Presentation Technology as a mediator of learners' retention and comprehension in a History classroom

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Abstract

The insistence that presentation technology should be incorporated into all areas of the curriculum applies to the teaching of History equally as to other subjects. Although technology has been placed in the hands of teachers, little training on how to adapt the technology to History has come with it. Three explanatory research questions were formulated for this study dealing with South African History teachers' experiences of presentation technology as teaching and learning tool, and the format of more history-friendly PowerPoint slides to maximise History learners' long-term retention and comprehension of the subject content. The purpose of this study was to put forward History teachers' opinion on the role of presentation technology as a mediator of learning, and to use the outcomes of the empirical study to identify ways in which PowerPoint slides can be best designed and used to improve the learners' long-term retention and comprehension. A qualitative intrinsic case study research design was used for the study. Individual one-to-one interviews were conducted with two teachers. A deductive approach was used for the data analysis. The results of the data analysis revealed that both of the interviewees experienced the use of PowerPoint presentations as an improvement in their classes. However, both indicated that one of the greatest disadvantages of the use of PowerPoint slides was the lack of interactivity and discussions during the slide shows. Johnson's (2011) history-friendly PowerPoint pedagogy (interactivity, nutshell narratives, meta-cognition and timelines and flow charts) was put forward to promote interactivity and discussion during PowerPoint slide shows.

Keywords: Constructivism; PowerPoint slides; Retention; Comprehension; History-friendly pedagogy; Nutshell narratives.

Introduction

In the past three decades there has been a decisive shift in the teaching and learning support materials that have been used to communicate messages in

educational settings: from the era of chalk-and-talk and occasional flip-charts, to overhead transparencies, and to PowerPoint slides (Linsell, 1998:33-35). The demand that presentation technology should be incorporated into all areas of the curriculum seems to be irresistible, and this insistence applies to the teaching and learning of History equally as to other subjects (Blow & Dickinson, 1986:36-38; Department of Basic Education, 2011:17, 47; Haydn, Arthur & Hunt, 1997:160). According to Smith (2007:81), the use of presentation technology needs to be seen as an integral part of the whole package of skills and strategies which can be deployed to enhance teaching and learning in History. Craig and Amernic (2006:147-160) demonstrate that there is not yet a substantial body of research evidence to affirm the potential of presentation technology to facilitate and enhance the teaching and learning of History. In this article, it is argued that presentation technology should form an integral element of the wide armoury available to promote retention and comprehension in History, and that the use of PowerPoint slides is one of the first means of introducing presentation technology in the History classroom.

Problem statement and research questions

The focus of the problem of this study is on how History as a school subject can be more effectively related to South African learners to allow them to easily retain and comprehend the learning material. Although the National Senior Certificate examination pass rate for History was 86% in 2012, teachers and teacher educators are still reflecting on ways to scaffold those learners who are either failing or just passing History. It is a challenging task given the wide diversity of educational backgrounds of the learners, and their lack of language and writing skills (Mac, 2013:1-5; SA news.gov.za, 2013:1; Siebörger, 2011:11).

The literature has documented some of the trends in the direction of poor performance in History retention and comprehension for some time. Learners have changed in the past couple of decades. They have changed as a result of the affects of the world they are raised in (Paxton, 2003:272; Skynews, 2012). Evidence of the extent of the changes is listed below. Greenfield (2008:2) confirms that the screen-based, two-dimensional worlds of so many learners is producing changes in behaviour: attention spans are shorter, personal communication skills are reduced, and there is a marked reduction in the ability to think abstractly. Greenfield's (2008:2) findings indicate that

growing up in a world full of electronic devices may alter how learners' minds work in terms of gathering and learning information. According to Gozzi (1995:1), there is less patience on the part of the learners for non-entertaining activities, and textbooks are not seen as either entertaining, or a valuable source of information for learning since learners experience sensory deprivation. Textbook publishers such as Macmillan (the "History for All" series), Maskew Miller Longman (the "Looking into the Past" series) and Oxford (the "In search of History" series) have added a few pictures and sidebars to their texts, but this still does not seem to make textbooks (especially History textbooks) any more appealing to learners. As a result of the complete lack of multimedia that learners are used to, and their bad experiences with memorisation and worksheets in school, the subject of History, and by extension textbooks in general, may not be a part of what learners see as their world. This creates motivational problems because they will not, or cannot bring themselves to read the textbook the way it needs to be read for teaching and learning to take place, even if they are taught how to do it. Even when textbooks are rewritten with the addition of primary sources, images and narrative, the activities that often come with them reduced history to a list of easily memorised facts (Haydn, 2003:1-3; Sewall, 1998:1-5).

Technology such as CD ROMs, the Internet, PowerPoint slides, audio-visual multimedia, computer simulations and archives has made its way into the South African History classroom (Department of Basic Education, 2011:17, 47). Although technology has been placed in the hands of teachers, little training on instructional design on how to adapt the technology to particular academic subjects such as History has come with it. The format that presentation technology such as PowerPoint slides had traditionally followed in the business world became the format that it followed in the classroom. However, the reduction of a historical narrative to a series of bulleted "factoids" (briefly stated or insignificant facts) is a format rife with pedagogical problems. The fact that bullets were ill-suited to the retention and comprehension of history created a need for a new presentation technology format, specifically adapted to the pedagogical needs of History learners to understand, discuss and debate an historical event or period using source material and an extended piece of writing (Johnson, 2011:33; Siebörger, 2011:11).

Against the backdrop of the above problem statement, the following three explanatory research questions were formulated:

- What are South African History teachers' experiences of presentation technology as a teaching and learning tool?
- How can the format of PowerPoint slides be adapted to be more history-friendly, and to make history more accessible to learners in the classroom?
- What should be included in a PowerPoint slide show to maximise History learners' long-term retention and comprehension of subject content?

Purpose of the study

The purpose of this study is to

- provide the outcomes of a small scale empirical study of the use of PowerPoint slides in History education in South Africa today
- put forward teachers' opinion on the role of presentation technology as a mediator of learning in the History classroom
- use the outcomes of the empirical study to identify ways in which PowerPoint slides can be best designed and used in the History classroom to improve the long-term retention and comprehension of the subject content
- stimulate academic debate about ICT and History teaching.

Review of the literature

Constructivism as theoretical perspective of the study

The importance of establishing a theoretical perspective for the implementation of technology in the teaching and learning of History lies in the need for an effective technologically-enhanced pedagogy. Hooper and Hokanson (2000:28-31), Lorsbach and Basolo (1999:121-128) and White (1999:3-12) advocate the use of constructivism as theoretical perspective as it represents a break from the positivistic assumptions of History which search for the acquisition of knowledge that mirrors a singular reality of textbook-defined facts and concepts. A more flexible, culturally relativistic and contemplative perspective of reality is needed, where knowledge is constructed based on personal and social experience.

According to Garrison (1998:43-60), Gergen (1995:17-39) and Von Glasersfeld (1998:17-40), constructivism emphasises the active role of the individual learner in the construction of knowledge, the primacy of social and individual experience in the process of learning, the realisation that the knowledge attained by the learner may vary in its accuracy as a representation

of an external reality, and that knowing has its roots in biological or neurological construction and social, cultural and language-based interactions. Moshman (1982:371-384) and Steffe and Gale (1995:1-57) distinguish three main branches of constructivism, namely radical constructivism, social constructivism, and cognitive constructivism. An outline of the three different types of constructivism is presented below.

Radical constructivism emphasises the internal nature of knowledge, and embraces the philosophic tenet that while a reality external to the individual may exist, the true nature of the reality is not knowable to the individual as it is not yet part of his/her subjective construction. Knowledge then becomes the subjective construction of the individual, resulting from the cumulative experiences of the individual (Piaget, 1977:1-40; Von Glasersfeld, 1998:17-40). This subjective construction implies that knowledge is not passively transmitted from the environment (classroom) to the individual (learner), but that knowledge is the result of active cognising by the individual (learner) for the purpose of satisfying some goal (retention and comprehension to pass an examination). The ultimate goal of knowing is the construction of internally coherent mental structures that are adaptive and lead to efficient and effective thinking and behaving (Von Glasersfeld, 1998:17-40). Social constructivism emphasises the social nature of knowledge, and embraces the philosophic tenet that an individual cannot come to know reality in any other meaningful way as in terms of social interaction (group work activities), (Garrison, 1998:43-60; Gergen, 1995:17-39; Prawat, 1994:220). The social activity (group work) as source of knowledge emphasises language, culture and context (discussion, activities, subject content), (Dewey, 1896/1972:96-109; Gergen, 1995:17-39). For social constructivism, truth is determined between people who are collectively searching for truth in the process of their dialogic interaction (Bakhtin, 1984:110). Cognitive constructivism emphasises the external nature of knowledge, and embraces the philosophic tenet that an individual can come to know reality as it exists external to the individual, knowledge is objective, and the acquisition of knowledge is the (re)construction of external reality into internal mental structures (classroom presentation, learner activity, schema theory), (Mayer, 1996:151-161; Prawat, 1996:215-225).

In all three branches of constructivism, the teacher is not concerned with whether the learners learn a set of textbook-defined facts and concepts, but whether the learners' understanding are coherent and valid given the resources with which they have engaged (radical constructivism), the learners'

social interaction has resulted in consensus (social constructivism), and the learners' have built mental structures that correspond to reality (cognitive constructivism).

Schema theory of cognition and learning as conceptual framework of the study

The information gathered in the empirical study of this article will be viewed through the lens of the schema theory of cognition and learning. Schema theory has become one of the major pillars of educational psychology and instructional design since the late 1970s, and has been employed as the foundation of instructional design strategies to create History curricula, whether it is technology saturated or not. The emphasis of schema theory on the prior knowledge of the learners has been used in the design of History lesson plans with encouraging results (Dahlin, 2005:287).

For Anderson (1977:367-381), the mind compartmentalises experiences and information into discrete packages called schema. All schema are logically categorised with similar schema in a branching format, and these branches are all connected in a large web of experience and information that represents a person's world view. Schema theorists such as Kintsch and Van Dijk (1978:363-394) further theorised that new information is easier for the mind to learn if it had some prior knowledge within the schema web to attach it to. The schema web of categorised packages of information retained permanently by the mind is referred to as long-term memory. This is distinguished from the working memory, also known as short-term memory, which is filled and erased on a regular basis to accomplish routine tasks (Morgan, 1981:30-32; Munro & Rigney, 1977:81). Humans create the schema structure, or long-term memory, in their minds by connecting their previous experience to the new information with bits of sense or connective logic (Dahlin, 2005:294).

Cognitive load theory focuses on the interplay between short-term and long-term memory, and attempt to find the conditions under which the information in the short-term memory is best transferred to the long-term memory without becoming lost (Paas, Renkl & Sweller, 2004:1-8). Cognitive load theory also points to the negative effects of repetition and the positive effects of different instruction (Protheroe, 2007:36-40). More recent advances in cognitive load theory had separated the visual and audible working memory, and documented significant increases in transfer to the long-term memory

schema from the use of audio-visual multimedia presentations (Paas, Renkl & Sweller, 2004:1-8).

Clarification of concepts

Presentation technology

The latest school of thought in History education methodology relates to the introduction of technology into the History classroom. The first attempt to introduce technology in the History classroom was the resources that were made available to learners via CD-ROM and the Internet. The field of technology in the History classroom then moved towards enquiry-based learning through computer simulations and archives, the placement of learner activities on the web, and the promotion of literacy in the History classroom by means of online reading and writing activities (Bass & Rosenzweig, 2001:41-61). History teachers were also provided with alternatives to the hard copy textbooks online (Schrum & Rosenzweig, 2001:134-140). The focus then shifted to the enhancement of the teacher's presentations by means of images (Blackey, 2005:59-71; Coohill, 2006: 455-468) such as maps and visual presentation technology such as PowerPoint slides with images (Fehn, 2007:430-461), audio technology (Lipscomb, Geunther & Mcleod, 2007:120-124), and audio-visual multimedia presentations (Hoover, 2006:467-478). Face-to-face communication over long distances via virtual field trips (Naik & Teelock, 2006:422-436), and video conferencing also became possible. Ferster, Hammond and Bull (2006:147-150) and Risinger (2006:130-132) have also demonstrated how History classrooms allow learners to create their own versions of recent phenomena in the mass media such as blogs and digital documentaries to enhance retention and comprehension of history.

Comprehension as learning outcome

Bloom, Englehart, Furst, Hill and Krathwohl (1956:111) developed a taxonomy for the cognitive domain that can be used to plan instruction based on learning outcomes. It consists of six levels, progressing from simple to complex – knowledge, comprehension, application, analysis, synthesis and evaluation. The level of the cognitive taxonomy identifies the level of complexity. The higher the taxonomic level, the more complex the learning involved. Each level specifies a behaviour a learner might be asked to perform. The teacher states these as performance objectives – what the learner will

know and be able to do. The verbs teachers use to identify what learners might be expected to do for the second level (comprehension) are convert, defend, distinguish, estimate and explain. A comprehension level learning outcome for understanding of subject content, is where the learner know what is being communicated and make use of the idea appropriately; for example, the learner may distinguish between the impact of European conquest, warfare and early colonialism in the Americas, Africa and India (McCown, Driscoll & Roop, 1993:362).

Retention

The learning involved in a History lesson involves observational learning, the acquisition of cognitive and behavioural patterns which prior to modelling (the teaching and learning activity) had a zero probability of occurring. Bandura (1986:122-147) characterises observational learning as a cognitive processing activity. Learning information from modelled events (a lesson) is transformed into symbolic representations that guide future action. There are four processes that operate as learners learn: attention, retention, production and motivation. The process of retention is the capacity to remember modelled behaviour. To perform a modelled behaviour, a learner must form an accurate cognitive version of the modelled behaviour referred to as symbolic coding and organisation. Retaining the information requires rehearsal if the learner is to perform. Bandura (1986:122-147) refers to two types of rehearsals: cognitive (covert) rehearsal and enactive (overt) rehearsal. Cognitive (or covert) rehearsal is imaginary practice. Enactive (or overt) rehearsal is practicing or doing an action after being shown. After much cognitive and enactive practice, the learning material becomes part of the learner's symbolic code (McCown *et al*, 1993:259-261).

Empirical study

Research design

As qualitative researcher, the researcher was primarily interested in the meaning that the subjects (History teachers) gave to their life experiences (teaching with PowerPoint slides). Hence, a case study was used to immerse the researcher in the activities of a small number of subjects to obtain an intimate familiarity with their social worlds, and to identify patterns in their

words and actions in the context of the case as a whole to describe, analyse and interpret a particular phenomenon (Thomas, 2004:54; Yin, 2003:88). A qualitative intrinsic case study research design was used for the study. Consequently, the purpose of the case study in this research project was to gather information on the experience of a sample of Further Education and Training (FET) History teachers in terms of the extent to which they use presentation technology such as PowerPoint slides in their classrooms, what the effects of the use of these PowerPoint slides had been on their teaching and learning, and the learners' retention and comprehension, and the ways in which these slides can best be designed and used in History teaching and learning.

Sampling

When it came to the sampling of the study, a very important consideration was the size of the sample to present the population. The population of the study was all the individuals in South Africa who were teaching FET History in technology-rich schools in South Africa. The size of the sample necessary for the study to be representative of the population depended on the degree of homogeneity of the population. Generally in homogeneous populations, where the members are similar with respect to variables that are important to the study (see next paragraph), smaller samples may adequately represent the population (De Vos, Strydom, Fouché & Delport, 2011:148).

To ensure that the sample was as representative as possible, non-probability purposive sampling was used. In non-probability purposive sampling the odds of selecting a particular individual was not known to the researcher, and the researcher does not know the population size of the members of the population (Gravetter & Forzano, 2003:118). This type of sampling is based on the judgement of the researcher, in that the sample is composed of elements that contain the most characteristic representatives of the population that serve the purpose of the study best (Grinell & Unrau, 2008:153; Monette, Sullivan & De Jong, 2005:134). The sample of this study included six teachers sampled from three different secondary schools in the Pretoria-Witwatersrand area. The rationale for the setting of the study was their proximity to the researcher, and that these schools have been known for their implementation of technology initiatives. The main criteria for the selection of the participants were that they have experienced the implementation of PowerPoint presentations in the History classroom, that they were FET History teachers, and that the

schools at which they were working were technology-rich schools with access to laptops, LCD projectors and online resources.

The smaller number of participants in the study allowed the researcher to go into greater depth with each teacher in terms of the ways in which PowerPoint slides made a difference in their classrooms, and how the slides could be improved to have a more significant effect on the learners' retention and comprehension. In similar case studies researchers such as Athanasouplos (2004) have used as few as one participant.

Data collection

The six identified participants were contacted for their willingness to participate in the research project. To ensure the anonymity of the teachers, they were labelled as Teachers #1 to #6. Only two of the teachers responded voluntarily to participate in the project, namely Teacher #1 and Teacher #5. Teacher #1 was a 33-year old male who completed a MEd degree and a professional teacher's qualification; while Teacher #5 was a female, who obtained a BA degree and a professional teacher's qualification, and who chose not to reveal her age. Both taught FET History, respectively for Grades 10 and 12, and their combined teaching experience was 33 years. Teacher #1 uses PowerPoint slides on average three times per week, and Teacher #5 uses these slides every day.

Individual one-to-one interviews were conducted with the two teachers. The purpose of the interviews were, as Sewell (2001:1) puts it, "... an attempt to understand the world from the participant's point of view, to unfold the meaning of their experiences, [and] to uncover their lived world prior to scientific explanations". The following ethical considerations were negotiated with the two teachers: anonymity, voluntary participation, and confidentiality. The interview schedule was an adapted version of an interview schedule used by Johnson (2011:145-148) entitled *Effectively using presentation technology in the History classroom.* The following four questions were included in the interview schedule:

- Did the introduction of PowerPoint slides change your approach to lesson design and presentation?
- Did the different components of PowerPoint slides scaffold the learners to better remember (retain) historical information, and understand how the

information fits together in terms of cause and effect to better comprehend history in general?

- What are the advantages of PowerPoint presentations?
- What are the disadvantages of PowerPoint presentations?

Data analysis and interpretation

Qualitative data analysis is usually based on an interpretative paradigm aimed at examining the meaningful and symbolic content of the qualitative data. A deductive approach was used for the data analysis of this study. Consequently, the categories of information required from the data were formulated in advance. The *a priori* categories were identified from the literature dealing with presentation technology as mediator of retention and comprehension in History education. The information gathered during the interviews were transcribed and coded with open codes that were developed from the research questions, and axial codes that were developed from the types of possible improvements that can be made. All data were viewed through the lens of schema theory. The analysed data were classified under the following five identified *a priori* categories:

Lesson design and presentation

Both teachers stated that the use of PowerPoint presentations resulted in positive changes in their classes. Teacher #1 noted that the use of the PowerPoint slides changed the format, but not the structure of his lessons, "I still follow the three phases of a lesson – the introductory phase, the middle phase and the concluding phase". However, he noted that he had to think differently about his lessons, because of the inclusion of the media. He also indicated that he reveals the new content more easily and systematically, and that the PowerPoint presentations allowed him to teach the subject content in a much more effective way: "It helped the learners to link the bulleted information to the images". For Teacher #1, the comparisons and contrast of events also became easier, and he cited an example from the topic, *The world in 1450* – with the PowerPoint slides, it was possible for him to compare and contrast the nature of power, power relations, technology, economy and trade in the different societies in the world of the mid-fifteenth century – West Africa, China, India, the Ottoman Empire, the Americas, Europe, and Southern Africa. Teacher #5 stated that technology has also improved her

classes: "It made the lesson presentation easier, faster and more specific". She then indicated that it also made complex events easier to explain, such as the topic *How did Uhuru lead to different types of states in independent Africa?* It allowed her to present the types of states that were set up in stages. She went on to explain that with the PowerPoint slides, she could play clips from YouTube while presenting the information in stages. She also demonstrated how she successfully used a timeline of how South Africa emerged as a democracy, and turned it into a narrative using pictures, cartoons, and newspaper clippings on the slides.

Different components of PowerPoint slides

From the interviews, it became clear that the common components of PowerPoint slides (bulleted information, images, audio files, audio-visual files, interactive web-based files) changed the way the two teachers assisted their learners to better retain the subject content, and comprehend history in general. The first component the researcher asked the participants to comment on was the placement of the words on the slides. Both teachers indicated that the bullet format was a concise and easy way to present the content, "... but most learners will write down the bullet, and one or two more ideas from the discussion, but still do not understand the topic at all". (Teacher #1). Teacher #5 noted that, "... in my classroom I experience that the many bullets bore the learners ... ". She demonstrated that the best way to keep the learners' attention is group work, the learners read the bulleted words in groups of three or four, talk about them, followed by a whole class discussion. She uses questions to analyse the content of the lesson, and encourage the learners to critically discuss the topic of the lesson.

The second component was the use of images. Both teachers argued that images make history come alive. Teacher #1 indicated that using images in PowerPoint presentations are invaluable, because "... the pictures are so real … and the conversations around the pictures are valuable because the learners are engaged in critical thinking when they discuss pictures". With the pictures, the learners' link the content of the lesson to concrete images. Teacher #5 responded by calling the use of images valuable, and confirmed that the images assist the learners to associate the real world images with the facts. She described a class where she was having a discussion about the various forms of protests against globalisation, and she was able to get the learners to think critically about the protests, by having them participate in an activity

where she showed them a picture to associate with the form of protest. The interviewer then moved to the third component of PowerPoint presentations, namely the use of audio files. According to Teacher #1, his learners get bored with audio recordings "... because they are not used to listening any more ...". However, he mentioned that Robert Mugabe's speech after ZANU-PF won the elections in 1980 was an essential part of the lesson on Zimbabwe's independence history, because the learners were fascinated by listening to a current controversial figure's voice from the past. Although Teacher #1 is a Grade 10 History teacher, his referral to the latter historical event was related to a theme in the National Curriculum Statement for History (Grade 12), entitled *Decolonisation and African nationalism*. The learners had more personal contact with the historical event. Teacher #5 noted that audio files such as recorded speeches are valuable, but that the sound may be a problem. Her only advice was to keep the clips short because they do not hold the learners' attention very long.

With regard to the fourth component of PowerPoint presentations, audio-visual files (animated graphics and movie and video clips), Teacher #1 was of the opinion that they are good, but technical difficulties are often a problem. For Teacher #5, the audio-visual files made the subject content easier to understand: "... they see and listen and they understand …". When looking at the fifth component of PowerPoint presentations, the interactive web-based files (web modules, online libraries and museums), Teacher #1 indicated that they may be very useful, and admitted that he did not use them yet. Teacher #5 indicated that she had not yet used online modules, but used online libraries such as the Google search engine. She also indicated that she encouraged her learners to "… Google when they have to do projects and/or write an essay".

Learner retention and comprehension

Both interviewees recommended that teachers of History should use various teaching and learning strategies to promote learner retention and comprehension. Teacher #1's response in terms of what teaching and learning strategies got the best results in retention was as follows: "… the methods used in the majority of South African History classrooms are still the chalk-and-talk and textbook methods". He noted that the repetition of the information from the textbook will not lead to retention, because the learners do not participate in the lesson; he emphasised that "... the best strategy to improve retention, is

for the learners to formulate their own understanding of an aspect, and write it down, …". Teacher #5 suggested activities that relate to the learners' real life experiences: "… to relate the classroom activities to present-day examples for the learners". Teacher #5 also responded that the most significant factor in the retention of the subject content was commitment. Both teachers were of the opinion that to teach the learners to put themselves into the shoes of people from the past, will improve their retention of the content.

When asked about what methods best promoted learner comprehension of historical content, Teacher #1 responded visual aids, such as pictures, charts or diagrams; and then concluded that, "Any activities will improve comprehension". Teacher #1 further recommended that, if learners were asked to go through a narrative, summarise the narrative in their own words, and then write an essay on the topic, the chances are that they will understand and comprehend the concepts and content much better. He also indicated that mind maps are vital for the learners to remember the historical facts and content. Teacher #5 demonstrated that a good method is to "Show a movie or a news clip, link it to the learners' pre-knowledge ... followed by a discussion to determine what they understood and knew … improves the learners' understanding". On the question, what in her opinion are the best methods for promoting the highest levels of comprehension of the content, she responded that discussions which involve as many learners as possible, but that the learners also had to write, construct an argument, and base their argument on primary and secondary evidence.

Advantages and disadvantages of PowerPoint presentations

When asked about the advantages of PowerPoint presentations, the teachers responded that it changed their lesson presentations: Teacher #1 indicated that "... the information was easier to read, and ... it supports the other teaching and learning methods". Teacher #5 listed the following benefits of PowerPoint presentations: History teachers can be more creative, the slides are interesting and make the topics easier for the learners to understand, and can quickly be adapted as circumstances demand.

According to the two teachers, there were some disadvantages to the use of PowerPoint slides in the History classroom. Both teachers indicated that the learners spend much more time copying the notes than engaging with the content. For Teacher #1, the biggest disadvantage was that if there was a

power failure, or if the LCD projector or PC were not working on his slide show days, he was stuck, and cannot proceed with his lesson. Teacher #5 indicated that oversimplification is one of the dangers of using PowerPoint presentations, because "… with complex issues such as the theories of race and eugenics the learners can only see a few of the dimensions, and then the slide show moves on". Teacher #5 also cautioned that if a History teacher does not combine different teaching methods such as debates, historical enquiry, research projects, creative responses and field trips with the PowerPoint slides, the learners may get bored.

Discussion

The results of the data analysis of the study revealed that both of the interviewees experienced the use of PowerPoint presentations as an improvement in their classes. They indicated that with the PowerPoint slides they started to think differently about their lessons, revealed the new content more easily and systematically, taught the subject content in a much more effective way, and that comparisons and contrast became easier, and complex events were easier to explain. For both teachers, using the five common components of a PowerPoint presentation changed the way they assisted their learners to better retain the subject content. The placement of the words on the PowerPoint slides was a concise and easy way to present the content and made it easier for the learners to follow, read and memorise. However, the learners remained passive during the lessons. They listen to the teacher-talk and write some of the bulleted information down, but they did not really understand the content of the topic. Consequently, they absorb the textbook knowledge into their short-term memory without any retention and comprehension of the subject content. The research findings of Johnson (2011:84) and Tamura (2004:80-91) confirm that rote-learning and memorisation do not facilitate retention, comprehension and deep learning. The subject content enters the short-term memory, stays in the short-term memory for a short period of time, and then leaves it again, and the learners forget the learned information.

Presentation technology such as PowerPoint slides were originally designed for the business world. As a result, when it was adopted in the classroom, the format which was traditionally followed in the business world also became the format in the History classroom. The reduction of historical narratives to a series of bulleted information resulted in various pedagogical problems (passive-listening learners, teacher-talk, memorisation, rote-learning, loss of retention,

lack of authentic examples, no or a few images, textbook knowledge, and so forth.) which made it especially ill-suited to facilitate the learners' retention and comprehension of the subject content. Retention as the capacity of learners to remember modelled behaviour (subject content) requires a learner to form an accurate cognitive version of the modelled behaviour (long-term memory retention). Retaining the information requires cognitive (imaginary practice such as a personal opinion on why archaeological evidence is valuable) and enactive rehearsal (doing an activity such as summarising the main points of a narrative as part of a written assignment). Only after much cognitive and enactive practice will the subject content become part of the learners' symbolic code that they need to perform a higher order level oral or written activity, such as to read the following famous saying of Edmund Burke: "All that is necessary for the triumph of evil is that good men do nothing", and then explain its relevance in terms of the abolitionist movement. Comprehension then is the History learners' understanding of the subject content, knowing what is being asked and making use of the idea appropriately in an action.

Both of the interviewees indicated that one of the greatest disadvantages of the use of PowerPoint slides was the lack of interactivity and discussions during the slide shows. They argued that passive learners lose interest and become bored. Hess (2004:151) confirms that interactivity and discussion will actualise the learners' prior knowledge and promote retention and comprehension of the subject content. Coohill (2006:445-465) and Johnson (2011:112) recommend that the original format of the PowerPoint slide shows will have to change. The slides should contain not only words but also images as these have a significant impact on the learners' retention and comprehension of the subject content. One of the teachers, Teacher #5, also recommended that to engage the learners with the content and to make the PowerPoint slides more history-friendly, interactivity and discussion during the slide shows are important. Teacher #5's recommendation for more history-friendly slide shows was comprehensively addressed in the recommendations section of this article. Cognitive load theory confirms the negative effects of repetition, and the positive effects of differentiated instruction (Protheroe, 2007:36-40).

In an attempt to find the conditions under which the information in the short-term memory is best transferred to the long-term memory without being lost, research findings (Lipscomb, Guenther & Mcleod, 2007:120-124; Paas, Renkl & Sweller, 2004:1-8) demonstrate significant increases in the transfer

of subject content to the long-term memory when real life images, visuals and audio-visual materials, and multimedia presentations are used. According to Mayer (1996:151-161) and Prawat (1996:215-225), the consistent use of real life images promotes the learners' retention and comprehension because it actualises the learners' authentic experiences. According to schema theory, when learners are invited to make comments and/or contributions to a lesson, they are often speaking from their own prior knowledge, a precondition for the subject content to move from learners' short-term to their long-term memory, where it has to be linked to the web of information already present in the long-term memory. The latter takes place through the actualisation of the learners' prior knowledge. Constructivism (the radical and social branches) confirms the active role of the individual learner (interactivity and discussion) in the construction of knowledge, the importance of the social and individual experience of the learners in the process of learning (learner prior knowledge), and for the teachers' acknowledgement that knowing has its roots in biological or neurological constructions (schema theory). Cognitive constructivism emphasises that an individual can come to know reality as it exists external to him-/herself, and that the acquisition of this knowledge is a (re)construction of the external reality into the learners' internal mental structures.

Conclusion and recommendations

The results of this study pointed to several challenges and changes to the current design and use of PowerPoint presentation technology in the History classroom. The challenges identified and changes recommended were as follows: the bulleted information on the slides to be changed to narratives to limit the learners' rote-learning and memorisation of the subject content which result in little or no retention and/or comprehension; the elimination of teacher-talk and passive-listening learners by introducing interactivity and discussion during the PowerPoint slide show to actualise the learners' prior knowledge, counteract disinterest and encourage enthusiasm; and the inclusion of modalities and materials within the PowerPoint slides to promote learner activity, interest, retention and comprehension of the historical material. More history-friendly PowerPoint presentations can make the subject content more accessible to the learners to maximise the learners' long-term memory retention, enhance the comprehension of the subject content, and improve the learners' academic engagement and performance. Table 1 (below) contains a comparison of the current and the proposed PowerPoint

slide designs:

Table 1: From the business world format to a history-friendly format

Current design – business world format	**Proposed design – history-friendly format**
Bulleted information	Nutshell narratives
No or few images	Modalities and materials on every slide
Passive learners	Active learners
Teacher-talk, listening learners, textbook knowledge	Interactivity, discussion, prior knowledge, textbook knowledge
Memorisation, rote-learning, forgetting, poor engagement and performance	Retention, comprehension, engagement, performance

Johnson (2011:84-113) describes a history-friendly PowerPoint pedagogy to promote interactivity and discussion during PowerPoint slide shows. The latter is also the format proposed for future use in South African History classrooms. For him (Johnson, 2011:84-113), the history-friendly PowerPoint pedagogy should include among others the following four elements:

Interactive atmosphere: One of the ways for History teachers to create an interactive atmosphere is to connect the topic of the lesson to the learners' prior knowledge by starting the lesson with a 5-minute discussion of the important news of the day and/or a summary of the current world events. This activity will connect the historical information of the lesson to the narrative that is already in the learners' long-term memory, and this will result in a more authentic discussion of the subject content as it connects to the learners' context.

Nutshell narratives and discussion: The subject content on the slides should be presented in concise paragraphs. Tamura (2003:80-91) termed these paragraphs nutshell narratives. The nutshell narratives are teacher-created, and chronologically arranged in combination with visual/audio-visual material on the slides. The History teacher then discusses the narratives briefly or in-depth, and link them to the information in the textbook. Finally, the learners summarise the main points of the narratives in writing. This force them to become engage with and think about the information in the text. At the end of the lesson, a hand-out with the information on the slides is distributed to the learners to prevent them from copying the information from the slides.

Meta-cognition and reciprocal and direct explanation: An important way to facilitate discussion or debate is to employ teaching and learning activities related to primary sources. Wineburg (2007:6-11) encourages teachers to introduce learners to primary source material to promote constructivist critical thinking about history. It is the key to the learners' ability to transfer subject content to the long-term memory. Intellectual discourse and high level discussion of primary sources on PowerPoint slides should be facilitated by means of two approaches. The first approach is the reciprocal approach, where the learners are requested to summarise the content on the slides, and identify and question the main points. The teacher clarifies the content to the class as a whole, and asks the learners to predict what will happen next. The second approach is the direct explanation approach, where the teacher explains his/her own interpretation of an opinion on the content which is then used to model the meta-cognitive historical thinking of the learners. A combination of the two approaches dramatically improves the performance of the learners.

Timelines, flow charts, retention and comprehension: The use of timelines and flow charts are important for the retention and comprehension of subject content. The learners in groups of five create a timeline from the events included in a cause and effect flow chart, pick out the ten most important turning point events, provide reasons for their choice, indicate why these events are important, and relate the events to their own thoughts about the history and current events in the news. Additionally, the learners in partner pairs create a flow chart of a cause and effect chain of a series of events. A combined timeline and flow chart activity can activate the learners' prior knowledge by connecting their prior understanding of an historical event to the event under study. The latter serves as a graphic organiser to assist the learners to create a framework to place the events into.

The results and recommendations of this study were intended to supplement the current good practice in South African History classrooms. The value of the study for schools that do not yet have access to higher levels of technology may be limited; but despite this limitation, trends applicable to those schools that have access were identified. Notwithstanding the above, the best learning often takes place once the technology has been turned off.

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