Dual PowerPoint presentation approach for students with special educational needs and note-takers

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ABSTRACT

In higher education, supporting students with special educational needs (SEN) necessitates an understanding of these needs, additional teaching aids and innovative ideas. The teacher must be an integral part of this support process, and this is difficult for the majority of teachers, due to their lack of core understanding of SEN. However, teachers can focus on their core skills and content knowledge, and have immense alacrity to explore potential options to support their students with SEN. I decided to support my students with SEN by adapting my PowerPoint presentations according to their requirements. PowerPoint presentations usually provide concisely summarised information to students that often lead to confusion in their pre-lecture or post-lecture review. This lack of comprehensive subject information within PowerPoint presentations can have serious implications for students with SEN and their note-takers if no other teaching resources or aids are available to help them. Students with SEN and note-takers reported this concern to me at Aberystwyth University, UK. Consequently, I began to explore ways to make my PowerPoint presentations extra helpful for my students with SEN. After a review of best practices for students with SEN based on universal design for learning and a few trials, I developed a dual PowerPoint presentation (DPP), lecture handouts and comprehensive lecture notes. Subsequently, I successfully employed this approach in the delivery of some of the undergraduate modules of a BSc computer science programme. Feedback from students with SEN, note-takers and the student support department, and examination results showed the success and potential of this DPP approach.

Students with special educational needs, PowerPoint presentation and motivation for dual PowerPoint presentation (DPP) approach

In higher education (HE), numbers of students with special educational needs (SEN) have been growing in classes and they require additional learning aids to accomplish their learning tasks. I believe that teachers need to remember 'teaching is about fostering student connections to content, not just presenting content to students' (Hlynka and Mason 1998) and therefore, as a teacher, I always want to make my lecture content extra helpful and useful

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for my students. PowerPoint presentations are one of the most common teaching aids used by the majority of teachers in the classroom. However, PowerPoint presentations usually provide only concisely summarised information for students, and this often leads to confusion during the pre-lecture or post-lecture review. The lack of comprehensive subject information could have serious implications for students with SEN and their note-takers if no other teaching resources or aids are available to help them.

I have made several changes in my PowerPoint presentations over the years, but they mostly focused on the academic content and styles of my slides. When, however, I encountered a severe learning issue related to my students with SEN and their note-takers, I realised that my changes had not gone far enough. One day, our Computer Science department at Aberystwyth University, UK received an emergency email from the student accessibility adviser quoting two problems related to the same issue:

(1) 'We are currently experiencing problems recruiting note-takers for lectures in both Computing Science and Institute of Mathematics and Physics (IMAPS) – we have sufficient note-takers, but not with the appropriate skills.'
(2) 'Some students may be struggling to keep up with lecture information so we'd be grateful if staff could post as much information as possible on Blackboard.'

Though it was a general email to the department, I concluded that some students with SEN had likely been struggling with my lecture notes too. Soon after, I discussed this issue with students with SEN, note-takers, and the student support department and came to realise that insufficient PowerPoint notes and study materials are one of the biggest hurdles for students with SEN to overcome. I realised that I should rethink my PowerPoint presentations based on the feedback provided by students with SEN, note-takers and the student support department. As a result of my analysis, after reviewing PowerPoint best practices for students with SEN based on universal design for learning and a few trials, I developed a DPP approach for inclusive teaching.

PowerPoint best practices for students with SEN based on universal design for learning (UDL)

If the designed PowerPoint presentation is helpful to students with SEN, then it is most likely extra helpful to all students. Teachers develop the PowerPoint presentation based on their skills and experience. However, the majority of teachers do not receive basic training to support students with SEN (Hartley 2010). Consequently, their PowerPoint presentations may not be focused on providing additional support to students with SEN. For designing the SEN PowerPoint presentation, every teacher should require a basic understanding of some main learning difficulties such as literacy difficulty (dyslexia), developmental coordination disorder (DCD/dyspraxia), handwriting difficulty (dysgraphia), specific difficulty with mathematics (dyscalculia), speech language and communication difficulty (SLC), hearing impairment (SNHL), visual impairment (NVI) or physical difficulties.

There is no single rule-of-thumb for making effective SEN PowerPoint presentations. However, UDL framework facilitates equal opportunities to learn for everyone and is one of the most effective ways to develop SEN PowerPoint presentations. UDL framework is based on scientific insights into how humans learn and offers a blueprint for creating instructional objectives, methods, materials, and assessments that work for everyone (*About Universal Design for Learning* 2016). UDL offers flexible approaches that can be customised and

Table 1. Best practices for PowerPoint development based on UDL framework.

PowerPoint best practices	Targeted learners with SEN profiles	Benefits for learners with SEN profiles
Use of additional images, audios, videos and multimedia content	Learners with strong visual learning styles or print related difficulties	Illustrates concepts and subjects easily by avoiding the text only dependence
Readable font size and typeface	Learners with dyslexia and those who are partially sighted	Improves the readability of slides
Colour and brightness contrast	Learners with dyslexia and colour-blindness	Improves the visibility of contents of slides
Emphasising text	Learners with visual impairments and dyslexia	Highlights the text/concept to attract learners' focus
Use of appropriate words, sentences, alignment and justification	Learners with dyslexia, dyspraxia and dyscalculia	Avoids confusion and complexity due to certain types of text or appearance
Numbers, arithmetic and maths simplification	Learners with poor memory and dyscalculia	Supports learners by simplifying mathematical concepts
Special SEN handouts	All SEN learners (different types of SEN handouts for different SEN learners)	Offers additional learning aids that can be helpful for various purposes
Physical action, expression and communication	All SEN learners (different types of delivery methods for different SEN learners)	Communicates effectively the well-prepared lecture notes based on the above best practices

adjusted to individual needs. According to UDL principles, the design of effective SEN PowerPoint presentations requires some crucial consideration depending on the target SEN group. These adjustments may vary from one SEN group to another or even from one SEN student to another. However, some common guidelines can make our PowerPoint presentations more effective for early-stage or less-affected students with SEN. Table 1 shows some of the best practices, which I have adopted in my PowerPoint presentations.

DPP approach

In this DPP approach, I designed two versions of the same PowerPoint presentation: handouts for teaching/summarising and comprehensive lecture notes to be used as a guide to SEN students/note-takers. In addition to the teaching aid to students with SEN and note-takers, these DPPs can be used for a variety of purposes. The handouts were useful for my teaching and students' revision, and the comprehensive lecture notes sometimes were useful for me to use in class and also for many students who forgot part of the lecture or missed the lecture; or who found the topic difficult at the time of delivery.

Lecture handouts

My PowerPoint handouts for students with SEN were traditional bulleted PowerPoint slides based on the PowerPoint best practices (see Table 1). Every single slide contains five to seven lines and around up to seven words per line. There must be enough space between lines to prevent crowding effects during reading. The use of graphics, tables and charts was enhanced to help students with SEN. Mathematics was simplified using pictures and real-life examples. Despite focusing on the SEN group, the handouts were used in classroom teaching in order to support those students whose learning styles did not favourably dispose them to the comprehensive lecture notes. The handouts were also useful for all students and note-takers as a note-taking tool and during the exam season, for revision purposes.

Comprehensive lecture notes

I learnt from my discussion and analysis that many SEN students with issues such as hand-writing difficulty, reading difficulty, hearing impairment, SLC had been struggling to prepare detailed notes for their learning. If they could receive the detailed lecture notes, then it could solve their problem with note-taking and avoid the dependence on multiple sources. It could also save a huge amount of time that they could otherwise spend on their actual learning. Again, in this design, I applied most of the PowerPoint best practices (see Table 1) for students with SEN, except adding supplementary content. The comprehensive PowerPoint lecture notes covered the topic in detail, including all terminology, definitions, explanations, simplified mathematics, diagrams, tables and charts. I adopted more graphical content than text; therefore, it could support many students with SEN such as those with dyslexia and visual impairments. Overall, this detailed version was particularly helpful to students with SEN who cannot prepare proper notes due to various reasons and note-takers who take vague notes due to their lack of understanding of topics/concepts.

Results and feedback

The most interesting thing about the comprehensive lecture notes was that it was developed against the standard PowerPoint practice. The standard PowerPoint practice does not advise us to make a large number of slides with additional contents. However, this was one of the possible solutions I considered during my investigations. Furthermore, some teachers may argue about the need to design second comprehensive lecture notes and prefer the 'notes page' in a single PowerPoint. My opinion is that the 'notes page' is a very basic text editor where you can add your teaching notes to remind yourself of what the slide is all about, and what points you should be covering. This might be helpful for some students but not for students with SEN because it does not provide the enhanced presentation environment to cover all necessary content which may be needed. The foremost aim of my comprehensive lecture notes was to satisfy the need of students with SEN and their note-takers.

I tested this dual PowerPoint approach first in a BSc final-year computer science module (CS35810) 'Further Issues In System and Network Services Administration' and subsequently, in some other modules. I taught primarily by using the lecture handouts and referred to the comprehensive lecture notes when necessary. Extensive feedback from students with SEN, note-takers and the student support department, alongside examination results, showed the threefold success of this new DPP approach. First, it fostered the learning of students with SEN and, in some cases, motivated them to become independent learners (e.g. '… I know I have got everything for my study that gives me the confidence to learn and overcome my difficulties in the modules because I cannot manage on my own'). Mainly, it was because of both PowerPoint presentations were based on the PowerPoint best practices for students with SEN, which offered them preferred lecture notes depending on their specific require-ments. Consequently, it eliminated the dependence on multiple sources and saved an enor-mous amount of time that they could now spend on their actual learning. Second, it helped note-takers to capture notes accurately and align with the actual subject (e.g. '… The com-prehensive notes were extraordinary in the sense of capturing lectures precisely as a note-taker'). This was because of the majority of note-takers were not from the same subject areas and having the lack of understanding of topics/concepts. However, in particular,

comprehensive lecture notes offered them detailed subject materials related to lectures, which clarified the complex topics and helped to verify their captured lectures precisely. Third, it also helped other students whose grasping of the subject was slow and who were shy to ask anything in the classroom. Additionally, it improved the pass rate by 29.5% and average marks by 15.61%, revealing that DPP approach worked not only for students with SEN but also for the rest of the class. However, in my opinion, the improvement in the module's results was not merely due to the use of this new DPP approach and further in-depth analysis was required to assess the actual contribution of this DPP approach.

The most important finding of this project is that the best practices for students with SEN actually help *all* students. This is an effective presentation teaching approach and learning aid that I developed as a common tool for modules where lecture notes are particularly important. I will not discuss the nature of the academic content since that will be discipline-specific and must remain an issue for the academic staff alone (Jones 2003). I wish to emphasise that this approach may not be helpful for some modules where lecture notes are not vital teaching material. Therefore, it is a context-specific approach and not a universal one.

Discussion

The UK Equality Act 2010 enforces additional reasonable adjustment for students with SEN in higher education (*Equality Act 2010* 2010). Therefore, it is a legal requirement to make additional reasonable changes to the way things are done, to the built environment and to provide auxiliary aids and services (*Equality Act 2010* 2010). Every university has been providing educational and non-educational services to students with SEN to overcome the barriers to their learning. However, in my opinion, working for students with SEN should not depend on the legal requirement alone, as meeting student needs is a teacher's moral obligation and the duty of society. As a teacher, the main aim of my dual PowerPoint approach was to discover an effective lecture notes provision strategy, particularly for students with SEN and note-takers. I believe that PowerPoint presentations are an important resource for teaching and learning within HE. However, the use of PowerPoint on its own does not guarantee success in teaching and learning. I think my students' assessment success was not solely due to the use of this new type of PowerPoint presentation. I believe that a full evaluation of this approach would accord some credit to the new PowerPoints, while my teaching style, other classroom activities, and students' hard work would also be contributing factors to their success.

Students with SEN need a variety of support at different levels in university. If DPPs were not the most desirable type of support, then it still provided some lecture notes to support students, in particular for students with handwriting difficulty, reading difficulty, hearing impairment, SLC, mathematics difficulty or some other physical difficulties, which prevent them from preparing lecture notes by themselves. Almost all universities provide note-takers to students with SEN. However, these note-takers often do not come from the same subject area, and/or they have very little understanding of the assigned subjects. In this situation, students with SEN who depend on their note-takers may not receive precise notes and this may negatively impact their overall performance. This DPP approach was undoubtedly beneficial for note-takers as they managed to produce better quality lecture notes.

Limitations of DPP approach

The scope of any research on students with SEN and note-takers will always be limited in numbers. In each class, students with SEN and note-takers are small in number; therefore, it is difficult to make a balance between the learning of students with SEN and the rest of the class. Also, PowerPoint is what you make of it: it is a teaching tool and can be used badly or well (Schulten 2010). I changed my PowerPoint presentations to contribute towards students' learning and this helped my students with SEN. My challenge and my pleasure are teaching my students what they need to do, how they should go about it, and to do it well. Most importantly, research tells us that students learn more by what they do than from what is explained to them (*Using Presentations to Help Students Learn* 2014).

I applied the several PowerPoint best practices in my PowerPoint presentations for students with SEN, and it seems to be helpful for students with mild dyslexia and other mild learning difficulties. However, dyslexia could be more severe when it overlaps with any of the other specific learning difficulties: dyscalculia, dysgraphia, dyspraxia, attention deficit disorder/attention deficit hyperactivity disorder, Asperger syndrome/autism spectrum disorder. In this situation, I do not think any PowerPoint presentation alone would be sufficient for learning. Nonetheless, note-takers can play their part for students with SEN and undoubtedly this DPP will help them.

Though the DPP approach has the potential to support students with SEN and note-takers, it may not be appropriate for subjects where lecture notes are not vital. Preparation of comprehensive lecture notes is a marathon task for teachers, and it can only be possible when teachers have enough extra time to do this work. Furthermore, this DPP approach was tested in a particular module and with a particular class of students, including some specific students with SEN. Critical analysis of the success or failure of this DPP approach needs further testing in various modules and with different levels of students with SEN. This project also does not provide an analysis between the two types of notes and perceptions of the rest of the class in addition to the students with SEN. Therefore, it is still not clear which type of notes worked more effectively for students in general.

Conclusion

This paper has presented the DPP approach, particularly for students with SEN and their note-takers. However, I developed it as a common tool for modules where lecture notes are of the greatest benefit. Development was based upon and prompted by feedback obtained from students with SEN, note-takers and the student support department. I discovered that students with SEN needed comprehensive notes to understand and review the subject more efficiently. I derived my own PowerPoint best practices for students with SEN based on the UDL. Eventually, I formulated two types of PowerPoint notes: (1) Lecture Handouts (short notes for teaching, summarising topics and note-taking) and (2) Comprehensive Lecture Notes (detailed notes for students with SEN and in-depth studies). Initially, I fused and tested these new types of lecture notes in the BSc final-year module: CS35810: 'Further Issues In System and Network Services Administration'. At the end of the term, I achieved better students' examination results as compared to the last year's results and positive feedback from students with SEN, note-takers and the student support department.

 In the future, this DPP approach needs to be tested in various modules and with different groups of students with SEN and their note-takers. Another future task is to perform a comprehensive survey to gather comparison data between the two types of notes and perceptions of the rest of the class. Providing an inclusive learning environment is an important responsibility for the staff at any academic institution and making reasonable adjustments for students with SEN is a vital part of this inclusive learning. The good news is that these adjustments are also likely to benefit all of our students.

Disclosure statement

The research and views contained in this document are those of the author and should not be interpreted as representing the official research and policies, either expressed or implied, of the UK Ministry of Defence or the UK Government.

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