Different Types of 'Background' of Illustration-based PowerPoint Slides: Anatomy Teachers' Preferences and Perceived Influence on Learning

Shafinaz Gazi[1]*, Khondker Manzare Shamim[2]

[1]Assistant Professor,
Department of Anatomy,
Bangabandhu Sheikh Mujib Medical
University (BSMMU),
Dhaka, Bangladesh.
Email: shafinazgazi@bsmmu.edu.bd,
Orcid ID: 0000-0001-5157-3835

[2]Professor (retired),
Department of Anatomy,
Bangabandhu Sheikh Mujib Medical
University (BSMMU),
Dhaka, Bangladesh.
Email: manzareshamim@bsmmu.edu.bd,
Orcid ID: 0000-0003-2520-2250

*Corresponding author

Abstract

Background: Teachers are often in dilemma on how to use illustrations effectively in teaching Anatomy using multimedia (for e.g., PowerPoint) slides. 'Background' is an important element for creating illustration-based PowerPoint slides but is often overlooked when designing such slides. Some general guidelines on the PowerPoint slide background for presenting textual materials are available, but guidelines on the background for presenting illustrations in PowerPoint slides are almost nil. This descriptive type of observational study was part of a broader research that was designed to assess the preferences of Bangladeshi Anatomy teachers towards different types of background of illustration-based PowerPoint slides and their perceived influence on learning. **Material & Methods:** A survey was conducted among 39 Anatomy teachers from Bangladesh. Seven PowerPoint slides with one same pair of Neuroanatomy illustrations but seven different types of background dealing with the following characteristics were shown to them to collect their preferences and perceived influence on learning: White/Light-coloured homogeneous/Dark-coloured homogeneous; Slightly decorated/Heavily decorated; Related to subject/Not related to subject. **Results and Conclusion:** The survey revealed that most of the participants preferred either light-coloured homogeneous background (around 64%) or white background (around 60%). The least preferred (about 18%) one was the heavily decorated background not related to the subject. Some interesting trends of preference were also observed, including those related to male and female teachers as well as to their length of experience. In most Anatomy teachers' perceptions, learning would be influenced by using their preferred 'backgrounds'. Although the results of the present study reveal some insight into the preferences of Anatomy teachers and their perceived influence of different illustration-based PowerPoint slide 'backgrounds' on learning, further studies are recommended on larger samples focusing on more specific issues of PowerPoint slide backgrounds before making any conclusive comments on these issues.

INTRODUCTION

Human anatomy is the scientific study of the form, position, size and relationships of the structures in the body.[1] It is obvious that Anatomy is quite a visual subject. Thus, for better understanding, visual materials like illustrations (also called pictures, figures,

images etc.) are important elements in teaching-learning of this complex science. Anatomists involved in education around the world are often in a dilemma about the best method of transmitting that visual information to students in an efficient and cost-effective way. Nowadays, with the advancement of computer technology, multimedia software like PowerPoint has become a common[2] and popular[3] teaching component in classrooms. It is also used by anatomists to project complex anatomical illustrations because it is time saver,[4] convenient to use[5] and cost effective.[1] It is assumed that PowerPoint is popular with most students.[3,6-11] Amare[11] thinks that "PowerPoint is more visually stimulating", so, this popularity may be for that "eye candy" aspect of PowerPoint. Teachers also prefer PowerPoint for their classes.[12,13] Perhaps, as Wanner[14] thinks, teachers like it for the ease in presenting material and the structure it provides to their presentation. He said, "It helps me to structure content and presentation". He also uses it "for student's engagement and active learning." However, teachers are often reluctant to give adequate time required to convert teaching materials to an appropriate PowerPoint slide.[5] It is very much understood that every slide has a 'background'. Obviously, the visual impact of a slide is a combined effect of the foreground material and the background. So, 'backgrounds' are an important element for creating an engaging presentation. However, they are often overlooked when designing PowerPoint slides.[15]

PowerPoint 'backgrounds' have been describe as images or design elements that are placed on slides behind whatever text, charts, images, or other objects are presenting.[15] For the present study, the term 'background' meant the white/homogeneous/decorated surfaces on which illustrations were placed in a PowerPoint slide.[16] There are very small number of instructional guidelines for the 'background' of textual material on the PowerPoint slides available in the literature, but no such guidelines on the 'background' of illustrations on PowerPoint slides were available in the hands of the present researchers while doing this research work.

A very essential and important component of PowerPoint slides is its colour. In addition to the colours used in the text or illustrations, a slide's background may be white, black or coloured. Colour is a central component of primate vision,[17] and is believed to be the most important visual experience to human beings.[18] Wichmann et al.[19] asserted that "colours must be recognised as capable of motivating students to learn and profit from their educational experience". Texture, patterns and other graphics add to the armoury of visual characteristics of these backgrounds. Anyone creating or looking at a slide cannot ignore their presence. Therefore, in order to make the visual experience of looking at a slide pleasant, eye-soothing as well as a meaningful contributor to learning, proper guidelines for creating and using appropriate backgrounds are essential. And in the process of developing such guiding principles, the importance of stakeholders' involvement is unquestionable. Perceptions, experiences, views, and opinions of teachers of different social and educational communities, therefore, prove to be invaluable resources. The present survey-based research was

designed to gather information on the feelings of Anatomy teachers of Bangladesh about different aspects of the 'background' of illustration-based PowerPoint slides for the first time and assess their preferences and perceived influence on learning. It is to be noted that this article is a part of a two-article series in which the previous article deals with the results of a focus group discussion among eight Anatomy postgraduate students of Bangladesh on the same issues as the present article.[16] These two researches on slide background are actually part of a much broader study exploring different aspects of presenting illustrations in PowerPoint slides that also includes a performance-based experimental study on undergraduate medical students of Bangladesh.

MATERIAL AND METHODS

The present study was a questionnaire-based survey among Bangladeshi Anatomy teachers, making it a descriptive type of observational study. The objective of this particular part was to gather information about the feelings of teachers in Anatomy on the use of different types of 'background' on which one same pair of Neuroanatomy illustrations were placed in PowerPoint slides. For this, an SMS (Short Message Service) of invitation was sent to 136 teachers who were of the levels from Assistant Professor to Professor using the list made by the Anatomical Society of Bangladesh. Forty-eight teachers responded. The responders who formally agreed to participate; who used PowerPoint slides for teaching; and who taught Neuroanatomy were included. Thus, a total of 39 teachers were selected in the survey. The teachers assessed the slides for their preferences of backgrounds and their

perceived influences on learning of the subject (Neuroanatomy). The analyses were done in the Department of Anatomy, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh.

In PowerPoint slides, text materials are commonly placed directly on the slide background, but an illustration can be placed either with its surrounding colour, that can be called the 'base colour' (Figure 1A), or directly on the slide background without any surrounding 'base colour' (Figure 1B). Anatomy books usually place illustrations on white pages, and this makes a white 'base colour' for these illustrations. Most of the Anatomy illustrations available on the internet are also placed on a white 'base colour'. Keeping this in mind, the questionnaire was designed by placing one pair of coloured Neuroanatomy illustrations,[20] each having a 'white base', on the seven following 'types' of 'background' in PowerPoint slides (Figure 2) to collect information about the feelings of the teachers in Anatomy regarding their preferences of those slides and perceived influences on learning:

- **Slide- a:** White background
- **Slide- b:** Light-coloured homogeneous background
- **Slide- c:** Dark-coloured homogeneous background
- **Slide- d:** Slightly decorated background not related to the subject,[21]
- **Slide- e:** Heavily decorated background not related to the subject,[22]
- **Slide- f:** Slightly decorated background related to the subject,[23]
- **Slide- g:** Heavily decorated background related to the subject,[24]

177

Here, the term 'homogenous' indicated plain, solid backgrounds without any figure, texture or pattern and the term 'decorated' indicated backgrounds with figurative graphics or other pattern or design, either related or not related to the subject of Neuroanatomy. For selecting the slide backgrounds, more than a hundred slide designs available in PowerPoint and other sources were examined.

The idea behind the questionnaire was to identify the facts about "How the teachers feel". Following this idea, the questionnaire comprised a series of statements with some probable response options. There were also open-ended response options for getting explanations or comments on the multiple-option questions. A soft copy of the questionnaire was sent by e-mail as a 'PDF file' to the participants. Their responses, collected over telephone, were noted by ticking or writing (as applicable) on a printout copy of the questionnaire by the researchers. When telephone or e-mail correspondence was inconvenient, a printout copy of the questionnaire was supplied to get the participants' own hand-ticked and hand-written responses. Microsoft PowerPoint 2010 was used to construct the exemplary slides for the questionnaire. After construction, the slides were copied from PowerPoint and pasted on the Word file page of Microsoft Word 2010 accordingly and the questionnaire was developed with those illustrated slides. The survey provided primarily qualitative data. However, some quantitation of these data was done. Thus, percentage frequencies of responses were calculated using the Statistical Package for Social Sciences (SPSS) Version 17.0. The open-ended responses (asking for responses other than the given ones) were dealt with separately.
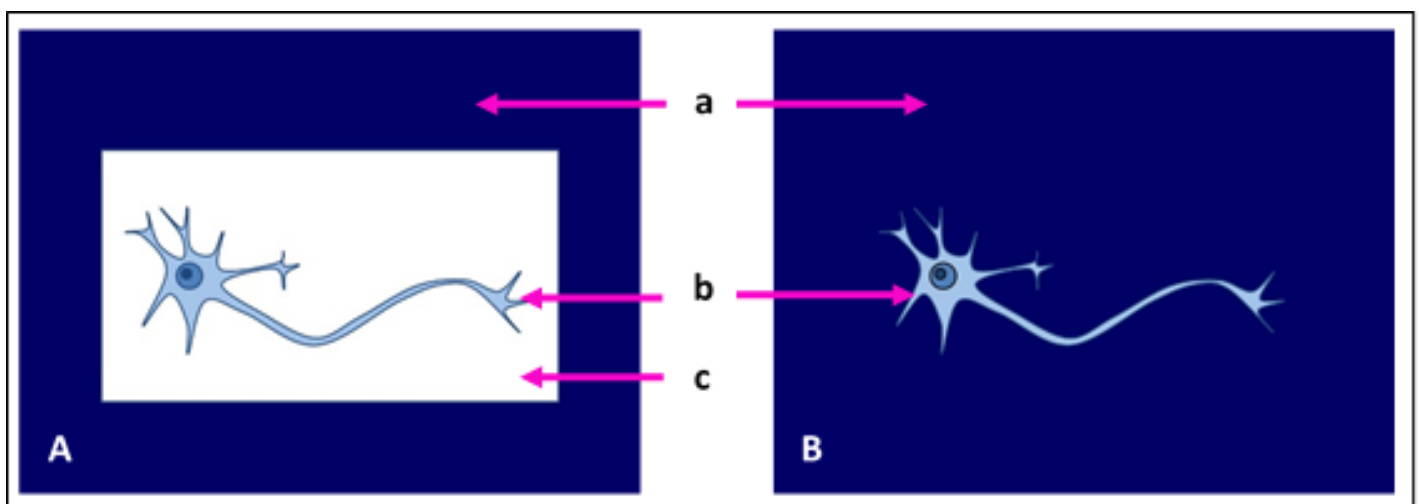

Figure 1: A hypothetical illustration in two hypothetical slides to show the different components of an illustration-based slide. Slide A: Illustration with a white 'base colour'. Slide B: Illustration without any 'base colour'. a: slide background; b: illustration; c: illustration's 'base colour'.
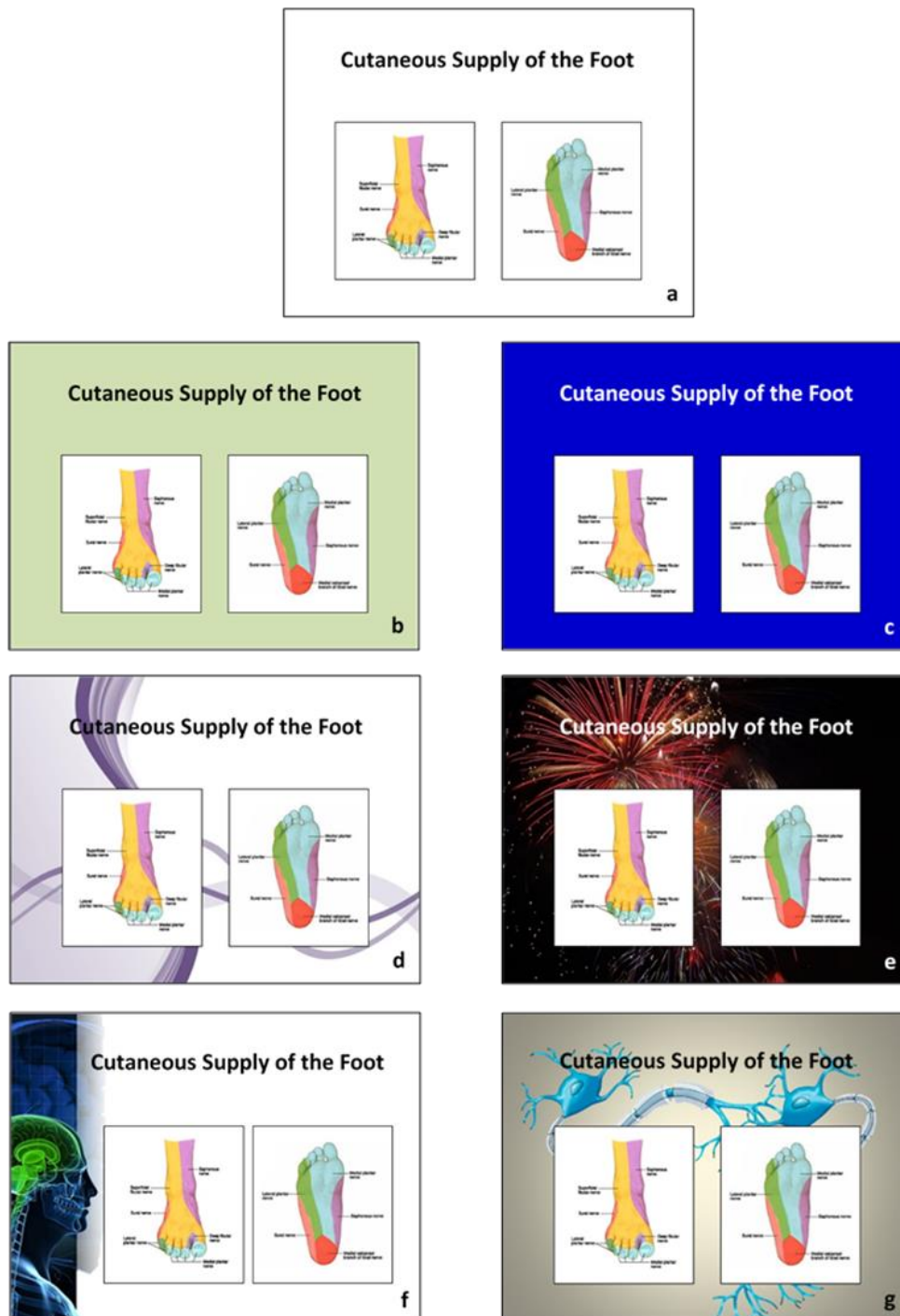
Figure 2: Different types of 'background' of PowerPoint slides on which the same pair of Neuroanatomy illustrations were placed to show to the Anatomy teachers participating in the survey.

RESULTS & DISCUSSION

The survey on the preferences and perceived influences of different 'backgrounds' in illustration-based PowerPoint slides on learning was participated by 39 Bangladeshi Anatomy teachers. Details of the participants are shown in [Table 1].

In the previous study of the present researchers,[16] eight postgraduate Anatomy students' feelings had been gathered through an FGD, which had naturally been based on an open-ended but facilitated discussion. Thus, there had been scope for everyone's feelings to be influenced by others. Frequencies of preferences had not carried much importance. Each individual expression had been considered valuable. On the other hand, the present study, being a survey, dealt with frequencies of preferences and their distributions, characteristics of the anatomists, like the length of experience and gender were addressed. In addition, each teacher was asked to give reasons for her/his feelings by choosing from specific supplied options. They also had scope for giving reasons freely. Thus, each teacher answered individually, unaware of what other teachers thought.

Students and teachers are related to PowerPoint presentations differently. While students experience them principally as viewers during learning sessions, teachers use them as creators and users as well as viewers. Thus, students relate to the PowerPoint slide background more passively than teachers. Teachers' viewpoints are multiple and are both active and passive. Students face slide backgrounds for being attracted, engaged, and focused, etc., or for the opposites. Teachers, on the other hand, have to consider their own tastes, students' choices, and possible effectivity in students' learning etc. As teachers take the main responsibility for what and how their students learn, they should keep in mind that technology can only enhance style, but contents depend on the presenter.[25] Creating a well-designed PowerPoint presentation is not intuitive and therefore a teacher should look for guidance.[4]

Colours can be used for communication.[26] Sense of colour is important for the teachers to create PowerPoint slides especially for choosing colour of slide's background. About 65% of the total participating teachers preferred 'light-coloured homogeneous background' (Slide- b) and the next preferred background was 'white' (Slide- a), selected by around 60% respondents. However, the least preferred background was the 'heavily decorated' one not related to the subject (Slide- e) that was liked by only 18% teachers. The frequencies of different reasons identified by the teachers for preferring the particular types of background are presented in [Table 2], and the frequencies of overall preferences are shown in [Figure 3A]. Berk,[27] suggested choosing a simple template or solid colour background that is not distracting from an image content and avoiding logos and other irrelevant graphics. He also suggested using cool coloured background for high contrast foreground to make the content more legible. These suggestions somewhat reflected in the results of this part of the present study.

Interestingly, as Figure 3B shows, more than 15% of the teachers included all the seven types of background in their preference list. Almost 18% preferred only the 'light-coloured

180

homogeneous background' (Slide-b). Equal proportions (about 8%) of the teachers chose only 'white' (Slide- a) and only 'dark-coloured homogeneous' (Slide- c) backgrounds. Perception of colour has been regarded as crucial to visual memory.[17] Generally, it may depend on individual differences[28] including personal tastes. Moreover, individuals' learned associations[18] with varied factors and myriad cultural issues[29] may have their impact on such perceptions. The background of slides, especially its colour, therefore, is such an attribute, the like or dislike of which is very likely to be determined by complexly interrelated and apparently unrelated influencing forces.

Figure 3C compares the responses of the Anatomy teachers of the present study with teaching experiences of 'up to 10 years' and those with experiences of 'above 10 years' regarding the slide backgrounds. The most preferred background to both the less experienced and the more experienced teachers were the 'white' (Slide- a) and the 'light-coloured homogeneous' (Slide- b) ones respectively. In general, the decorated slides were preferred to the less experienced group than to the more experienced group. The teachers having less than 10 years teaching experience, who are assumed to be younger than those having experience of 10 years or more, were more inclined to choose the 'coloured' backgrounds than the 'white' background, and vice versa.

Again, 25 of the teachers were female and fourteen were male in the present survey. Figure 3D shows that around 64% of these female teachers and the same percentage of the male teachers had the 'light-coloured homogeneous background' (Slide- b) in their list of choice. Sixty percent of the female teachers and around 64% of the male teachers had the 'white background' (Slide- a) in their list. Thus, for these two slides, there was no or little gender difference. It should be noted, however, that these frequencies were not mutually exclusive, as the teachers were given the option to choose more than one background as their preferred one. Thus, for the other five slides, the frequencies of being in the chosen list were 13% to 26% higher in the males than in the females (for the 'dark-coloured homogeneous' background and 'heavily decorated background related to the subject' respectively). About 50% of the male teachers kept the 'heavily decorated background related to the subject' (Slide-g) in their chosen list compared to only 24% of the female teachers. The results indicated that in addition to almost similar frequencies of preferences towards the 'white' and 'light-coloured homogeneous' backgrounds, the male teachers also had relatively more inclinations towards the more 'decorated' type backgrounds than the female ones. A survey[30] of Chen, Zeng and Rao shows that both male and female participating students "love" white background and "hate" purple one.

It is interesting to note that in the present study (Table- 2), in responding to the statement on why s(he) would like to use a particular type of slide out of the seven supplied, the proportion of teachers choosing "I don't know why" varied from 0% (for the 'white' and 'light-coloured homogeneous' backgrounds) to about 29% (for the 'heavily decorated background not related to the subject').

When asked to respond on the statement, "The types of background used in illustration-based Neuroanatomy PowerPoint slides can influence learning", most of the participating teachers either agreed (about 70%) or tended to agree (around 23%) to the statement (Figure 4). On this regard, Jones[5] suggested that appropriate use of PowerPoint can enhance the teaching and learning experience. "It is a valuable aid to presentation providing that its use has been carefully considered in terms of pedagogy", he further added.

In the present study, a special point has to be made here. In this survey the Anatomy teachers were sent paper-printed representations of the slides, rather than showing them the slides with multimedia projector. As expected, the brightness of the paper printed slides was decreased and the colours somewhat altered in the present research compared to the real slides. This might have influenced the feelings of the teachers.

Table 1: Personal information of the participants of the survey

Information	Frequency (N = 39)
Designation	
Professor (or equivalent)	12 (30.77%)
Associate Professor (or equivalent)	20 (51.28%)
Assistant Professor (or equivalent)	7 (17.95%)
Experience in teaching Anatomy	
Up to 10 years	27 (69.23%)
>10 years	12 (30.77%)
Gender	
Female	25 (64.10%)
Male	14 (35.90%)

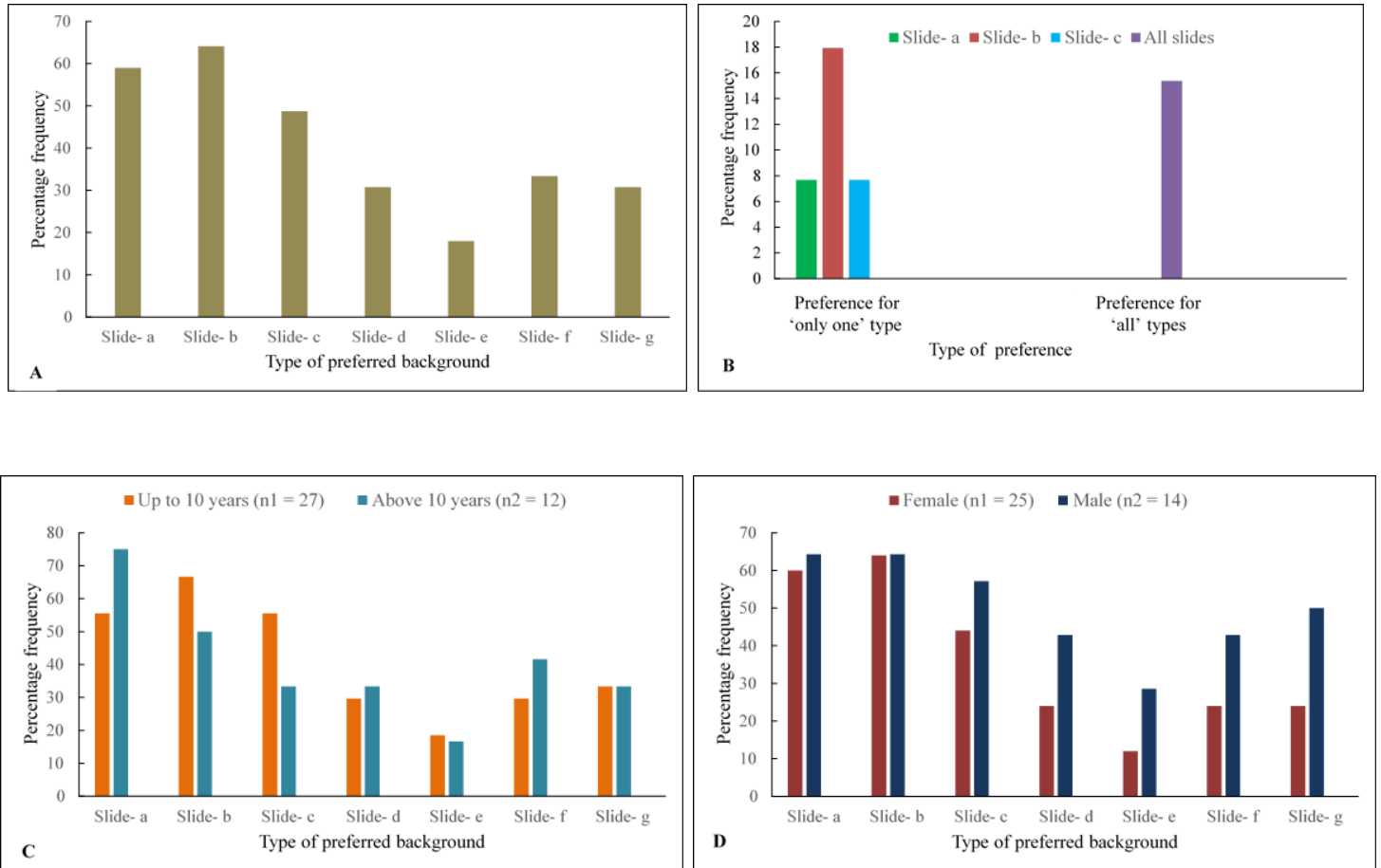N: Number of participants in the survey

Figure 3: Frequencies of preferences of the Anatomy teachers (N = 39) to different 'types' of background from different perspectives (sum of the frequencies may not be 100% because the respondents were allowed to choose more than one type): A. Overall preferences; B. Preferences for "Only one type" and "all types"; C. Experience-wise preferences; D. Gender-wise preferences.

Table 2: Feedback of Anatomy teachers (N = 39) on the use of different types of 'background' on which a pair of illustrations were placed

Feedback	Frequency*
Of the seven supplied PowerPoint slides, **I would like to use slide- a because**	**(n = 23)**
a) (I don't know why)	0 (0%)
b) I don't like coloured or decorative backgrounds.	7 (30.43%)
c) students can concentrate on the illustrations only when the background does not differ in colour from the illustrations.	18 (78.26%)†
d) of other reasons: "Multicoloured illustrations on white background look good and not distracting"	1 (4.35%)
Of the seven supplied PowerPoint slides, **I would like to use slide- b because**	**(n = 25)**
a) (I don't know why)	0 (0%)
b) light-coloured backgrounds always attract me.	7 (28.00%)
c) light colour is less contrasting but enough for highlighting the illustrations against the background, and so students would easily concentrate on the illustration.	22 (88.00%)†
d) of other reasons.	0 (0%)
Of the seven supplied PowerPoint slides, **I would like to use slide- c because**	**(n = 19)**
a) (I don't know why)	1 (5.26%)
b) dark-coloured backgrounds always attract me.	0 (0%)
c) dark colour is more contrasting and can highlight the illustration more clearly. So, students would be able to concentrate easily on the illustration.	18 (94.74%)†
d) of other reasons.	0 (0%)
Of the seven supplied PowerPoint slides, **I would like to use slide- d because**	**(n = 12)**
a) (I don't know why)	1 (8.33%)
b) slight decoration makes this slide attractive but won't distract students' attention from the illustrations.	8 (66.67%)†
c) students would enjoy this type of slightly decorative background more than a white background.	4 (33.33%)
d) of other reasons.	0 (0%)

Feedback	Frequency*
Of the seven supplied PowerPoint slides, **I would like to use slide- e because**	**(n = 7)**
a) (I don't know why)	2 (28.57%)
b) although this type of backgrounds is more attractive than simple backgrounds, they wouldn't affect students' attention to the illustrations.	3 (42.86%)†
c) students enjoy this type of vibrantly decorative background more than a simple background.	1 (14.29%)
d) of other reasons: "I like to use vibrantly decorated backgrounds my starting slide or in slide transition."; "I like to use it to attract students' attention"	2 (28.57%)
Of the seven supplied PowerPoint slides, **I would like to use slide- f because**	**(n = 12)**
a) (I don't know why)	1 (8.33%)
b) slight decoration makes the slide eye-catching.	2 (16.67%)
c) the Neuroanatomy-related design makes the background more logical.	9 (75.00%)†
d) the background does not directly conflict with the illustrations.	3 (25.00%)
e) of other reasons: "Subject related background may give a clue about the topic."	1 (8.33%)
Of the seven supplied PowerPoint slides, **I would like to use slide- g because**	**(n = 13)**
a) (I don't know why)	2 (15.38%)
b) decorative nature of the background is eye-catching.	3 (23.08%)
c) the Neuroanatomy-related design of the background creates a relevant environment.	8 (61.54%)†
d) the background helps the illustrations to be highlighted but does not distract from them.	1 (7.69%)
e) of other reasons.	0 (0%)

n, number of the respondents who liked to use a particular slide.

* The percentage frequencies do not add up to 100%, as the respondents were allowed to choose more than one option.
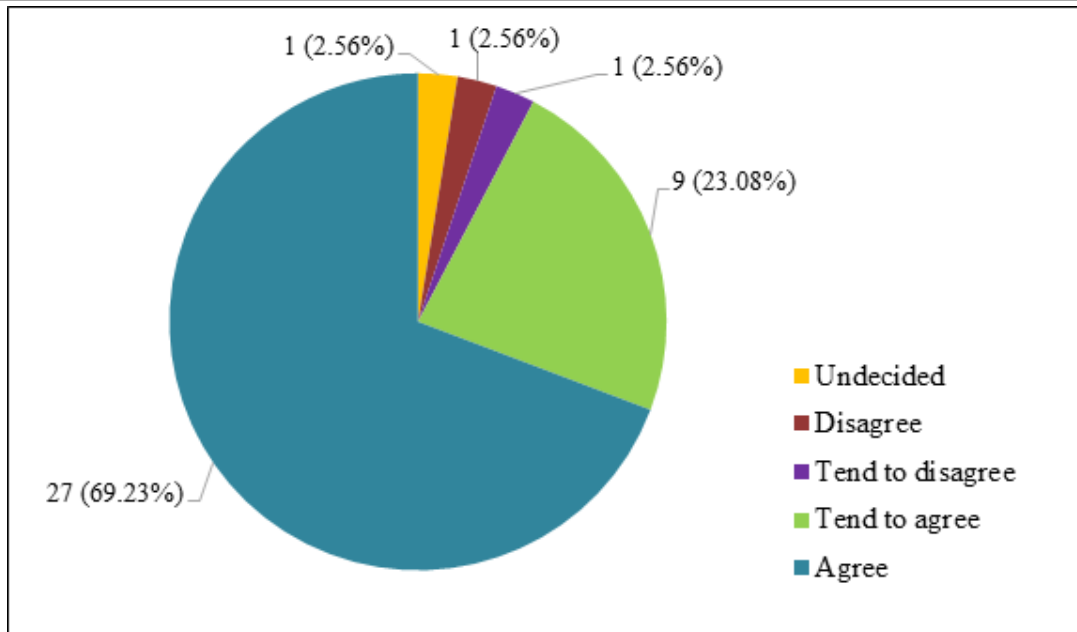
† The most chosen reasons for preference.

Figure 4: Anatomy teachers' (N = 39) perceptions regarding the influence of different types of 'background' of illustration-based PowerPoint slides on learning.

This research falls into that rare group which has dealt with teachers' perspective on the topic. No scholarly literature was available to the present researcher that has addressed the details of slide backgrounds by showing picture of those slides. While being a strength of this research, it was also felt as handicap as well in terms of analysis through comparison.

The issue of whether slide background influences learning is a very broad one of considerable depth. It is known that learning is a behavioral change that includes change in thinking, doing, and feeling. Again, it is a general understanding that the process of learning involves attention, and engagement, information gathering, information retention and memory performance, associations related to understanding etc. on the part of the learner. On the facilitator's (i.e., the teacher's) side, gaining attention and proper communication

etc. are very important attributes to achieve. In the present study, only the teachers' 'perception' of the effectivity of a particular slide background in learning was addressed. Thus, in developing a complete understanding of its possible influence, research needs to be directed in different directions in properly controlled research design.

An important limitation of the present study is that only one example of each 'type' of background was shown to the teachers to make their choice. This has definitely fallen short of understanding whether another light- or dark-coloured homogeneous background, another slightly or heavily decorated background or another subject related or not-subject-related background would have yielded a different result. Understandingly, different colours of the same design or different designs of the

same colour are likely to have every potential to have different outcomes.

However, the results of the present study would be able to provide a baseline idea on the preferences and perceived influences of different aspects of PowerPoint slide backgrounds for presenting Neuroanatomy illustrations. They also suggest that presenting illustrations on PowerPoint slide background is an important issue in the present-day context of. There is very little scholarly literature on the background of illustrations-based slides. So, no specific guidelines could be followed while developing the illustration-based slides with different types of background.

It was very difficult to predict various possible confounding factors and address them while dealing with the colours and designs of different backgrounds of presenting Neuroanatomy illustrations in PowerPoint slides, as there seems to be enormous subjectivity regarding the plausible influencing factors.

CONCLUSIONS

It may be said that the present survey revealed that most of the participants preferred either light-coloured homogeneous background or white background of illustration-based PowerPoint slides. The least preferred one was the heavily decorated background not related to the subject. There were some interesting trends of preference of slide backgrounds related to the male and female teachers and also to their length of teaching experiences were observed. Although the results combined with the review of the previous literature provide some directions in understanding the preferences of Anatomy teachers to different illustration-based PowerPoint slide backgrounds and their perceived influences on learning, further studies are recommended on larger samples focusing on more specified, stringently selected, widely distributed interrelated issues of slide background before making any conclusive comments on these issues.

Acknowledgments

REFERENCES

1. Brenton H, Hernandez J, Bello F, Strutton P, Purkayastha S, Firth T, et al. Using multimedia and web3D to enhance anatomy teaching [Internet]. Computers & Education. 2007 [cited 2020 May 28]; 49(1):32–53. Available from: doi:10.1016/j.compedu.2005.06.005

2. Hashemi M, Azizinezhadb M, Farokhic M. Power Point as an innovative tool for teaching and learning in modern classes [Internet]. Procedia - Social and Behavioral Sciences. 2011 [cited 2021 Jun 3]; 31:559-563. Available from: https://doi.org/10.1016/j.sbspro.2011.12.103Get rights and content

3. Hadiyanti KM, Widya. Analyzing the values and effects of PowerPoint presentations [Internet]. LLT Journal. 2018 [cited 2021 May 12]; 21 (2579-9533):1410-7201. Available from: doi: doi.org/10.24071/llt. 2018.Suppl2108

4. Schmaltz RM, Enström R. Death to weak PowerPoint: strategies to create effective visual presentations [Internet]. Front. Psychol. 2014 [cited

2019 May 26]; 5:1-5. Available from: https://doi.org/10.3389/fpsyg.2014.01138

5. Jones AM. The use and abuse of PowerPoint in teaching and learning in the life sciences: A personal overview [Internet]. Bioscience Education 2003 [cited 2020 Jul 5]; 2(1):1-13. Available from: https://doi.org/10.3108/beej.2003.02000004

6. Bartsch RA, Cobern KM. Effectiveness of PowerPoint presentations in lectures [Internet]. Computers & Education. 2003 [cited 2019 Jan 11];41(1):77–86. Available from: doi: 10.1016/S03601315(03)00027-7

7. Szabo A, Hastings N. Using IT in the undergraduate classroom: should we replace the blackboard with PowerPoint? [Internet] Computers & Education. 2000 [cited 2019 Aug 2 ;35(3):175–87. Available from: doi:10.1016/S0360-1315(00)00030-0

8. Apperson JM, Laws EL, Scepansky JA. An assessment of student preferences for PowerPoint [Internet]. Computers & Education. 2008 [cited 2019 Dec 4]; 50(1): 148–153. Available from: https://doi.org/10.1016/j.compedu.2006.04.003

9. Ding X, Liu J. Research on five stakeholders & five relationships of higher engineering education in China [Internet] . Int J Educ Manag Eng. 2012 [cited 2019 Mar 29];2(9):61–5. Available from: doi: 10.5815/ijeme.2012.09.10

10. Shirazi AS, Rezaei NM, Akbari M. Slide designing by "Microsoft Power Point Software" in a dental school of Iran [Internet]. Indian Journal of Dental Education. 2013 [cited 2020 Feb 21];6(3). Available from: https://www.researchgate.net/publication/260110014

11. Amare N. To Slideware or not to slideware: students experiences with the PowerPoint vs. lecture [Internet]. Journal of Technical Writing and Communication. 2006[cited 2021 Feb 11];36(3):297–308. Available from: doi:10.2190/03GX-F1HW-VW5M-7DAR

12. Savaşci AF. Why Turkish pre-service teachers prefer to see PowerPoint presentations in their classes [Internet]. Turkish Online J Educ Technol. 2011 [cited 2021 Jan 21];10(3):340–7. Available from: https://eric.ed.gov/?id=EJ945010

13. Pham HT, Nguyen HB. Teachers' perceptions about PowerPoint use as an ICT tool for teaching vocabulary in Vietnam [Internet]. Eur J Foreign Lang Teach. 2018 [cited 2021 Feb 11];3:68–86. Available from: www.oapub.org/edu

14. Wanner T. Enhancing student engagement and active learning through just-in-time teaching and the use of PowerPoint [Internet]. Int J Teach Learn High Educ. 2015 [cited 2022 Feb 17];27(1):154–63. Available from: http://www.isetl.org/ijtlhe/

15. PowerPoint backgrounds (everything you need to get started) [Internet]. Nuts & Bolts. Date unknown [cited 2022 Jan 10]. Available from: https://nutsandboltspeedtraining.com/powerpoint-tutorials/powerpoint-backgrounds/

16. Gazi S. Shamim KM. Different types of 'background' of illustration-based PowerPoint slides: Anatomy postgraduate students' preferences and perceived influence on learning. Unpublished. 2022.

17. Jadhao A, Bagade A, Taware G, Bhonde M. Effect of background color perception on attention span and short-term memory in normal students [Internet]. Natl J Physiol Pharm Pharmacol. 2020 [cited 2021 Dec 27];2320-4672:1. Available from:doi:10.5455/njppp.2020.10.06162202017072020

18. Dzulkifli MA, Mustafar MF. The influence of colour on memory performance: a review [Internet]. Malays J Med Sci. 2013 [cited 2019 Mar 15];20(2):3–9. Available from:http://www.ncbi.nlm.nih.gov/pubmed/23983571%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC3743993

19. Wichmann FA, Sharpe LT, Gegenfurtner KR. The Contributions of color to recognition memory for natural scenes [Internet]. J Exp Psychol Learn Mem Cogn. 2002 [cited Mar 5];28(3):509–20. Available from: doi: 10.1037/0278-7393.28.3.509

20. Tank PW, Gest TR. The Lower Limb. Lippincott Williams & Wilkins. Atlas of Anatomy [image on internet]. 2009 [cited 2019 Sep 2]; Chapter 3. p.130,134. Available from: http://web.uni-plovdiv.bg/stu1104541018/docs/res/anatomy_atlas_-_Patrick_W._Tank/3%20-%20The%20Lower%20Limb.htm

21. Side purple free PowerPoint templates [image on internet]. PPTGROUNDS. 2012 [cited 2019 May 16]. Available from:https://www.pptgrounds.com/abstract/926-side-purple-free-powerpoint-template- backgrounds

22. Sullivan J. Great fireworks night [photograph on internet]. Wikimedia Commons. 2013 [cited 2019

188

Aug 18]. Available from: https://commons.wikimedia.org/wiki/File:Great_fireworks_night.jpg

23. Anatomy of a healthy brain of the human body [image on internet]. CrystalGraphics. Date unknown [cited 2019 Oct 5]. Available from: https://powerpoint.crystalgraphics.com/templates/view/16738/anatomy-of-a-healthy-brain-of-the-human-body#largeimage

24. Schroeder M. Neuron with healthy myelin sheath [image on internet]. FineArtAmerica.com. 2019 [cited 2019 Nov 13]. Available from: https://fineartamerica.com/featured/5-neuron-with-healthy-myelin-sheath-monica-schroeder.html

25. Pugsley L. How to design an effective power point presentation [Internet]. Education for Primary Care. 2010 [cited 2019 Apr 2]; 21(1):51-53. Available from: https://doi.org/10.1080/14739879.2010.11493876

26. Decker K. The fundamentals of understanding color theory. 99designs. 2016[cited 2020 Jul 26]. Available from: https://99designs.com/blog/tips/the-7-step-guide-to-understanding-color-theory/

27. Berk RA. Research on PowerPoint: From basic features to multimedia [Internet]. International Journal of Technology in Teaching and Learning. 2011 [cited 2020 Jul 9]; 7(1): 24-35. Available from: https://pdf4pro.com/amp/view/research-on-powerpoint-from-basic-features-to-multimedia-57153f.html

28. Emery KJ, Webster MA. Individual differences and their implications for color perception. Curr Opin Behav Sci [Internet]. 2019 [cited Oct 17];30:28–33. Available from: https://doi.org/10.1016/j.cobeha.2019.05.002

29. Chang B, Xu R, Watt T. The impact of colors on learning [Internet]. Adult Education Research Conference 2018. University of Victoria, Canada, June 7-10. 2018 [cited 2021 Sep 23];(10). Available from: https://newprairiepress.org/aerc

30. Chen NR, Zeng QZ, Rao JP. Students' preference for color combination of PPT courseware [Internet]. 5th International Conference on Economics and Management. 2019 [cited 2021 Feb 5]; 978-1-60595-634-3. Available from: doi: 10.12783/dtem/icem2019/31206

Source of Support: Nil, Conflict of Interest: None declared