Instructional Design Mediated Interactivity

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Abstract

Interactivity in learning is a necessary and fundamental mechanism for knowledge acquisition and the development of both cognitive and physical skills (Baker, 1994). The current transformation of our institutional learning environment has created an urge for multi-sensory instructional design system (IDS). Interaction is intrinsic to successful, effective instructional practice as well as individual discovery (Sims 1997). Interactivity Learning Environment (ILE) can be mediated by strategically designed instructional framework. The current instructional design training for teachers may require immediate review because, research by Saniah (2009) for example, has shown that teachers who have attended a computer training were not capable of applying the skills in designing non-linear and interactive instructional teaching aids. As such, this paper has suggested a tested instructional design framework to motivate teachers to integrate instructional materials that facilitate interactivity during classroom delivery. This paper has also demonstrated eight creative applicable ideas on the application of instructional design mediated interactive delivery during a graphical representation aids learning. The suggested framework can be integrated into future teacher's professional development programs and it can be merged into competency based training (CBT) modules to train teachers to be skillful in creative and interactive instructional design as well as application of interactive instructional delivery.

Keywords: instructional design, interactivity, powerpoint

1. Introduction

Interactivity in learning is a necessary and fundamental mechanism for knowledge acquisition and the development of both cognitive and physical skills (Baker 1994) and, Interaction is intrinsic to successful, effective instructional practice as well as individual discovery(Sims 1997). Instructional challenges has increased threefold in the twenty-first century with the transformation of information accessibility and the availability of technology mediated information exchange, the perspective of teaching and learning has evolved towards more constructive focus. Student centered learning require additional attention on the planning and delivery of instructional materials.

2. Instructional Design

Design is an activity enclosing a logical sequential process in solving an identified problem. Designing involves process or processes. Need analysis will be carried out to identify the requirements or problematic situation. The relevant information will be gathered and analyze, to clarify doubts and strengthen understanding of the requirement. There is always multiple means to a resolution. So, alternative ideas will be generated and a most feasible alternative will be adopted to present the best possible solution.

Instructional Design is a logical structured sequence to solve a teaching and learning problem or challenge. It is a systematic process that adhere to standard learning principles in putting together relevant instructional materials into plan to facilitate effective teaching and learning. The process involve stages of activities. The design model such as ADDIE, ASSURE and Rapid Prototyping are process flowchart that laid down systematic stages during the designing process. Each stages encompasses a set of independent steps or procedures including analysis of targeted groups, formulating learning objectives, delivery strategies, developing flowcharts and evaluation formats.

There are many perspective of defining Instructional Design (ID). The following few abstracts from "Training and Instructional Design", Applied Research Laboratory, Penn State University, briefly describe the multi facet aspect of ID.

(a) Instructional Design as a Process:
Instructional Design refers to a systematic development of instructional specifications in

which the theory of learning and instructional is incorporated and it embraces the design of teaching aids, activities, source of information and evaluation (Smith and Ragan, 2005). It is the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs. It includes development of instructional materials and activities; and tryout and evaluation of all instruction and learner activities.

(b) Instructional Design as a Discipline:

Instructional Design is that branch of knowledge concerned with research and theory about instructional strategies and the process for developing and implementing those strategies.

(c) Instructional Design as a Science:

Instructional design is the science of creating detailed specifications for the development, implementation, evaluation, and maintenance of situations that facilitate the learning of both large and small units of subject matter at all levels of complexity.

(d) Instructional Design as Reality:

Instructional design can start at any point in the design process. Often a glimmer of an idea is developed to give the core of an instruction situation. By the time the entire process is done the designer looks back and she or he checks to see that all parts of the "science" have been taken into account. Then the entire process is written up as if it occurred in a systematic fashion.

3. Interactivity

The concept of interactivity is not new to the education arena. Rafaeli (1988) quoted interactivity as a natural attribute of face-to-face conversation. Within the new media environments, three traditions of interactivity research are identified: human-to-human interaction, human-to-documents interaction, and human-to-system interaction (McMillan, 2005), and understanding interactivity can help practitioner create environment that facilitate interaction. A instructional designer with the concept of interactivity in mind, will definitely more likely be systematically integrate design interface and activities that will facilitate interactive delivery .

Interactivity in any teaching and learning context involves students responding to information, seeking feedback on their responses, reflecting on the feedback and acting appropriately to tailor their personal learning experiences (Laurillard, 2002). The student will be motivated to explore accordingly to their competency, the depth of knowledge and the mode of achieving their learning outcomes.

Interactive instructional delivery creates a platform and opportunities for student to interact with peers and teachers and by engaging such activities, their interpersonal skills can be developed. They will also concurrently, improve their competency to explore information and structure an effective response to the information gathered. Multi communication channel within a teaching and learning process will stimulate the motivation of the student to proceed through the lesson. The interactive interaction will also broaden the learning experience and enabling the horizon of learning expand beyond the four-walls of the traditional classroom and the limitation of the teacher.

Within the context of instructional delivery in a teaching and learning environment, five perspective of interaction can be identified, namely(refer to figure 1),

- instructor to content [1]
- instructor to technology [1]
- instructor to student [2] [4]
- student to student [3]
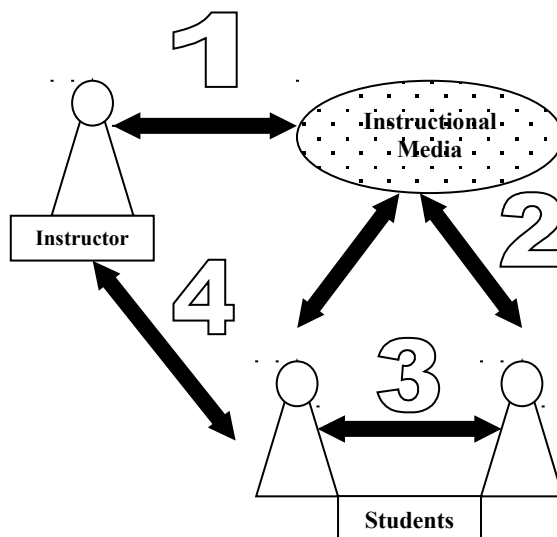- student to content [2]

Figure 1: The Elements of Interactivity

Instructor to content interaction is clearly the usage of instructional contents by the instructor during the teaching and learning process while his interaction to technology is the engagement and skills of the instructor to utilize technology elements effectively. Instructor to student interactivity happen during the instructional delivery and during the feedback within the communication channel. Student to student communicate and interact with each other through group work, class discussion or planned instructional activities. Finally, the reaction of the student towards the display of the instructional materials is referring to student to content interaction.

Interactive Instructional Activities may include the following:

- group discussion

- problem solving
- cooperative learning
- brainstorming
- role play
- tutorial group
- debating
- Q & A
- electronic quizzes
- peer to peer assisting learning

Tan & Hanim (2009), Interactivity integration allow the teacher to transform a teacher centered lesson into effective and enjoyable student centered learning experiences. Associate Professor Dr Yusup Hashim in his keynote delivery during the 3rd International Malaysian Education Technology Convention stressed that "Endless" leads to boredom, by being too passive, lacking of interaction, allowing learner to disengage. While Dr Hj Mohd Arif Hj Ismail, the chairperson of Malaysian Education Technology, in the same occasion mentioned that the flexibility of today's technology afforded us the luxury to cater to every student's learning needs and demands. So, effective interaction is vital and it can be planned and executed to enhance the achievement of learning outcomes. Student needs to be motivated with relevant information, they have to be confident with their capability of understanding what they are learning and consequently, the satisfaction after the learning process motivate them to continuously feeling interested towards the subject matter.

During the course of teaching and learning, different happenings may disrupt the systematic preparation and linearly executed lesson of the teacher. The teacher may require to flip from one slide to another or altering and relating slides to and from any location within the presentation. If the presentation is not instructional design mediated, the teacher may have the difficulty of searching for the related slide (unless he is smart enough to use the slide sorter or the pop-up "Go To Slide" menu). But if the presentation is instructional design mediated, then navigation from one topic to another, one particular slide to any slide within the presentation or hopping around the presentation will become very handy and can be executed professionally. The lesson will become very interesting, lively and motivating. Student will be very attracted and motivated to actively involve in the learning process without been interrupted by the poorly design and inflexible instructional interface.

Instructional design in such perspective is very much focus on constructed learning. Constructed learning is a process by which information is actively learned in a context relevant to the learner and learning is this way is active, context driven and collaborative (Taylor, 2006). The learner has to be made interested in the subject, if, not they will not learn effectively. Instead of the teacher deliver most of the information, the student can be empowered to be the instructor of a particular focus topic. Learning should be two way. Student centered learning should also depends very much to the maturity of the student and the facilitation of the instructor. The writer has been engaging such strategies during his sociology in education and education technology class for the past three years. The lecturer will provide the relevant interactive lectures initially, and then the rest of the topic is distributed to the students in group. Guidelines and continuous guidance were provided along the process. They were encouraged to plan interactive activities for their presentation. The sociology class was more towards social activities encouraging interpersonal and social skills. While the education technology classes were focus on selecting the right media for the delivery. The role within the classroom has been swapped; the student is now a lecturer. Throughout the duration, great improvement has been observed, the presentations were prepared utilizing the non-linear format, the presentation were delivered interactively and the student who was handling the topic has become the expert within that topic and they can continuously providing expert assistance to their fellow classmates.

The challenge of engaging with interactive instruction and the success of is delivery is heavily depends on the competency of the instructor to put together his instructional materials in a logical sequence that facilitate flexible usage within a technological based platform. Lack of Knowledge had been the caused for the teachers to be less confident to integrate ICT in the curriculum (Wan Zah Wan Ali et. al. 2009). There are abundant of software in the market for this purpose. But this paper is selecting Microsoft PowerPoint as the instructional platform. PowerPoint was created by Bob Gaskins in 1981 to make presentations easier. But it has been blamed for everything from bad teaching to bad learning (Abram and Neely, 2004).

4. Instructional Framework

A framework is a systematic and intentionally constructed gateway to instructional resources. It has interactive linking and display that can be accessed at any time without difficulty. It should be capable of catering for multi sensory and multi learning style. A well planned and non-linear enabled instructional framework is not only a cure to instructional inadequacies, but, its prime function is to prevent the happenings of instructional inadequacies.

Educationalists have argued that the use of presentation software can encourage a more active learning environment (Hunt 1998). Rocklin (1998) suggests the use of PowerPoint can help teachers to

"help their students learn". But PowerPoint is most often used inappropriately (Ellwood, 2005). The software is present in almost every computer within the institution in Malaysia. Most often, PowerPoint is just a software platform for them to compile their lecture notes. Even in seminars presentation, it is merely a presentation with slide after slide of research statistic and findings. It has seldom been used interactively.

Tan & Nur Jihatie (2007) conducted an introductory research in Kelantan and out of 51 PowerPoint competencies listed; the respondent can only perform 21 competencies confidently. Tan & Saniah (2009) in their research on a group of 150 primary teachers who have just attended a computer upgrading training in Port Dickson, the respondent admitted that their competency and the frequency of integrating PowerPoint were still at average level and time and skill factor were the main obstacles. Research by Wan Zah Wan Ali et.al.(2009) on the problem faced by teachers in Smart School has also revealed that the 14-week course attended by them prior the implementation of ICT integration in school did not give them the competencies and confidence to engage in ICT teaching. The knowledge they learned in the course were not tuned to the actual school setting. The software and hardware introduced in the course were not been able to apply in their school.

The intention of this paper is thus, to suggest a design framework utilizing PowerPoint as the platform. PowerPoint is no alien to most educationist and majority of us can use most common function of the software. It is present in most personal computers and compatibility is not a problem. Secondly, the design framework is linearly constructed but it can be linearly or nonlinearly apply. Once prepared, it can be used as an interactive electronic folder to enable teachers to systematically adding or interchange their instructional materials.

The non-linear and interactive PowerPoint interface has been put together since 2006, the framework was introduced at the beginning of each semester to the student teachers undertaking the subject of Education Technology. Through observation, the level of preparing non-linear and interactive presentation materials increased positively among the student teachers. Their confidence improves due mainly to the quantity of information integrated into their presentation and effortless linking as well as extracting the information has becoming handy. Most of the student teachers have already graduated and through the feedback received during practicum visits, their PowerPoint instructional materials were welcomed by the students and the teachers from the school.

Tan & Hanim (2009) has prepared a training module based on Competency Based Training(CBT) to impart the competencies in preparing non-linear and interactive PowerPoint materials. The module has been tested by their respondents and all have shown positively improvement in their competencies. The following section will be the extracts of the module. The ultimate competency outcome will be the construction of an instructional framework utilizing PowerPoint as the platform.

Step One: Design the Master Slide.

The Instructional designer need to analyze the targeted group, content integration, learning style and teaching approaches to identify the best possible delivery approaches. The selected content will then be arranged according to its relativity, complexity and delivery approaches. It is a good practice to plot a relationship chart to identify its logical flow and the hyper linking integration.

The next step is to alter and format the default *Master Slide*. The alteration made to the *Master Slide* will have the effect of extending the changes to other relative slides. Click at the *View* to pull the dropdown menu and select *Master – Slide Master* as in figure 2.
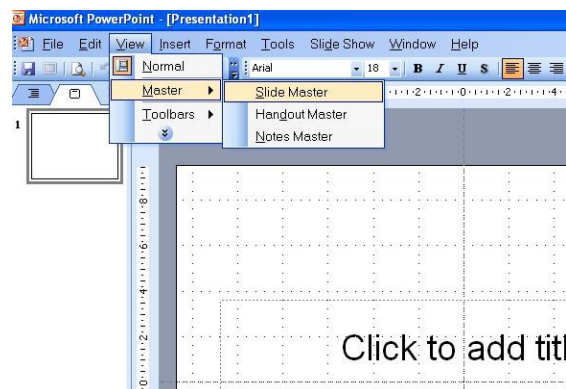

Figure 2. Activate Slide Master.

Once the master slide is in view, the default *Title Auto-layout* as in figure 3, is used to set as slide title. It is moved away from the slide and placed at the top right hand corner of the master slide(figure 4). The slide title will enable each individual slides be named accordingly. By doing so, identification of slide with the appropriate content will become handy during the linking process. The font size can be changed to smaller number to keep the title in a view during editing and the font color is preferably white.
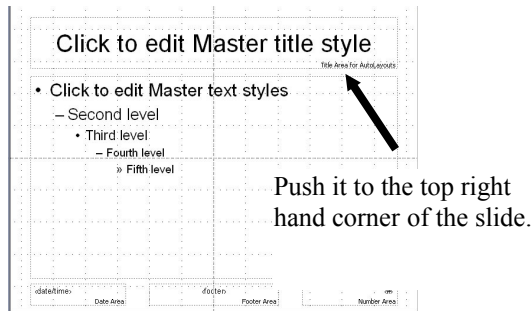
Push it to the top right hand corner of the slide.

Figure 3: Master Slide Design

Figure4: Slide Title Template Created

An auto shape will be used to mark the content area, with a harmonious color with the background. It should cover the entire slide area leaving only about 1cm on the left and bottom for navigation buttons.

Step Two: Creating the Main Topic Slides

Once the main topics have been identified, the main topic slides can be created. I personally prefer to use the *outline* slide sorter to manage my slides. Each additional slide will be given a related name which will appear in both areas, the slide sorter and at the top of the slide working area (figure 5).
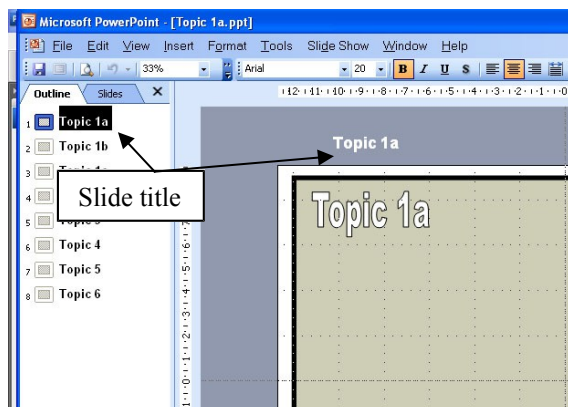

Slide title

Figure 5: Slide Titles & Main Topics

Step Three: Main Topics Navigation

Move back into Master Slide view and insert main menu navigation buttons at the bottom of the slide within the space provided(figure 5). In order to not transcend reading gravity, it is important that the most important object (and therefore the most eye-catching) is placed in the top half of the screen. All other text and graphics will be placed in a "z-pattern" in the bottom two thirds of the screen (Wynn, 1995). The menu navigation is intended to allow the instructor to navigate through the presentation; therefore it should not occupy the main reading location. Furthermore, the sub topic indicator will also be located along the left boundary of the slide, making them ergonomic for right handed navigation. The size of the button and text should be reasonably small to avoid disrupting the focus of the audience.
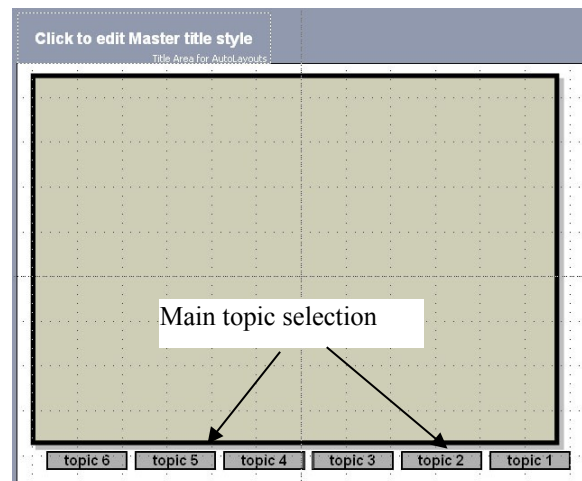

Main topic selection

Figure 6: Main Topic Navigation Menu

Then, insert hyperlink to each main topic selector as indicated by figure 6 to its respective main topic slides. During the linking process, you can see that the title of each slide will appear in the selection box *select a place in this document* and selecting the appropriate slide will become very easy

The main topic navigation allows the instructor to group the lesson into logical and sequential folders. However, he can apply the navigation nonlinearly and interactively. He can select or relate with ease during the presentation. He can also plan and control his presentation time. The main topic can also function as the revision reminder at the end of the lesson.
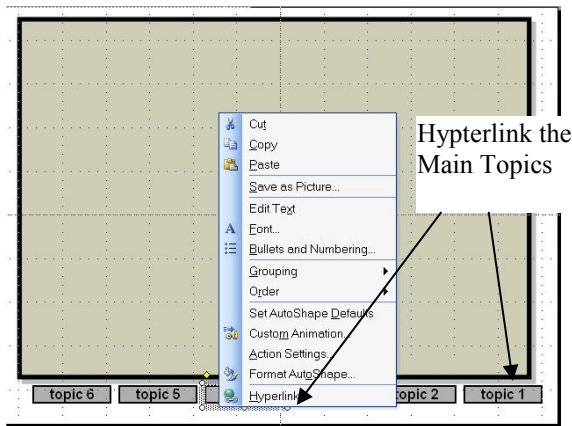
Figure 6: Hyperlink Main Topics.

Step Four: Sub-topic Indicator

If the main topic consists of more than one slide (remember the 1-6-6 principle; one point per slide, six lines of text and six words per line) then another set of controlling buttons have to be created: the sub topic indicator. Use any shape available for the buttons and insert the numbering indicator for each button corresponding to its number of slides within each main topic. Link the buttons to its respective slides by *Action Setting*. Place the buttons at the lower right corner(figure 7). The number that corresponding to its respective slide can be highlighted to differentiate current and the rest of the slides. Once the initial set of buttons has been created and linked, copy and paste to other remaining slides to ensure its identical location on the slides.
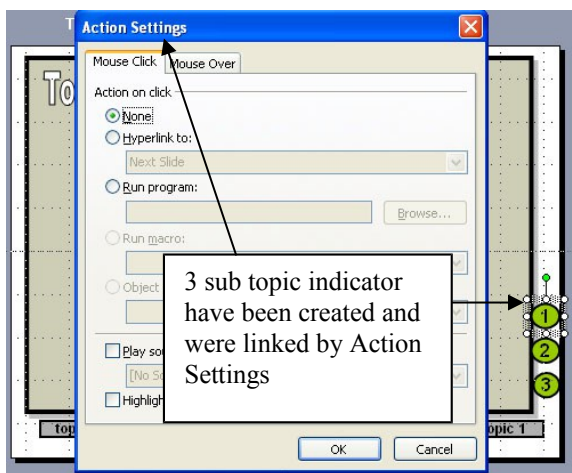

Figure 7: Sub Topic Indicators

The above suggested instructional design template enable and motivate the application of non-linear presentation. By clicking the main topic menu at the bottom of the slide, instructor can navigate from one topic to one topic or returning to any prior topic without hassle. While the sub topic indicator

enable the instructor to flip within the topic and control its presentation with ease.

The format has also reduce the time consume to design and getting ready a particular instructional materials. It has definitely formulated a systematic routine to instructional design. The capability and powerful screen control of the instructor will surely attract the students and motivate them to pay more attention and explore the whole presentation.

Such design format will also improve the confidence of the instructor. More useful and related information can be integrated into the presentation and the most important of all, the level of interactivity can be improvised to suit the level and the situational requirement of the student.

Topic components such as activities, games, brain storming graphic, pop quizzes etc can be integrated into the design and they can be quickly be accessed in time of needs. The element of interactivity within a particular lesson can be manipulated, integrated, engaged and controlled. Through continuous practice, learning interaction will become a routine, mediated by the flexible instructional design framework.

5. Interactive Application

Creativity enhances interactivity. The effort of integrating creative instructional design intending to motivate interactive teaching and learning process will definitely enhance the level of achieving learning outcome. Adapting from Sims (1997) *Elements of Learner Control,* the following figure explains graphically the design principles embedded into the suggested instructional activities.
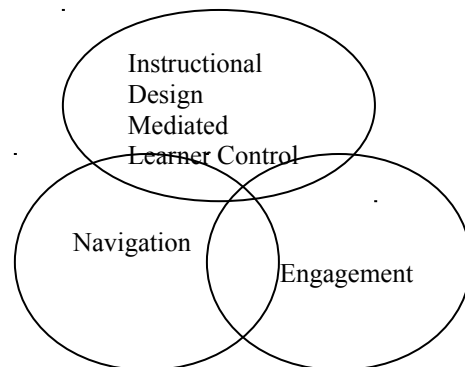

Figure 8: Element of Instructional Design Mediated Learner Control.

The instructional materials can be embedded into the PowerPoint presentation slides with the intention of learner centered teaching. Although the learner will be given a priority role to control the flow of the process, the instructor will still maintain a balance control over the general implementation of the

lesson. Navigation control has been integrated and strategically embedded into the graphical display. The instructor is allowing various options to move throughout the lesson (Sims, 1997). The instructor can flexibly engage any activity following the flow of learner interaction. Learner engagement motivates the active involvement of the learner with the content and the instructor. Without any interaction between user and content, learning will not take place(Sims 1997). With the instructional design and its embedding control mechanism, the instructor can easily and strategically maneuver through the integrated navigations. The following suggested activities display one particular examples in which instructional design can easily mediated interactivity in the classroom.

Activity One: Thumbnail setup.

Design Aspect: Taking for example, during the lecture of a Sociology class, the instructor intends to introduce some famous sociologist to the student. The lecturer can type in tones and tones of note on the slides or he can display the pictures one by one on the slides. But, interactivity may be limited by the design and the lesson may be very lecturer centered. If the instructional design is taking another perspective, to focus on student interaction perspective, then, one slide is sufficed to achieve the learning outcome. Supposing we are going to discuss four famous sociologists (Auguste Comte, Karl Marx, Max Waver and Emile Durkheim) the pictures can be duplicate one: one enlarge and one thumbnail. Arrange the thumbnail along the left boundary and the enlarged pictures at the centered location of the slide(figure 9). The enlarged pictures will be hyperlinked to the respective thumbnail and attached the triggering function(it can be ON or OFF).

Application Aspect: The thumbnail graphics can be display to attract attention and arouse the interest of the student and stimulate them to ask questions or discussing among themselves regarding the identity of the thumbnail(remember the five elements of interactivity)
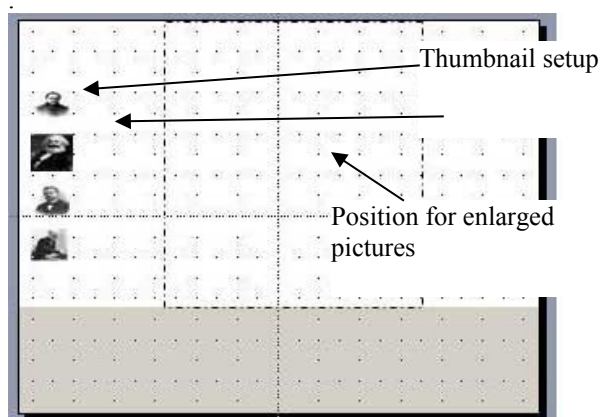.

Figure 9: Thumbnail

Activity Two: Triggering

Design Aspect: The enlarged pictures will be linked to the respective thumbnail with the trigger function. Two trigger will be attached to the picture: entrance and exit.

Application Aspect: Discussion regarding which picture to view can start off the activity. Click at the thumbnail will display the enlarged picture. Discussion, constructive lectures and Q and A can be conducted regarding the displayed pictures. Clicking again the thumbnail will hide the displayed pictures and another thumbnail can be selected (figure 10).
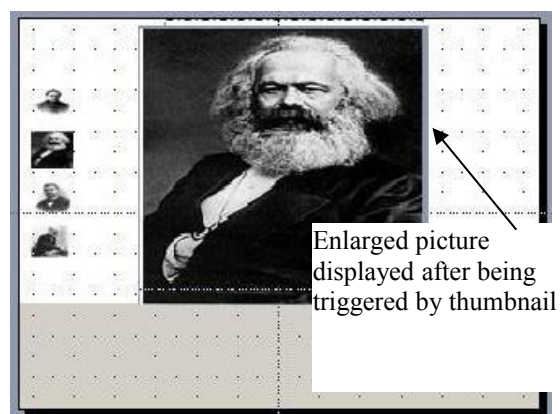

Figure 10: Triggering

Activity Three: Screen Tips
Design Aspect: The enlarged picture can be attached a hyperlink. In the hyperlink box, activate the screen tip and key in the require information(it can be the name and year of the sociologist).

Application Aspect: During the lesson, Q and A can be conducted or pop quiz can also be implemented. To reveal the information hiding inside the screen tip, place the cursor on the picture.
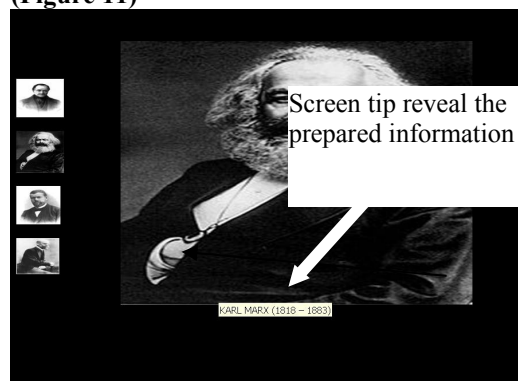**(Figure 11)**

Figure 11: Screen Tips

Activity Four: Speaker's Note

Design Aspect: During the design stage, long stretch of information can be pre-typed in the note's column.

Application Aspect: During the teaching and learning stage, if addition information or note taking is require, speaker's note functions can be activated to display the information typed earlier.
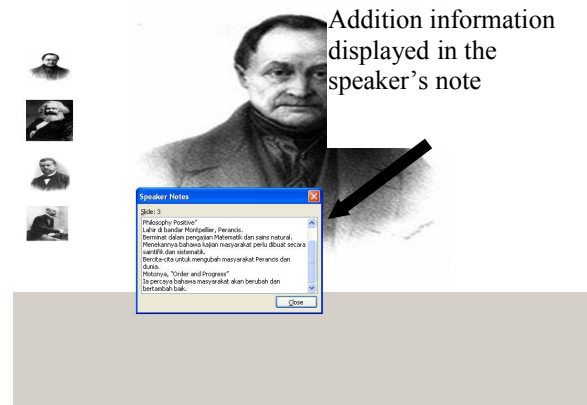

Addition information displayed in the speaker's note

Figure 12: Speaker's Notes

Activity Five: Marker/Highlighter

Application Aspect: During the teaching and learning stage, if marking on the screen or highlighting is require, then, press CTRL and "P" simultaneously will transform the cursor into a marker or highlighter. The color of the marker/highlighter can be changed to suit the purpose of the activity. Press the key "E" to erase any part of the highlighted drawings.

Activity Six: Blackout

Application Aspect: During the teaching session, if the instructor intend to block the focus of the student to the display temporary, or a pop quiz is conducted regarding the displayed slide, press the key "B" to blackout the screen and hiding the information. Pressing the key "B" again to reveal the answer or information.

Activity Seven: Brain Storming

Design Aspect: If typing during active presentation is required, then during the design stage, a text box has to be integrated into the slide. Activate the *Tool Box* function and position a text box at the bottom of the slide, change the properties setting to arrow multiple lines, enter key press etc.

Application Aspect: During the lesson, a group discussion or brain storming session is conducted

asking for student input on a particular subject, the input can be typed spontaneously on the presentation without escaping out from the presentation. The notes typed can be saved and utilize for discussion later on within the lesson (figure 13).
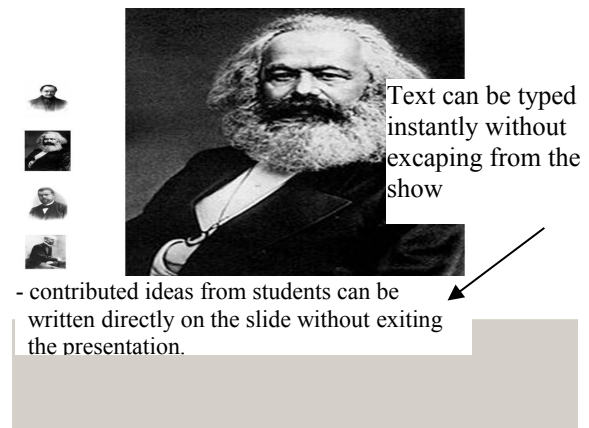

Text can be typed instantly without excaping from the show

- contributed ideas from students can be written directly on the slide without exiting the presentation.

Figure 13: Instant Typing

6.0 Conclusion

Interactivity enhance the teaching and learning in a classroom. Instructional design facilitates and mediates the delivery of interactive instructional activities. However, the effective and professional application of interactive activities requires instant considerations of other factors such as the people, the place, and the weather and last but not least, the experience as well as the interpersonal competency of the instructor. Practices make perfect. Reflection and remedial action after each session is vital. It will ensure a better instructional design mediated interactivity.

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