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6

MAKING IT MEANINGFUL THROUGH EXAMPLES

EXAMPLES ARE POWERFUL LEARNING tools. Lee and Anderson (2012) point out that one of the primary ways to make lectures effective is to incorporate many examples. Based on what we know about how memory works, it makes sense that examples would help us remember. When learning new content, we naturally try to determine how this new information fits into our current knowledge base. In essence, we strive to put the new information into the context of what we already know.

It has long been known that new information is grafted onto previously learned information through a process of assimilation and accommodation (Baldwin, 1889; Piaget, 2001). Assimilation is a process by which new information is placed into categories similar to known information. When babies are introduced to a new object, they may quickly put it into their mouth to see if the object may be assimilated into the group of "things that can be eaten." If to that point everything presented to the child has been objects that provide nutrition, and this new item is a child's toy, such as a rattle, then this new object is accommodated by placing into a new category of "things that cannot be eaten." This process of assimilating items into existing categories and making accommodations by changing and creating new categories, when necessary, is a foundation for learning. It is also why it seems so natural to place things into categories: for example, introverts or extroverts, fast or slow, hot or cold, and friendly or mean. Gradations of categories certainly emerge through this process, but the first step is essentially dichotomous groupings.

strengthens previously learned material, builds connections between previously learned information and new information, and makes new connections among and between concepts just introduced. Overall, examples are powerful learning aids as they help us make these connections to prior knowledge and assist us with seeing connections between new concepts, building and strengthening our neural pathways.

When we use examples, we are tapping into a memory concept called *elaboration*, the act of adding to information being learned by identifying relevant experiences and examples. One particularly effective type of elaboration is called *relational elaboration*, which occurs when we compare and contrast features of the new information being learned with the features of other concepts we have previously learned. As professors, we naturally use this technique when lecturing. For instance, after introducing a new topic, we often discuss how this topic relates to a previously discussed topic, reviewing similarities and differences. Students are taught this process when they are asked to compare and contrast two concepts, theories, or processes on examinations and in papers. Comparing and contrasting theories and other content is also a typical lecture activity to teach new concepts and to model how experts think about new information. Not surprisingly, there is a strong connection between taking a deeper look at how concepts relate and how well we learn the content (Hamilton, 1997).

When we attach meaning to concepts by using relevant examples, we are also increasing student motivation to learn the content. Motivation plays an important role in learning. Research has shown that that high levels of motivation are associated with high levels of achievement (Walker, Greene, & Mansell, 2006; Waschull, 2005), probably because motivated students are more likely to pay attention and exert high levels of effort (Goodman et al., 2011). Enhancing meaning through real-world applications is a primary way to increase motivation for learning (Wlodkowski & Ginsberg, 1995). By highlighting the importance of our content through meaningful, real-world examples and scenarios that are relatable to our students, we can have a positive impact on student motivation and learning.

Using examples from everyday life is an excellent method to pave the way for high levels of learning as well as increase long-term retention of information. When we use examples from everyday life, our students are able to easily connect new content to familiar experiences, situations, or knowledge. Connecting material to our selves, called the *self-reference effect*, is a natural and efficient learning system (Rogers, Kuiper, & Kirker, 1977). This form of elaboration is powerful because our memory for the familiar is much stronger than our memory for the unfamiliar (Wood et

disciplines, such as psychology, it is easy to identify everyday examples that naturally fit into course content. For instance, when teaching the concept of negative reinforcement, which is the increase of a specific response as the result of the removal of an aversive stimulus, many psychology professors use seatbelts as an example. Although the concept alone might be difficult for most individuals to remember, it is much easier if an example that is relevant and grounded on previously known information is provided. If people do not put on their seatbelt, cars are manufactured to emit an irritating series of beeps or a buzzing sound to indicate the seatbelt is not secured. The removal of the irritating sound (aversive stimulus) when you buckle your seatbelt increases the likelihood that you will continue to use your seatbelt in the future (specific response). As most students have had this experience before, they can relate to it. This new concept, negative reinforcement, is then linked to a familiar experience, seatbelt use. This connection makes it much more likely that the content will move from working memory to long-term memory.

In addition to helping students encode this new information, the neural connections being established also assist students with accessing or retrieving this information when it is needed in the future. Thus, examples help students encode information more effectively and make the retrieval process easier. To be as effective as possible, however, it is important for students to be able to relate to the examples. This is facilitated by getting to know your students so you can better identify examples that are personally and culturally relevant. If you are teaching a course with students who don't drive or travel by car often, the example just described would not be meaningful and therefore be of little value. In such cases, the example is actually detrimental as it is additional irrelevant information, which will make learning more difficult. Although the connection between course content and everyday life might be more apparent in some disciplines than others, it is typically possible to find everyday examples that connect to one's discipline, content, and student experiences. In addition to personal examples, we can also turn to pop culture or current events. When students are familiar with an example from pop culture or current events, the content comes alive and gives immediate meaning to the concepts. If students are not familiar with the pop culture reference or current event, confusion can result. Thus, it is probably best to describe the scenario in detail or even show a brief related video clip so that the example has value to your students. As said before, knowing your students will make this process of finding relevant examples much easier.

Not all examples need to rely on personally familiar content. Rather

simply provide an additional explanation or demonstration of a concept being learned. This type of example is also very powerful. For instance, in a public speaking course, the professor might provide students with several examples of effective or ineffective speeches. The students do not have to be already familiar with the speeches for this teaching technique to be helpful. The examples work because they provide additional information about the concept being learned, helping students to more fully understand the concept. This approach is often used in health sciences, where many examples of healthy and unhealthy tissue samples may be presented. In art, this approach may be used to demonstrate subtle brush strokes of a certain painter.

In some cases, a verbal explanation of the example will be effective; however, as noted in Chapter 5, examples are often much more powerful if a visual component is included. This is particularly effective in disciplines that are very visual in nature (e.g., math or art). Simple strategies such as using the whiteboard can sometimes add the visual dimension needed, but we may also want to look to technology for additional ways to make the most of examples. Technology allows us to bring powerful examples to our classes that may have not been possible otherwise. Videos, images, and sounds can add clarity to concepts already explained or may be used to introduce new examples of the concepts. Videos can be particularly helpful when we want to share examples that are complex in nature, when limited resources or physical space restraints prohibit us from showing the example or conducting the demonstration in the classroom, and when actual exposure may be hazardous. A historical example, for instance, could be discussed, but showing a video of the example would likely enhance the student learning experience. Other technology tools might include websites, document cameras, or educational apps. All these tools allow us to easily bring examples from around the world into our classroom.

MODELING

Modeling is an effective way for us to help students learn by example during lectures. The process of modeling is essentially acting out an example. Some disciplines rely heavily on this lecturing technique. Can you imagine teaching students about mathematical concepts without illustrating how the concepts applied to different problems? Could you imagine a discussion on how to use lab equipment without the professor first demonstrating how to safely use the equipment or trying to teach

content because watching others is one of the primary ways we learn. This approach is called *observational learning* and has made valuable contributions to understanding human behavior for more than 50 years (Bandura & Walters, 1963). It is easier to carry out an action previously observed as it provides direct instruction on what and how to do something. This is why observation is such an important part of so many learning experiences. Although modeling may be a necessity in some disciplines, it is important in all areas. We can all think of ways we can use modeling to enhance learning.

Worked Examples and Demonstrations

Two types of modeling are worked examples and demonstrations. *Worked examples* are a type of modeling where the professor works through a problem or scenario. For instance, a business professor may show accounting students how to complete a ledger, or an education professor might show students how to complete a lesson plan before asking students to try it on their own in class or for homework. Students learn from watching the process used by the professor when engaged in problem-solving activities (Tuovinen and Sweller, 1999). *Demonstrations* are another type of modeling. A computer science professor might demonstrate how to use software to create a product, or a chemistry professor could demonstrate how to conduct a lab experiment before students have an opportunity to carry out the task independently. An instructor in a counseling course may demonstrate how to manage nonverbal communication when asking sensitive questions, and a graduate teaching assistant in chemistry may model structures of elements using Styrofoam balls and pipe cleaners. Research has shown that students who watched demonstrations learned more than students who did not (Balch, 2014). Although live demonstrations are typically best, research shows that virtual demonstrations are also effective (Lewis, 2015).

Applying newly acquired information can greatly facilitate learning. One of the most powerful ways we can increase student learning is through the application of concepts just learned. Learning cannot happen in isolation and without practice. The purpose of learning is to be able to use newly acquired skills and knowledge in a productive way. By providing real-world examples, we can help our students see how what they are learning can be transferred and used in a variety of situations. Showing students how the course content has meaning and relevance outside the classroom enhances student motivation and learning. Identifying real-

interrelatedness of concepts being learned and why they matter can have a positive, significant impact on the learning process.

CASE STUDIES

Real-life, complex, and in-depth case studies allow learners to use real-world examples to increase the meaning of our course content. McFarlane (2015) recommends choosing case studies that are relevant, practical, and interesting. In a study conducted by Mayo (2004), students were randomly assigned to case-based instruction classes or classes taught in the traditional lecture approach. Results indicated that most students found the case studies interesting and relevant, and students exposed to case studies performed significantly better on the final exam (85%) compared to students not exposed to case studies (75%). Case studies provide students with a context for taking in our course content. By increasing the content's meaning and application, we can deepen students' understanding while also increasing their motivation to learn the content. Although some view the case study approach as an alternative to the lecture, case studies can certainly be integrated into lectures. Professors can review a case study as part of the lecture or use the case study as an active learning break in between lecture segments. We can create our own case studies or use case studies that have already been developed by textbook authors or colleagues. In some instances with advanced students, the instructor can provide the anticipated learning outcome and ask students to create the cases, a process that can be a powerful learning experience.

It is important for the professor and the student to find real-world examples or applications of the content. Faculty should be providing initial examples for several reasons. As experts in the discipline and skilled educators, our examples will be on target and accurate. Sometimes, when students do not understand a concept, their examples may not correctly connect to the content. In addition, research has shown that students are better equipped to apply content after they have seen examples from the instructor. This was illustrated in a research study conducted by Carroll (1994) in which students were assigned to a worked example or practice group. In the worked example group, the teacher showed students how to do a variety of math problems. In the practice group, students instead worked independently on problems. The results indicated that students in the worked example group outperformed students in the practice group in class assignments, homework, and tests. These findings highlight the important role of expert examples.

exercise and provide an opportunity to engage students in a high-level cognitive task. This process strengthens elaboration, and research has shown that students learn more when they use elaborative techniques (Gadzella & Baloglu, 2003; Hall et al., 2004). Giving students the opportunity to engage in elaboration and find their own relevant examples during lectures is also a way to increase cognitive engagement. Because everyone's natural tendency is to look for meaning, students will often think of examples that illustrate the content to some extent during our lectures without even being prompted to do so. However, carving out lecture time for students to intentionally engage in this process will help them take full advantage of the benefits associated with this cognitive task. In addition to giving students the opportunity to cognitively interact with the content, asking students to identify examples also provides the instructor with an opportunity to assess the level of understanding among the students in the class. When students give their examples, we can then provide feedback to let students know if their examples are appropriate and accurate. This is an important part of the process because we don't want students to make inaccurate links or connections. Encouraging and assisting students with finding examples and real-world applications at different points of the lecture will also make it more likely they will apply this cognitive strategy outside the classroom. Wood, Motz, and Willoughby (1998) argue that students need more opportunities to practice using effective learning strategies. Students are most likely to use strategies that are familiar to them, so if we use this strategy regularly during our lectures, students will be more likely to incorporate the use of examples into their study approaches.

Lectures that include examples, models, cases, and demonstrations have been shown time and again to facilitate better learning in students. Providing case studies and other examples helps students think more critically about the course content. Because examples provide additional, meaningful information about the content, students will gain a more comprehensive understanding of the material. According to Bloom's taxonomy, application is an important cognitive task we typically tackle after developing a foundational knowledge and understanding of the new material (Anderson & Krathwohl, 2001). By applying what has been learned to different problems or situations, students can strengthen and deepen their understanding of the material. Application is an important and necessary part of learning, and we can assist students with developing sophisticated critical thinking skills by providing case studies and other examples

LEARNING AND ENGAGEMENT STRATEGIES

Helping to make information meaningful through examples, such as modeling and demonstrations, has strong potential to augment lectures and increase elaboration for students. The following learning and engagement strategies are designed to illustrate a variety of ways to enhance traditional lectures through the use of examples. If you already use some of these lecture enhancement strategies, think of ways to adapt them for future use.

Provide Two Examples for Each Big Idea

Find a good example for each important concept in the course and then search for a complementary second example. If you have been teaching for a while, you probably already have examples you use regularly. If you are new to teaching or are teaching a new class, this task can seem overwhelming at first, but you do not have to do all this work yourself. Use your resources. Start by looking at the textbook you are using for the course. Most textbook authors provide numerous examples in the text as well as in the instructor resources that accompany the textbook. Of course, you can also search the Internet for examples. Many professional organizations have websites for faculty to share resources and ideas, which is another great place to start. Talking with colleagues in person or through electronic mailing lists or Google groups will also help you identify meaningful examples. Professional colleagues are often very willing to share the examples they use. A final strategy is to ask students to identify examples and then explain why they chose the specific example submitted. There are many places to find relevant examples for the major concepts in your course. Having at least two examples for each concept will be very helpful for your students.

Incorporate Case Studies

Case studies illustrate the real-world value of the concepts presented in your lectures. As mentioned earlier, case studies are more in-depth examples that highlight the relevance of the content learned through application. It is important to develop or find case studies that directly connect to your learning goals and to content specifically tied to presented lectures. Some case studies can simply be described, but it might be more effective to show videos of examples in other cases. For instance, in a marketing class, it might be best to show a video illustrating the business plan and actual advertisements used in a marketing project rather than trying

rather than a verbal description of the symptoms. Just like with briefer examples, use resources from the publisher of your textbook, professional organizations, and colleagues on your campus to help you find case studies aligned with your learning goals. When presenting the case study, pause periodically so students can ask questions and reflect on what they are learning. It is also helpful to include the information gained through the case study in subsequent lectures.

Use Small-Group Discussions of Case Studies

Another way to use case studies is to have students discuss the scenario with other students in the class as a lecture check, rather than presenting the cases during the lecture. The small-group activity could take place after the content-based lecture. Small-group discussions of case studies often work best if you've already modeled how to analyze and approach the study and if you provide students with guiding questions or clear directions about the task. Students will then be able to refer to this previous experience and your modeling as they work on applying course content to the case study you provided. Depending on the complexity of the case study, this may take a considerable amount of class time, so you may want to ask students to do some of this work prior to attending class. When using this as an in-class activity, walk around the room to support and challenge students. A common but ineffective question often asked by professors when checking on the progress of a group is, "How is it going?" Students will often simply state all is well when you ask this question, and you are left without much information about their progress. Instead, ask more specific questions such as, "What is your response to this question?" or "What has surprised you about this case thus far?" These types of questions and subsequent responses allow you to better assess progress and provide useful feedback during this activity.

Be sure to give students adequate time in small groups to work through cases, but do not provide too much time. Keeping the time relatively short keeps students on task and uses class time efficiently. You can even turn the case into a small competition by handing out cases and stating, "When I say 'go' you will have only six minutes to complete the case. Let's see how many groups can finish in six minutes." As you experiment with using this technique, you will gain a better understanding of how much time is needed for the activity. Keep in mind that not providing students with enough time may frustrate students. Finding the right amount of time to help students stay on task and be productive is important. After groups

Create Make It Meaningful Teams

For this activity, assign students to teams or clusters of three to four individuals per group. Each Make it Meaningful team is tasked with coming up with an example of the concept you just discussed in your lecture. The goal is for students to work together to identify an example that is meaningful and relevant to them. In small classes, you can ask each group to share its example, but in larger classes, randomly select several groups to report on their examples. To keep others engaged during this part of the process, you could ask students to answer questions about the examples or have them rank the usefulness of the examples presented. Technology polling tools or online survey tools such as SurveyMonkey could be used for this purpose. Surveys could be incorporated into the activity during class or distributed electronically after class. On the survey, you could use simple questions such as, "Is this example on target and accurate?" and "How useful is this example in helping you to understand the content?" (A rating scale would work well for this question.) Adding this additional component to the process can help keep students on task during the small-group activity, and it can also provide you with valuable feedback about which examples resonated best with your students. You can then use these examples in future lectures.

Think, Pair, Share

This strategy is becoming ubiquitous in higher education and pairs extremely well with lectures. Examples are a great use of the think-pair-share activity, which asks students to first think independently of an example related to the content just presented in a lecture. After a minute or so (or longer with more complex content), students can then share their example with a classmate. You can then ask for volunteers or randomly call on several students to discuss some of the examples in a large group. During the large-group discussion, you can provide feedback about whether you believe the example is on target and add more details as needed.

Have Students Complete Example Tables

For this task, ask students to independently complete a two-column table. The first column is for the big ideas discussed during the lecture, and the second column is for the examples of the big ideas. As you have provided examples during the lecture, students should be able to easily find this information in their notes. After giving students a few minutes to complete the table, you can ask them to participate in a share-and-compare

examples are different, they can add the other examples to their table. This is a great activity for the end of class because it helps students summarize the examples and helps them see the important role of examples in learning, emphasizing that they should be looking for examples presented during lectures and documenting these examples in their notes.

Use a Web Quest

Ask students to search the Internet for an example of a concept being discussed. Students can work in pairs or small groups to do a quick search for an example of a concept just learned. You could also ask students to tweet their responses, and you could then display the examples on the screen for everyone to see. This is a great way to have students use technology during class for learning purposes. However, when you encourage students to use technology, you need to be mindful of the potential risk for off-task behaviors.

SUMMARY

Making lectures meaningful through examples promotes interest in the topics presented and allows students to use prior knowledge to better understand the new information being presented. Using relevant examples through modeling and demonstration allows for students to make sense of what they are learning and also provides elaboration to aid in remembering the material when it is needed at a later time. Meaning is essential for elaboration of the information being learned, and examples are important to facilitate that meaning, which in turn fosters long-term learning.

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