Summary

This article attempts to answer three questions pertaining to the topic “Deep Learning:” what is deep learning; why should faculty adopt approaches that promote deep learning; and, what types of exercises help students achieve deep learning. In answering the first question, Millis stresses the differences between deep and surface learning. While the latter general amounts to random accretion of unrelated facts and is ephemeral, deep learning focuses on developing overall understanding and meaning of a set of materials or concepts. As such, deep learning leads to a level of knowledge that allows for long-term retention and the ability to apply that knowledge in new ways. Millis further defines deep learning by noting four key characteristics. The first is a “well-structured knowledge base with a focus on concepts, the integration of knowledge, and a cumulative experience. The second characteristic of deep learning is that it promotes a high level of motivation in students and a “sense of ownership” of the material. Third, deep learning is associated with active rather than passive forms of knowledge acquisition. Finally, deep learning requires interaction, between students and between students and instructors.

In answering the second question, Millis points out that one of the most common course learning objectives adopted by professors, regardless of discipline, is the development of critical thinking skills. Yet, research has shown repeatedly that lecture, the instructional method of choice for most, is particularly ill-suited for promoting critical thinking in students. In contrast, critical thinking, which constitutes a fundamental element of deep learning, is activated through active and cooperative learning techniques. Thus, instructors who wish to imbue critical thinking skills in their students need to consider adopting the types of learning approaches associated with deep learning.

In the bulk of the article, Millis presents three examples of deep learning activities. The first of these employs a combination of the jigsaw with a graphic organizer assignment. This activity proceeds in a sequential process. In the first step, students are placed into base groups, in which each student receives a particular topic; in her example, each member of the base group receives a character from Death of a Salesman and is asked, as homework, to create a graphic organizer that lists the character’s four main personality traits as well as textual evidence that reflects each of them. The second step, which occurs in class, students form expert groups composed of members who share the same topic, or in Millis’ example, the same character. In the expert groups students compare graphic organizers and decide on the four best answers and evidentiary support. In the final step, students return to their base groups and teach their fellow group members about their specific topic.

Millis refers to the second example of a deep learning exercise as a “cooperative debate.” In this activity students are placed into groups of four to five and assigned a pro or con position on an issue. For homework students gather evidence to support their teams’ position. In class, the instructor gives groups time to compare notes and lay out the strongest argument for their position. In order to decrease the likelihood that the strongest students in each group dominate deliberation, the instructor
doesn’t tell the groups who will serve as their respective spokesperson until it is time to present. In the next step, each team’s spokesperson is required to present the team’s argument to the rest of the class. After each team has presented its position, the teams are given time to form a rebuttal to the team that presented the position opposing theirs. In the final step, a spokesperson of each group’s choosing presents the team’s rebuttal, and those students not involved in the given debate topic vote to decide which team made the best argument.

The final deep learning activity described by Millis is the “Pro-Con-Caveat Grid.” Millis discusses this activity as a means of promoting deep learning in an online class, but it could be employed in a face to face course as well. In the first step of the activity, instructors provide students with a template grid in which they, as homework, list arguments for and against a particular position or decision, as well as any caveats upon which those positions depend. When they have finished, students upload their completed grids into the course management webpage in a section specifically designated for their respective online cooperative learning team. Students in the same team compare the grids submitted by the team’s members, and then they collectively develop a consensus grid. Once the team has completed its composite grid, it submits the grid to a different group. In the final step, each team, working collectively, writes feedback on the grid sent to it by the other group and submits the comments to the originating team.

Conclusions

Millis concludes the article by posing a series of questions that she suggests instructors ask themselves in developing assignments intended to promote deep learning. First, does the assignment challenge students to examine course materials in a manner that is focused on key concepts, rather than minutiae? Second, are students required to turn in written evidence that demonstrates engagement and understanding? Third, does the assignment create sufficient motivation to create a sense of ownership of the material. Additionally, instructors need to consider whether they have developed a grading system that rewards both individual and collective efforts at attaining deep learning, effectively used both in and out of class time to get students to actively engage the materials, and are they employing activities that require interaction.

Applications

The bulk of this paper, made up of the sample deep learning activities, can be readily applied in almost any course. All three of the examples provided by Millis should be easily adaptable to any field of study. Additionally, all three sample activities involve multi-stepped processes that engage students both in and out of the class in active learning. Finally, the article conveniently provides sample graphics for the graphic organizer and pro-con-caveat grid techniques.

Citations of Interest


