lectures and verbal description. Students need to learn visually and teachers need to learn to teach visually. Chanlin (1998) reports how lessons with no graphics, still graphics, or animated graphics influence students with different prior knowledge levels. An additional study by Chanlin (1999) proves animated graphics enhances learning, specifically in males gender. Kleinman and Dwyer (1999) coated the findings indicate that the use of color graphics in instructional modules as opposed to black and white graphics promotes achievement, particularly when learning concepts. An earlier study by Myatt and Carter (1999) suggests that most learners prefer color visuals to black and white visuals, but that no significant difference in learning occurs whereas color is related to the content to be learned. In addition, the study points out that simple visuals preferred by young students and complex visuals preferred by old students. In overall simple visuals are more effective regardless of the age group. Lih-Juan Chanlin (1999) pointed out in the International Journal of Instructional Media, Animation has been found useful and helpful to illustrate complex structural, functional, and procedural relationships among the content. However, the effective learner is confirmed only when proper animation content is provided. If a concept is too simple, any single medium can convey it successfully. If a concept is too difficult, whatever combination of media is used, the presentation will fail. Large comments that the failure of using animation is due to the complexity of the textual material. An animation cannot necessarily compensate for knowledge deficiency if the learning content or the animation itself is too complex. A number of researchers have identified knowledge discrepancy among learners as influencing effectiveness of animation. Inconsistent findings exist among various studies. In a study of middle-school students on using animation to improve understanding of mathematical concepts, Blissett, G. & Atkins, M. (1993) says that those with less prior knowledge or lower-ability learners tended to find the learning demands confusing. Based on a study of community college faculty members, [Houston \(2000\)](#) observed that the primary instructional uses of video were to introduce or summarize a topic, provide visual examples, and stimulate discussion. Potential applications exceed these traditional approaches. Additionally, Robertson, Card and MacKinlay (1993) argue that desktop 3D environments can be easier to use than immersive environments because people are already familiar with the desktop computer, and do not subject the user to the physical and psychological stress often associated with immersive environments. Lastly, the development and proliferation of the Internet has made possible distributed 3D environments which can be explored by multiple learners together, from their own desktop computers, at separate locations.

IV. Analysis of the study:

Visuals from science subject related to health sequence like respiratory system and digestion system were chosen as content for analysis. Self administrated questioners were prepared to find the effectiveness and the impact of visual representation among the user. Visuals are grouped in to two as listed bellow

- Control group-static visual representation [pictures, illustrations, line drawing, 2 D graphics and photographs]
- Experimental group-animated visual representation [3D graphics, video, animation]

The clippings of static visual representation related to respiratory and digestive system were screened to the control group where as the clippings of animated visual representation related to digestive and respiratory systems were screened to the experimental group.

At an average of 73.3% of students says Yes, that the pictures, illustrations, line drawing, 2 D graphics and photographs related to digestive and respiratory system sequence were showed and found useful, understandable, informative and effective memory. Whereas 21.8 % of students says No, to the same questions.

4.1. Observations of the study:

Table 1: Observation of the Control group-static visual representation [pictures, illustrations, line drawing, 2 D graphics and photographs].

Clippings of pictures, illustrations, line drawing, 2 D graphics and photographs related to respiratory and digestive system sequence were shown to the Control group.	
Students - Boys	<ul style="list-style-type: none"> • Visuals were boring to watch for a long time. • The drawings were good and monotonous. • Colours were not that interesting. • Real pictures were complicated to understand than the drawings. <ul style="list-style-type: none"> • Visual needs to be explained.
Students – Girls	<ul style="list-style-type: none"> • It is still and not entertaining the viewer. • Real pictures were confused. • Visuals were not interactive in terms of content delivery. <ul style="list-style-type: none"> • Expected to explain.

Table 2: Observation of the Experimental group-animated visual representation [3D graphics, video, animation].

Clippings of 3D graphics, video, animation related to respiratory and digestive system sequence were shown to the Experimental group.	
Students- Boys	<ul style="list-style-type: none"> * Easy to understand the process. * It is more attractive, entertaining and colorful than normal visuals. * Easy to recall the frames. * It was realistic and influencing the audience. * The visual are really effective and informative. * Makes us vigilant. * Visuals are interactive in terms of content delivery. * Created and focused towards the content. * Additional information delivered than the animation of information. * Animation provides attraction and excitement.
Students - Girls	<ul style="list-style-type: none"> * It is attractive. * It is acceptable and entertaining and gets register in our minds. * It is something thing unusual and affects our mind. * The colours presented in the visuals are comfortable. * The choice of colours was good. * Visuals were self explanatory.

4.2. Analysis of the study:

Table 3: Detailed analysis of the Control group-static visual representation [pictures, illustrations, line drawing, 2 D graphics and photographs].

Clippings of pictures, illustrations, line drawing, 2 D graphics and photographs related to respiratory and digestive system sequence were shown to the Control group.			
Description		Yes %	No %
1.	Learning is better with visuals and text than with text alone.	96%	-
2.	More colours are needed to understand a visual.	60%	28%
3.	Colour visual representations add interest and improve Learning.	98%	-
4.	Real pictures and photographs of the content are effective while learning.	100%	-
5.	Black and White visuals better for Learning.	22%	70%
6.	It's better to place the text near to the visuals with necessary background.	66%	30%
7.	Selected colours are better for clarity than the basic colours.	70%	24%
8.	Visuals in sequence are required for easy understanding.	74%	22%

Table 4: Detailed analysis of the Experimental group-animated visual representation [3D graphics, video, animation].

Clippings of 3D graphics, video, animation related to respiratory and digestive system sequence were shown to the Experimental group.			
Description		Yes %	No %
1.	Drawing based animations are better than real picture animation.	88%	10%
2.	Contents are well supported with the animated graphics.	82%	16%
3.	The use of colours in the visual allows the learner to focus on the studies.	92%	6%
4.	3 D visuals are more interactive and effective.	89%	22%
5.	3D visuals, Animations and Video are accessible to learn.	86%	12%
6.	Animated drawings have the maximum input of the content.	88%	12%
7.	Text and audio are complementing the visual representation.	89%	10%
8.	Referring the content of animated visuals are possible at any time.	87%	12%

At an average of 87.6% of students says Yes, that the 3D graphics, video, animation related to digestive and respiratory system sequence were showed and found more useful, more understandable, highly informative and effective in retention. Whereas 12.5 % of students says No, to the same questions.

Comparative analysis between Control group and Experimental group tables prove that 73.3% of students says Yes to the static visuals and 21.8 % of students says No to the same questions. 87.6% of students says Yes to the animated visuals and 12.5 % of students says No to the same questions. Due to the tremendous change and advancement in technology, animation has become one of the major element penetrates in to day today

context of the younger minds. Animated forms are influencing the audience to participate and make them emotionally fell to the screened visuals. Since the animation is abstract and easy to understand by all types of students, it will definitely change the way of storytelling or the content delivery in a more effective way in the future. Further it proves that animated visuals are more effective than the static visuals.

4.3. Comparative analysis of the study:

Table 5: Comparative analysis between Control group and Experimental group.

Description	Yes %	No %
1. Control group-static visual representation [pictures, illustrations, line drawing, 2 D graphics and photographs]	73.3 %	21.8 %
2. Experimental group-animated visual representation [3D graphics, video, animation]	87.6 %	12.5 %

4.4. Findings:

4.4.1. Effective Visuals Representation:

Before you can achieve any of your presentation goals, you must capture and hold your audience's attention. The average adult attention span is only eight seconds. So it is essential that you continually engage your audience with new ideas and images. Research shows that 87% of information stored in the brain is received visually. When done well and appropriately, visual aids will also boost your credibility with your audience. The most important rule when creating a multimedia presentation is to keep it simple to make sure your audience understands and follows the presentation. Computer generated presentations have the advantage of being easily edited and customized. According to a study done by the University of Minnesota, visual aids increase the chances that your audience will be persuaded by your position by 43%! The amount of information and the way it is presented to the audience has a great effect. Simplicity and continuity throughout the entire presentation enables the audience to grasp your message. It is important that the audience is not overloaded with too much information on one visual.

A. Content / Text:

Limit to 3-6 bullets per slide, Limit each bullet to six words. Left-align (don't center) lists and bullets. Be concise with words.

B. Font:

Use 24 point or larger. Use no more than 2 fonts per visual. Times Roman is ideal for headings. Arial provides easier reading when used in the body of the visual. Use mixed case for legibility. Save CAPS for emphasis but never more than 7 words per visual. Italics are hard to read in large bodies of text – reserve for emphasis.

C. Check for: spelling errors & grammatical errors inconsistent punctuation:

D. Psychology of Colors:

RED – stimulating, motivates action, increases expectations, heightens sense of realism, urges to achieve results and succeed impulse, desire, and passion. Used to increase enthusiasm and induce quick decisions.

BLUE – calming, therapeutic, Credibility, increases sensitivity, tradition, lasting values, loyalty, security, contentment. Used when credibility and trust need to be established.

BLACK – direct, forceful, in the past, powerful, strong, uncontrollable, negates emotions, formal, without choice, used in financial reports.

GREEN – life, energy, faith, opinionated and self-assertive, discussion, needs to impress and exercise control, used in presentations requiring feedback.

YELLOW – bright, cheerful, stimulating, attractive, initiates actions and ideas, seeks change, creates anxiety, used for text against dark background NEVER used as background color!

GRAY – neutrality, lack of commitment, used when audience is to make a decision, NEVER used when showing information critical to establishing objectives.

E. Tables and Charts:

Tables - illustrate timetables, schedules, lists, etc. Format the tables and charts to maximize the readability.

Bar charts - compare things that you can quantify. Use different colors (dark to light) to distinguish bars.

Line charts - represent changes over time. Lines to 4 per chart (from dark to light)

Pie charts - show parts of the whole limit slices to 10 per pie (from dark to light).

Determine the best background color to convey your message. Label your chart or table with a specific title. Use arrows to emphasize and eliminate the need to point at the screen. Enliven charts by adding clip art to bar

graphs. Direct the eyes of the audience by highlighting significant data. Charts should be readable and have logical flow when reading. Left to right. Dark to light. Top to bottom.

F. Qualities of Effective Visuals:

1. Purposeful – Each visual should have a specific purpose. If slides are constructed only to help you read your way through the presentation, make all movement meaningful unless the audience will be bored.
2. Accurate – The value of the information depends on the integrity and care with which the data was collected and analyzed.
3. Selective – Avoid the temptation to overwhelm the audience with too much detail. They can only remember so much and will tune you out if they feel overwhelmed.
4. Concise – Present the data only once. Do one thing at a time. Time is limited, so choose and design visuals that convey the data quickly and accurately.
5. Consistent – Display similar data in a similar form. Slides should be prepared so that all words, lines, colors, styles, and other elements are consistent.
6. Focused – Tables and graphs should make a point. The point should be apparent from the design of the visual and should be stated in the title.
7. Clear and Simple – Abbreviations, awkward word choices, and confusing details make a visual ineffective and difficult to understand. Arrangements of design elements, such as graph labels and legends, may cause distraction if not simple and clear.
8. Effective – Keep words to a minimum. Visuals should be immediately understandable. Smoothly expand and compress detail.
9. Convincing – Make sure the message you are trying to convey is made quickly and clearly.
10. Independent – A good visual speaks for itself. A table, with its title and footnotes, and a graph, with its legend, should be understandable without extensive explanation.

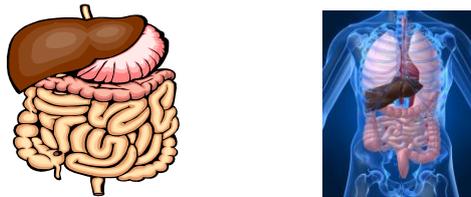


Fig. 1: Example of a good visual representation.

V. Conclusion:

Success of animation due to advantages of more visual information conveyed, rather than animation of the information. Animation is interactive so that learners focus on the relevant content so it is exciting. The structure and content of the visual representation should perceive and comprehend. Learners show interest because accessibility of visuals or animations found easier. Found that the long term memory level is increased among the student with the support of visuals. The study proves that the 87.6% of learners highly benefited through the effective use of animated visuals representation through learning. Complexity of the content is simplified with the use of visual representation there by the clarity of the content and knowledge is increased among students. Still need to find an animated presentation tool that is both very general and easy to use. It is definite that the content delivery through the animation will create tremendous impact with an added value for the younger minds.

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