Group study sessions often start often with tentativeness and apparent disinterest. How can this be improved? The goal of this study was to see if employing a brain teaser at the beginning of the session would increase perceived learning by the students.

Brain teasers are challenging puzzles that force participants to think in creative ways. They often involve lateral thinking and outside of the box problem solving skills. However, they are rarely employed in academic settings. This investigation looked at the ability of brain teasers to promote perceived student learning. In this example, the brain teaser was used a mental warm-up for the students. Additionally, it had power in the fact that it encouraged social interaction between students and instructor right from the start. Past research has shown the power of social interaction in classroom settings. Hopefully, the brain teaser would encourage mental awareness and give the group a sense of autonomy.

The research was conducted over four consecutive weeks. Two weeks were used as controls. The control weeks consisted of a normal study session. During these two weeks a questionnaire was administered at the end of the session. It was a blind questionnaire; the study group leader left the room for the questionnaire and did not have students write their names on the questionnaire. This prevented any confounding errors (i.e. student response change due to leader presence). During the other two weeks, the students were given the brain teasers at the beginning of class. After working through the teaser, class resumed as normal. At the end of the hour long session, the questionnaire was once again randomly distributed.
The questionnaire consisted of four questions. Questions 1, 2, and 4 asked students to give a 1-10 ranking. Question 1 prompted the student to rank how alert they were for the session. Question 2 asked how much the student gained from the session. Question 4 had students rank how much effort they put into the session. Question 3 let students evaluate the course session as a whole. It asked each student to write about what they thought of the session and how it was beneficial and what could be improved.

The testing was randomized by not systematically scheduling weeks that the teaser would be used. Students were not told when the teaser would be used. This prevented students from expecting the teaser. Students who did not want to participate may have made plans accordingly if they were aware of the teaser. They may have shown up late to skip it. They may have brought other work to do during the teaser exercise. In any case, randomization prevented any student bias that may have popped up.

The hypothesis of the experiment designers is that brain teasers should increase the perceived effectiveness of study sessions. This will happen because students can mentally prepare for the work by doing the brain teaser. The group will also run more effectively because of the social interaction the teaser forces. It will do this by overcoming the initial tentativeness that students approach the session with.

For week one, on a scale from 1-10, where a brain teaser was not given, the average student’s perceived alertness for question one was 8.833, the average student’s perceived gain for question 2 from the session was 8.083, and the average perceived effort in the session for question 4 was 8.416. The overall average of the three questions for week one was 8.444. For week two, on a scale from 1-10, where a brain teaser was given, the average student’s perceived alertness for question two was 8.500, the average student’s perceived gain for question two from
the session was 8.333, and the average perceived effort in the session for question four was 8.166. The overall average of the three questions for week one was 8.381.

For week three, on a scale from 1-10, where a brain teaser was not given, the average student’s perceived alertness for question one was 7.400, the average student’s perceived gain for question 2 from the session was 7.500, and the average perceived effort in the session for question 4 was 7.200. The overall average of the three questions for week one was 7.366.

For week four, one a scale from 1-10, where a brain teaser was given, the average student’s perceived alertness for question one was 8.818, the average student’s perceived gain for question 2 from the session was 9.364, and the average perceived effort in the session for question 4 was 7.200. The overall average of the three questions for week one was 8.818.

The overall average of the weeks that a brain teaser was given (weeks 2 and 4) was 8.607, and the average of the weeks that a brain teaser wasn’t given was (weeks 1 and 3) 7.945. Comparing the two weeks where brain teasers were given and the other two weeks where brain teasers were not given, it is clear that brain teasers positively affected student’s perceived learning. In our study, in weeks two and four when a brain teaser was given at the start of the workshop, students recorded higher overall questionnaire scores, with an average of 8.6. As opposed to weeks 1 and 3, where a brain teaser was not given, in which students recorded scores with an average of 7.9.

Averaging the scores of each individual question for the four weeks uncovered more conclusions. Question two seemed to show the most change when mapped with the use of a brain teaser. Question two was: “On a scale from 1-10 rank how much you gained from the session.” The average scores for question two in weeks one and three, without a brain teaser, were 8.0 and 7.5. Whereas, the average scores for question two in weeks two and four, with a brain teaser,
were 8.3 and 9.3. This showed the most dramatic positive correlation with a brain teaser in perceived student learning.

Question four also gave a positive correlation with student’s perceived learning. Question four was: “On a scale from 1-10 rank how much effort you put into the session.” The average score for question four in weeks one and three were 8.4 and 7.2, respectively. The average scores for question four in weeks two and four were 8.2 and 8.8, respectively.

Finally, question one showed the least amount of positive correlation with student’s perceived learning. Question one read, “On a scale from 1-10 rank how alert you were for this session.” The average score for question one in weeks 1 and 3 were 8.8 and 7.4. The average scores for question four in weeks 2 and 4 were 8.5 and 8.8. Question one showed the lowest amount of correlation with perceived student learning.

Overall, student’s scores on the questionnaire were higher on weeks where brain teasers were administered suggesting a positive correlation with student’s perceived learning. Question two, which ranked student’s gain, showed the highest positive correlation. Question four, which ranked student’s effort, showed the second highest positive correlation. Finally, question one, which ranked student’s alertness, showed the least amount of correlation. Questions two and four, which ranked gain and effort respectively, may be less prone to fluctuation than question one, which ranked alertness. The reasoning for this belief follows. Alertness is highly situational. It reflects the combination of many variables, such as the time of the workshop and sleep deprivation. The other questions asked for an evaluation of the specific hour in question. Amount learned (gain) and effort were only subject to this session. This suggestion can explain the low correlation seen for question one.
There are a few things that are important to discuss. Overall, it certainly looks like the brain teaser was an effective tool for the group. Statistically, students reported that they gained more with the teaser. Subjectively, the leaders noticed a huge change in the group dynamic. Students collaborated and formed small groups to work in without prompting. There was an increase in discussion and interaction between the students. Everyone seemed to be more invested in the work. Also, students who had not participated much in the past were more willing to go up to the board to show their work.

Another noticeable change was the response to the questionnaires. The students gave a great deal more information during weeks when the questionnaire was given. Without prompting, the students offered up longer explanations for what they thought of the group. This does not show that they learned more. But, it definitely shows that they were more active and ready to participate.

There are many directions in which this research can proceed. One of the limitations of this study was the cohort size. For this reason, a larger scale experiment would be interesting. Additionally, a longer study would useful. Both of these would give more data points. This would allow for more confidence in the results. A limitation of this study was its inability to control outside circumstances that could influence the results. If students were in a bad mood or were sleep deprived because of a hectic schedule, they may not have been as prone to be influenced by the teaser. The workshop leaders cannot do much to help these students because the trouble stems beyond the scope of the classroom interaction. As the results of question one show, confounding errors such as these definitely exist and came into play during the course of the study.
However, the overall results were positive in nature. Brain teasers not only helped students learn more effectively, but also improved student alertness and investment into the workshop. The correlation between perceived learning and the use of a brain teaser is interesting. More follow up study would be helpful. Specifically, a follow up study that explores the relationship between alertness level and perceived learning would be interesting.

References


