Transforming the Lecture: How to Create Non-Linear Lectures
to Promote Active and Engaged Learning

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Abstract: Despite the ubiquity of PowerPoint lectures in the college classroom, they have been criticized for promoting passive learning. In this brief article, a quick fix to the traditional PowerPoint lecture is described to demonstrate how any college faculty can efficiently and effectively modify (existing) lecture content into a dynamic, engaging, and interactive student-centered learning experience.

Developed as a tool to make presentations more structured (Amare, 2006), PowerPoint™ has become omnipresent in college lectures across the United States (Herting et al., 2020). Despite its ubiquity, the PowerPoint lecture – as traditionally structured and presented - has been criticized for promoting passive learning (Clark, 2008; French & Kennedy, 2017). College faculty are well aware of the need to utilize and integrate student-centered, active-learning strategies in their classrooms (Flipped Classroom Trends, 2015; Kim et al., 2019). Despite this awareness, many faculty continue to rely on traditional PowerPoint lectures because they don't believe they have the time, energy, or resources to significantly change their approach to teaching (Flipped Classroom Trends, 2015; Kim et al., 2019; Michael, 2007). In this article, a quick fix to the traditional PowerPoint lecture is described to demonstrate how any college faculty can efficiently and effectively transform (existing) lecture content into a dynamic, engaging, and interactive student-centered learning experience using a feature that is already widely available within Microsoft PowerPoint.

The Traditional Lecture Approach

The traditional approach to structuring and delivering a PowerPoint lecture stereotypically involves educators presenting content to their students in a highly structured and linear order. That is, faculty who utilize the traditional approach to lecturing with PowerPoint present content to students by progressing through a series of meticulously prepared PowerPoint slides in a predetermined, sequential order. There is no doubt that this approach to structuring and delivering lecture content is efficient and can be effective in promoting learning, especially when the delivery of content is scaffolded properly (Taber, 2018) and punctuated by various interactive, active-learning activities (see Bernstein, 2018; Snyder, 2003). However, as an approach that has been criticized for being overly teacher-centered (O'Neill & McMahon, 2005; Phillips, 2005), the traditional PowerPoint lecture has been found to promote a wide-range of passive learning behaviors that hinder student learning (Chi & Wylie, 2014; Phipps et al., 2001; Michel et al., 2009; Moust et al., 2005). Research finds that – compared to more student-centered approaches (e.g., the flipped-classroom approach) that are focused on promoting active, interactive, and constructive learning within the classroom (Chi, 2009; Chi & Wylie, 2014) – traditional lectures tend to be less effective at promoting student participation (McClanahan & McClanahan, 2002), fostering critical thinking (Nelson & Crow, 2014), and facilitating the achievement of major learning outcomes (Christianson & Fisher, 1999; Day, 2018; Hake, 1998; Lo et al., 2017; O'Sullivan & Copper, 2003; Tutal, 2021; Van Alten et al., 2019).

An extensive body of research (e.g., Bowen, 2000; Crouch & Mazur, 2001; Deslauriers et al., 2011; Freeman et al., 2007, 2014; Haak et al., 2011; Lambert & McCombs, 1998; Michael, 2006; Prince, 2004; Querol et al., 2015; Sisk, 2011; Wieman, 2017) suggests that the traditional teacher-centered approach to lecturing should be updated or otherwise modified to involve more student-centered, active, interactive, and constructive learning opportunities in which students can actively engage in and take ownership of the learning process, meaningfully interact with one another, and form new mental representations of course content based on their existing knowledge (see Chi, 2009). Hearing this siren call for change, many lecturers - who are hesitant to completely change the way in which they approach teaching and learning – have strategically integrated various active, interactive, and constructive learning "activities" (e.g., think-pair and share, concept-mapping, one-minute papers, in-class quizzes, and debates) into their existing lectures. Although empirical evidence suggests that including various active learning activities within lecture-intensive courses is a step in the right direction (Haak et al., 2011), the degree to which this patchwork approach to "fixing" the traditional lecture is comparatively more effective is currently unclear (see Bernstein, 2018).

As an educator that values student-centered teaching, I have continually challenged myself to explore new pedagogical practices and techniques that will promote more active, interactive, and constructive learning among my students and in my classrooms. In these efforts, I have explored how the use of a new feature within Microsoft PowerPoint could more meaningfully and systematically change the way that I, and my students, interact and engage with course content. Inspired by research on just-in-time-teaching practices (Novak, 2011; Wanner, 2015) and the extensive literature linking heightened perceived control with increases in student engagement and academic achievement (Findley & Cooper, 1983; Wigfield et al., 2006), I redesigned the way I present and discuss lecture content to be more student-centered. Rather than delivering PowerPoint lectures in the traditional way, by progressing linearly through lecture content, I utilize a feature within the software called "summary zoom" so I can – at any moment - swiftly, and non-linearly, present blocks of content based on *students'* interests and/or needs, thereby providing students with a heightened degree of control over their learning. More specifically, this approach to structuring and delivering a PowerPoint lecture – which I call the non-linear, "choose-your-own-adventure" approach – relies on students, rather than the lecturer, to choose the direction and pace of the lecture, making the approach less teacher-centered and much more student-centered.

Overview of the Approach

During a "non-linear lecture," the lecturer presents a list of topics or major student learning objectives (SLOs) to students - asking them to identify the topic or SLO that they would like to cover first during the lecture. Using the "summary zoom" feature, the lecturer can then swiftly advance the presentation directly to a series of content slides covering the chosen topic or SLO. After covering the prepared content for the first chosen topic or SLO and addressing student questions, the lecturer can then ask students to choose the next topic or SLO to discuss – continuing this process until all topics or SLOs that students would like to discuss are covered.

Hopefully, as you can infer from the brief description of the process provided above, this alternative approach to structuring and delivering a PowerPoint lecture is more dynamic and engaging than traditional approaches and much more student-centered. PowerPoint lectures are no longer linearly presented *to* students by faculty, but the PowerPoint lectures can be experienced dynamically and non-linearly by students *and* faculty, promoting the students' and faculty's reciprocal dialogue about the content. More directly, through the use of this approach, students and the faculty member are charged with engaging in a real-time reciprocal discussion of the content wherein the students – after having had

read the content for the day - can share their interests in and struggles with specific assigned content, and the faculty member can respond by presenting additional content and information that is directly relevant to their interests and struggles, immediately in the moment. Compared to the traditional approach, this new approach allows students to exert more control over their own learning by directing the discussion of lecture content, with a faculty ready to respond with existing content and activities at the click of a button.

Creating Your Own Non-Linear Lecture Using the Summary Zoom Feature

It only takes a few steps to transform a traditional, linear PowerPoint lecture into a non-linear PowerPoint lecture using the summary zoom feature within the software. For those unfamiliar with the feature, which was added to PowerPoint in 2016, "summary zoom" allows a lecturer to dynamically present content in a non-linear manner using an interactive table of contents page that is automatically generated by the software. The summary zoom feature can be found on the display ribbon on Microsoft PowerPoint (using Office 365) under the "insert" tab on the main navigational menu at the top of the page (see Figure 1 below).

Figure 1

Screen shot depicting where the "summary zoom" feature can be found in Microsoft PowerPoint.
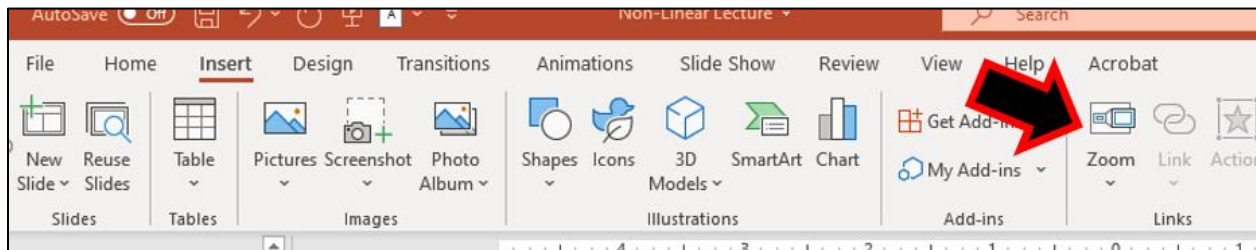
Before using the summary zoom feature, it is recommended that the faculty member organize the content of the lecture around major topics or SLOs. After ensuring the content is organized, it is often helpful to insert "section headers" to clearly indicate where slides addressing a specific topic or SLO can be found. For instance, if I am giving a first-day presentation of the course syllabus, I may organize the slides within my presentation around the major headings of the syllabus – such as "instructor information," "course description," "student learning objectives," "Grading Criteria," and so forth. After ensuring the presentation of content is organized around these major topics, I would then insert "section header" slides to demarcate these major topic areas. To insert a section header in PowerPoint, click on the "new slide" button on the display ribbon under the home tab, and select the "section header" option (see Figure 2 below).
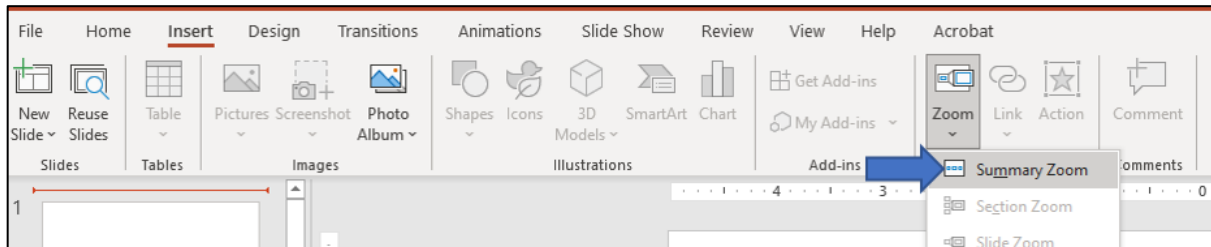
Figure 2

Screen shot illustrating how to insert a new "section header" slide within Microsoft PowerPoint.
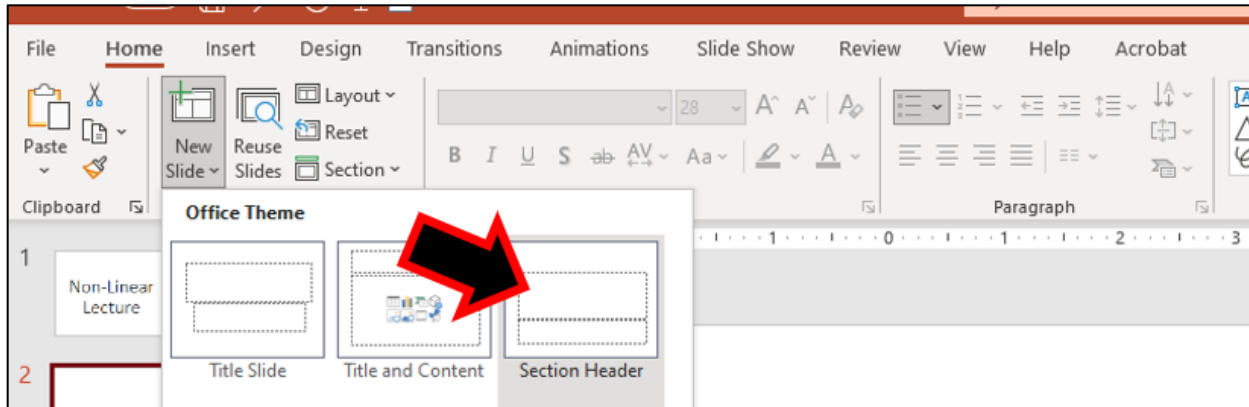
Once the content has been organized, and section headers inserted to clearly demarcate topics or SLOs, the summary zoom feature within PowerPoint can now be used to modify the functionality of the software, enabling the instructor to present topics or content areas in a non-linear order. To use the "summary zoom" feature, simply click on the "zoom" option on the display ribbon under the "insert" tab and select "summary zoom" option from the dropdown that appears (see Figure 3).
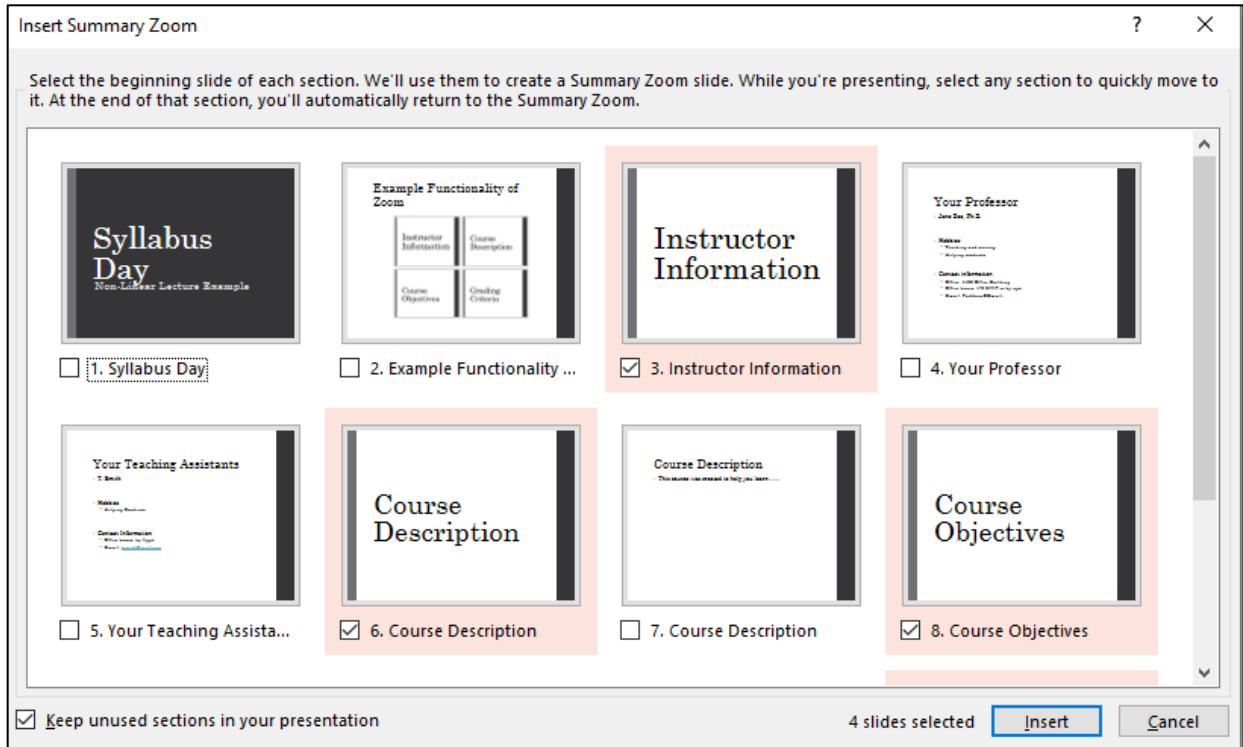
Figure 3

Screen shot illustrating where the summary zoom feature can be selected within Microsoft PowerPoint.

Once the summary zoom option is selected, a dialogue box, like the one depicted in Figure 4 below, will emerge. Instructions provided on this dialogue box tells the user to select the slide demarcating sections within the presentation. Slides that are selected within this dialogue box will be automatically populated in a new "table of contents" slide that will emerge in the presentation. This table of contents slide is interactive, enabling the user to quickly move between sections during a presentation. Using the running example provided, I would select the section headers that I want to be included on the table of contents slide such as "instructor information," "course description," and "course objectives." Doing so would enable me to quickly move between each of these major sections of content during lecture.

Figure 4

Screen shot of the dialogue box that will open (with slides and section headers from the running example).

After identifying the relevant section headers, select the "insert" button at the bottom of the dialogue box (again, see Figure 4 for an illustration). Once the button is selected, the process is complete. The software will insert a table of contents slide at the beginning of the presentation that includes all the section headers you created and selected in the previous steps. As depicted in Figure 5, the table of contents slide now allows faculty to swiftly navigate topics or content areas within their lecture at a click of a button. It is important to note that the software will automatically revert back to the table of contents slide once the faculty has progressed through all the slides within a chosen topic or content area. This function is important, because it allows the faculty to quickly transition back to the table of contents slide so the class can move on to another content area.

Figure 5

Visual representation of the non-linear presentation of content afforded by the summary zoom feature in PowerPoint.
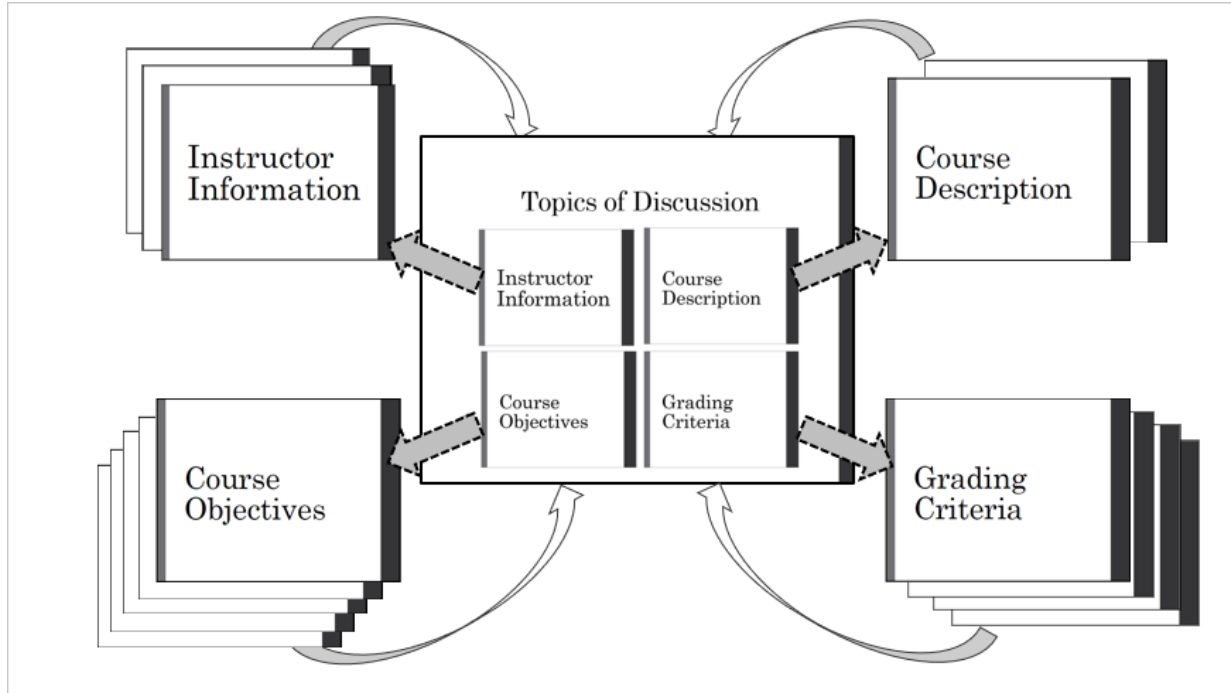

An Alternative Approach: Creating a Non-Linear Lecture using Hyperlinks

Although the summary zoom feature integrated in PowerPoint is easy to use, there are other methods one can use to transform a traditional linear PowerPoint lecture into a non-linear PowerPoint lecture. For instance, one could use hyperlinks within PowerPoint to the same end. As seen in Figure 6, the functionality is really no different from the summary zoom approach. Besides aesthetics, the major difference between the two approaches simply comes down to the amount of work required. More specifically, instead of letting PowerPoint create an interactive table of contents slide, a faculty member using the hyperlink approach must create their own interactive table of contents slide by creating the table of contents slide and then manually inserting hyperlinks to associated content within the presentation. In addition, throughout the PowerPoint, or at specific points, the faculty member must include some form of hyperlinked text (such as a "back" button) that will take them back to the table of contents slide. The major steps for transforming a traditional linear PowerPoint lecture into a non-linear lecture using the hyperlink approach is provided in Table 1.

Figure 6

Visual representation of the non-linear presentation of content afforded by using the hyperlink function within PowerPoint.
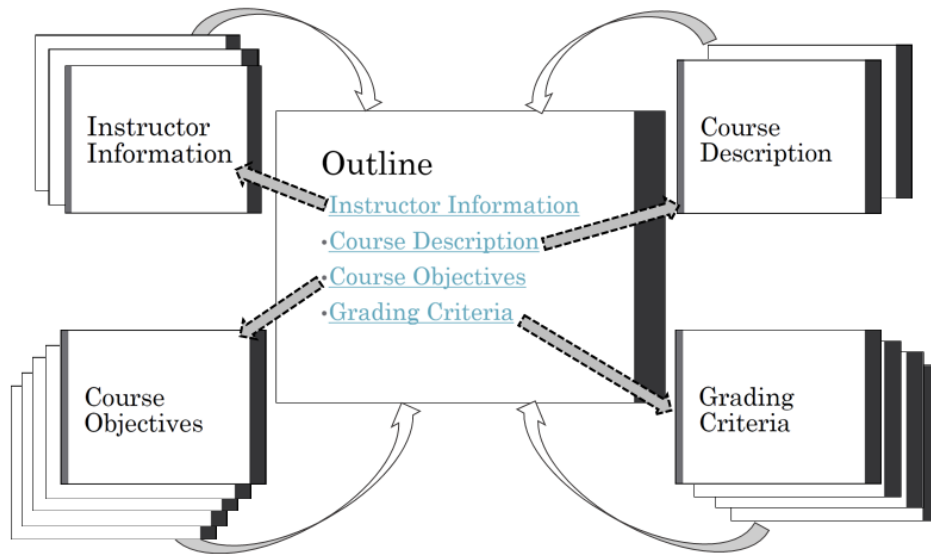
Table 1

Four steps to transform a traditional "linear" PowerPoint lecture into a non-linear, "choose your adventure" PowerPoint lecture using the Hyperlink approach.

1. Add a Table of Contents slide that lists the major topics to be covered in the lecture.
2. Organize the content around the topic areas provided on the Table of Contents slide (inserting "section header" slides to demarcate content).
3. Insert hyperlinks that link each topic listed on the Table of Contents slide to its associated section header.
4. Insert a "Back" textbox or button on all content slides that, using the hyperlink feature, re-directs back to the Table of Contents slide.

Benefits of the Non-Linear Lectures

Through using this new, non-linear, approach to lecturing – using functions already provided within Microsoft PowerPoint - students in my classes have demonstrated heightened engagement during lectures and discussions. For instance, consistent with research demonstrating that the use of more student-centered teaching practices tends to be associated with increases in student participation (McClanahan & McClanahan, 2002) and achievement (O'Sullivan & Copper, 2003; Christianson & Fisher, 1999; Hake, 1998), I have observed an 18% increase in student attendance as well as an almost 11% increase on exam scores since integrating this approach into my classes. Although a systematic empirical investigation is clearly warranted, I suspect that part of the success of this new strategy reflects how I have used the interactivity of the summary zoom feature to directly reinforce student preparation,

attendance, and engagement. That is, because the summary zoom feature within PowerPoint allows me to dynamically and non-linearly present content, I have now been able to make the process of discussing and engaging in course content a shared endeavor where the students and I form a partnership in which we cooperatively and judiciously decide upon the trajectory and content of discussion. By giving students the volition to direct where the lecture will focus, and incentivizing their tendency to do so via the assignment of "participation points," students quickly come to realize that reading the assigned content before coming to class is a requirement of the course, and one that is *consistently* rewarded. Although students can still come to class unprepared or choose to be disengaged in the discussion, the overall dynamic that is created within the classroom with this approach more formally normalizes student preparation and engagement by changing their experiences with and expectations concerning "lectures." Students become motivated to prepare and engage in discussion. As one student stated on a mid-semester course survey, "I really like how the lectures don't feel like lectures. I look forward to coming to class and asking questions about the content."

It is important to note that there are a wide range of evidenced-backed methods faculty can rely on to engage students in the process of directing discussion of content using this non-linear lecture approach and further reward or incentivize preparation and participation. For instance, consistent with just-in-time teaching practices (Novak, 2011; Wanner, 2015), faculty could assess gaps in students understanding of course content prior to class, and then adapt the discussion of content in class based on student performance. Alternatively, and consistent with research on self-regulated learning (Boekaerts, 1999), a faculty could ask students to metacognitively reflect upon and identify the content from a reading that they have the most trouble understanding – and then prioritize discussion of content in class based on students' responses. Although not an exhaustive list of suggestions on how faculty can help students direct the discussion of content, it should be clear from the examples provided that a non-linear approach to lecturing can be integrated with – and in fact many times helps a faculty easily adopt – any number of evidence-based practices within the scholarship of teaching and learning literature that have been found to benefit students.

Finally, it is worthy of noting that the non-linear, choose your own adventure, approach is beneficial for everybody in the classroom, not just the students. In my own personal experiences as a faculty member using the approach, I have found that class time is spent more effectively, lecturing is experienced as more enjoyable and engaging, and strong interpersonal student-teacher relationships are established – all of which promote the personal and professional success of students (Baxton, 2006; Cuseo, 2018; Harril et la., 2015; Stupinksy et al., 2019). Although systematic empirical research is clearly needed on the strategy, I believe it is clear that non-linear lectures are an easy, efficient, and effective quick-fix for transforming traditional, teacher-centered, PowerPoint lectures into dynamic, engaging, and interactive student-centered learning experiences.

A final Note – and Clarification
Despite its ease of use, and potential to be integrated into any course that uses a traditional PowerPoint lecture approach, some may argue against using a non-linear lecture approach in their class because they believe that learning or their subject area, specifically, requires faculty to present content linearly. In fact, a reviewer of this paper mentioned such concerns during the review process, stating that "some subjects *must* be taught in a linear way… For example, students couldn't 'pick their own adventure' with accounting and jump right to financial statements before learning the accounting equation." The reviewer then recommended that I mention in a revision that this non-linear lecture approach only applies to subject areas or content that *can* be delivered in a non-linear way. I appreciate this feedback and

acknowledge the fact that learning is optimized when information is properly scaffolded (Larkin, 2002). That being said, the reviewer's suggestion is misinformed for two reasons that I would like to clarify now.

First, inherent in the reviewers' suggestion is the assumption that a non-linear, "choose-your-own-adventure' approach to lecturing requires a faculty member to relinquish control of the order in which ALL content is presented and discussed in class. While the non-linear lecture approach gives students the autonomy to choose the order in which the class discusses *major sections* within a lecture presentation, it does not necessarily allow students to choose the order in which ALL content is presented and discussed. More specifically, the summary zoom feature (and alternative hyperlink approach) described in this paper only allows faculty to present blocks of content demarcated by "section headers" within PowerPoint, in a non-linear order. Blocks of content within each section are still presented in a traditional, linear format (i.e., unless the faculty member decides to do otherwise). For instance, although students who are presented a first-day presentation of the course syllabus could choose the order in which they discuss the major sections of the presentation titled "instructor information," "course description," "course objectives," and "grading criteria," they do not get to choose the order in which slides are presented within their chosen section. Content slides within each section is presented in a linear order. As I hope this example clarifies, although the non-linear lecture approach allows faculty to present blocks of content in a non-linear order, it does not force faculty to present ALL content in a non-linear manner.

Second, implicit in the reviewer's critique is the faulty assumption that students would come to class not having had completed some preparatory work – such as reading assigned chapters or watching assigned videos. Consistent with other pedagogical strategies or approaches to teaching and learning that are meant to foster active, constructive, and interactive learning in the classroom (e.g., the flipped-classroom approach; see Hussey et al., 2015), faculty who choose to try a non-linear, "choose-you-own" adventure approach to lecturing should design their course in such a way that students are first exposed to content *outside* of the classroom in preparation for the learning that will occur *inside* the classroom, during "lecture." In doing so, faculty can ensure students are first exposed to content in a traditional, linear manner, especially content that "*must* be taught linearly."

In sum, if used appropriately, the non-linear "choose-your-own adventure" approach to lecturing proposed in this reading does not inhibit students from learning content linearly. Consistent with best practices in teaching and learning within higher education (Atkins & Brown, 2002; Hativa, 2001; Ramsden, 2003), the non-linear lecture approach simply allows faculty to use class time more effectively than the more traditional, linear approach to lecturing. Instead of spending time in class presenting content to students, faculty using a non-linear lecture approach can use the time to actively engage students in a discussion about the content. As such, the approach is the perfect "quick fix" for any faculty attempting to promote more active, interactive, and constructive learning among their students.

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