MIND MAPS AS CLASSROOM EXERCISES

John W. Budd

Industrial Relations Landgrant Term Professor
Industrial Relations Center
University of Minnesota
3-300 Carlson School of Management
321 19th Avenue South
Minneapolis, MN 55455-0438

jbudd@csom.umn.edu

Final Version: March 2003

MIND MAPS AS CLASSROOM EXERCISES

Abstract

A Mind Map is an outline in which the major categories radiate from a central image and lesser categories are captured as branches of larger branches. The author describes an in-class exercise in which small groups of students create a Mind Map for a specific topic. This exercise is another example of an active and collaborative learning tool that instructors can use to move beyond "chalk and talk." The exercise can also help incorporate activities for diverse learning styles into economics courses and can re-energize a course in mid-semester. Ideas for Mind Map topics for a wide variety of economics courses are provided.

Key words: active learning, Mind Map, teaching

JEL code: A20

The need for active and collaborative learning techniques in teaching has been well documented in general (Johnson, Johnson, and Smith 1991; Meyers and Jones 1993; Slavin 1995) and as it pertains more specifically to teaching economics (Maier and Keenan 1994). Concrete examples of different active and collaborative learning exercises that economics instructors can use can be found in Carlson and Skaggs (2000), Manning and Riordan (2000), Truscott, Rustogi, and Young (2000), and others.

The need for instructors to use exercises to connect with diverse learning styles has also been established in general (Claxton and Murrell 1987; Sarasin 1999) and as it pertains to teaching economics (Bartlett 1996; Becker and Watts 1995, 1996; Ziegert 2000). Examples of specific strategies in economics include those described by Lage, Platt, and Treglia (2000) and Tinari and Khandke (2000). As such, it is important for instructors to have a wide variety of specific exercises to employ in their classes.

Motivated by the twin goals of using active learning and responsiveness to a diversity of learning styles to enhance learning, I describe an exercise in which student groups create a Mind Map for a specific course topic. The creation of a Mind Map in a small group is an active and collaborative learning exercise. And because a Mind Map captures a specific topic in a nonlinear fashion and incorporates graphics and colors, this exercise can connect with learners whose style is not as well-served by traditional linear, text-based materials. Therefore, using Mind Maps as an in-class exercise is one more tool that economics instructors can add to their portfolio of active learning activities as they seek to move beyond "chalk and talk."

WHAT IS A MIND MAP?

A Mind Map is a form of an outline with ideas and pictures radiating out from a central concept (Buzan and Buzan 1993; Wycoff 1991).[1] Examples are presented in Figures 1 and 2. Figure 1 is a Mind Map for the determinants of housing prices and Figure 2 is a Mind Map of this article. Excellent, extensive Mind Maps can be found throughout Buzan and Buzan (1993). As with a traditional outline, a Mind Map is based on organizing information via hierarchies and categories. But in a Mind Map, the hierarchies and associations flow out from a central image in a free-flowing, yet organized and coherent, manner. Major topics or categories associated with the central topic are captured by branches flowing from the central image. Each branch is labeled with a key word or image. Lesser items within each category stem from the relevant branches.

In the housing prices Mind Map in Figure 1, the two major categories are supply and demand so these are the main branches. Four factors that affect supply are demographics, land availability, regulation, and construction costs and each of these is captured by a lesser branch flowing from the major supply branch. Within construction costs, for example, several lesser dimensions flow from it: the costs of lumber, windows, drywall, and labor. On the demand side, several major categories are identified as affecting demand and each of these lesser branches in turn have lesser branches capturing dimensions of each category.

The categorizations and determinants of housing supply and demand captured by the Mind Map in Figure 1 could also be presented in a traditional, linear outline.[2] But there are some very significant differences. In addition to the obvious radial structure, note more carefully that each branch is captured by a single key word, not a phrase or sentence. Using single words reduces ideas to their core. Important ideas are not obscured by extraneous words. And new associations are not limited by more specific phrases. For example, in Figure 1, if a branch had

been labeled "zoning regulation" instead of "regulation" then other types of regulation might not have been considered.

Another significant difference is the use of graphics. Buzan and Buzan (1993) emphasize that the central point in the Mind Map must always be an image because the brain is drawn to an image more than a word. Moreover, the use of images in the entire Mind Map is recommended. Similarly, differences in the size of the branches and the associated words are used to reinforce associations and to add emphasis. The other difference to highlight is the use of color.[3] A traditional outline is often monochromatic whereas the use of color is important in creating Mind Maps. In particular, many Mind Maps use one color for each major category to aid in organization.

As articulated in Buzan and Buzan (1993), these differences can make Mind Maps powerful tools.[4] Research on memory and learning emphasizes the importance of associations (Driscoll 2000). The radiant structure of a Mind Map with explicit branches promotes associations. The use of color for different categories can also make more powerful associations. The use of emphasis in a Mind Map, for example with thicker main branches and larger printing, can also foster recall of information. The focus on using single key words can foster more expansive connections and confining the entire Mind Map to a single piece of paper allows one to see the entire picture at once and perhaps stimulate additional associations.

CLASSROOM APPLICATIONS

In a labor relations course at the University of Minnesota, I have created two in-class exercises in which small groups of students make Mind Maps. At the start of the class session, I provide a brief introduction to Mind Maps by outlining the basic principles and showing some examples from Buzan and Buzan (1993). I then describe the topic for their Mind Map and the

3

students are divided into groups of three and provided with a large sheet of paper, a handful of colored markers, and a number of small post-it notes.

Brainstorming is a critical component of creating a Mind Map so the groups are instructed to brainstorm as their first step. The small post-it notes are quite useful at this stage. The groups can write ideas on the post-it notes and then shuffle them as many times as necessary to create effective categorizations. The creation of Mind Maps in small groups instead of by individual students is to facilitate a deeper analysis of the topic through brainstorming. Moreover, small group activities allow students to voice their ideas, support their ideas with evidence, listen to other points of view, and gain confidence (Meyers and Jones 1993).

The small groups of students have approximately one hour to construct a Mind Map in each group. When completed, each Mind Map is attached to a classroom bulletin board and we have a quick poster session so everyone can review all of the Mind Maps. The remainder of the class time is devoted to debriefing the exercise via a discussion of the major themes and different categorizations for the problem at hand.

During the exercise, it is important for the instructor to circulate among the groups. This helps those groups that are having trouble getting started and those that need prompting to broaden their thinking. Because Mind Maps are generally not familiar to most students, the groups also benefit from encouragement to incorporate color and small pictures as organizational aids and prompts. Once started, however, some groups also need to be re-directed away from elaborate drawings toward more substance. This is an informal method of continuous feedback (Huba and Freed 2000). Circulating among the groups also gives the instructor a chance to interact with the students in a more personal manner than a traditional chalk and talk lecture affords. Lastly, the Mind Map exercise was not graded and lacked formal mechanisms to ensure

participation of all group members. Moving from group to group during the exercise allows the instructor to observe the extent of participation and to get the more passive group members to be more active. For example, I frequently address questions specifically to the passive group members and then turn their answers into concrete action steps on the Mind Maps.

In my course, the topic for one of the Mind Map exercises is the bargaining environment which is the range of factors that influence labor and management negotiators and that determine bargaining power. To make the exercise more concrete, I created three newspaper-type articles that were written as if they were providing a preview of the upcoming negotiations between a specific local union and the copper company Phelps Dodge. The articles are for 1954, 1967, and 1983 – time periods in which the bargaining environment was very different.

Each team of students is assigned a specific year and their task is to create a Mind Map of the bargaining environment for the negotiations with Phelps Dodge for that specific year based on the newspaper-type article. The central image of the Mind Map represents the local union. Major branches might include economic, political, legal, and technological categories. Within the economic branch, students could then identify labor market and product market factors, and various other subcategories and more specific factors (e.g., the unemployment rate).

The other Mind Map exercise in my course is on the effects of labor unions. This exercise occurs near the end of the course so it can facilitate student reflection on the entire course. The central image in this Mind Map represents unionism and the various branches identify categories and examples of the effects of unions. One branch might be macroeconomic effects, which could include effects on unemployment and inflation, and another might be workplace effects, which could include effects on wages, adjustment costs, and productivity. One of the Mind Maps created by a student group on this topic is presented in Figure 3. The effects of labor unions are

broadly grouped into five categories and various subcategories branch off from each of them. In a relatively short period of time, the group was able to analyze, categorize, and display many important dimensions of a wide-ranging topic.

Although my specific exercises are for a labor relations course, there are applications in traditional economics classes when the problem at hand involves categorization and is amenable to being captured by a traditional outline. For example, consider the topic of elementary supply and demand in a principles course. A Mind Map is not appropriate for replacing the usual graphical analysis in introducing supply and demand. However, if an instructor wants students to think carefully about the determinants of supply and demand for a specific product, after seeing the traditional graphical analysis, then the creation of a Mind Map that outlines broad categories and then specific examples within different categories is a possible tool for serving this goal. This is the example presented in Figure 1.

Other applications are possible. The sources of economic growth could be categorized through a Mind Map in a macroeconomics course. The varied consequences of policy interventions could be outlined in a Mind Map exercise in a wide range of courses. For example, the creation of a Mind Map of the effects of minimum wage legislation could be a useful exercise in a labor economics course. Other examples might include violations of the classical regression assumptions, sources of income inequality, determinants of migration, or types of trade barriers. In short, the outline structure of a Mind Map is appropriate for problems in economics courses in which a traditional outline is used; it is not intended as a substitute for other problems in which other methods, such as graphs or equations, best capture the problem. The Mind Map exercise is also intended to promote the reflection and application components of learning, not initial instruction. In the case of supply and demand, for example, a Mind Map

exercise is a vehicle for students to reflect on the concepts of supply and demand by thinking of various influences; I am not suggesting that it is an effective way to initially teach students the meaning of these concepts.

PEDAGOGICAL BENEFITS

As described above, Buzan and Buzan (1993) articulate how the nature of Mind Maps can facilitate richer and broader associations, and hence better learning. These are clearly consistent with standard course objectives so to the extent that Mind Maps create an enhanced understanding of supply and demand or other important course topics, then using Mind Maps as a classroom exercise is beneficial.

But the pedagogical benefits of this exercise do not rely upon it being a "better" way of learning. As referenced at the outset, there has been widespread call for economics instruction to move beyond chalk and talk lectures. This Mind Map exercise is something that instructors can use to add active and collaborative learning to their courses. Students are engaged in active learning as they wrestle with ideas, associations, and categories in creating a Mind Map—they are creating their own Mind Map, not simply looking at one creating by the instructor. The exercise is collaborative because the Mind Maps are created as a small group effort. A collaborative relationship between the instructor and students can also be established as the instructor helps with the constructions of the Mind Maps, but as a "guide on the side" not as the "sage on the stage" (Palloff and Pratt 2001, 108).

As presented here, the Mind Map exercise is collaborative rather than cooperative learning because the group interaction is not tightly structured (Millis and Cottell 1998). Some cooperative learning strategies for ensuring that all of the group members are actively engaged, however, can be applied to the Mind Map exercise. To foster equal participation, a roundtable or

round-robin structure could be included during the brainstorming phase such that the group members take turns, with limited options for passing or skipping turns, vocalizing and writing down one idea each turn (Millis and Cottell 1998; Kagan and Kagan 1994). To establish individual accountability, the exercise could include a brief presentation of each Mind Map to the rest of the class with one randomly chosen group member as the presenter (Kagan and Kagan 1994). In my own experience, I have used my circulation among the groups to monitor equal participation and to ask questions of passive participants to make them more active.

The Mind Map exercise also supports classroom teaching that is responsive to diverse learning styles. There is substantial research on individual differences in learning styles across four dimensions, personality, information processing, social interaction, and instructional methods (Claxton and Murrell 1987), which imply the need to use diverse teaching methods to reach learners with different strengths. One categorization of learning styles includes auditory learners, visual learners, and tactile/kinesthetic learners (Sarasin 1999). Auditory learners may be well-served by traditional lectures, but visual learners need greater visual support and tactile learners need to do things to learn. The construction of a Mind Map provides a learning experience for visual and tactile learners who are traditionally not as well served by lectures.

Lastly, varying the nature of instructional materials for a single individual over time has biological, cognitive, and motivational underpinnings (Driscoll 2000). As one example, this Mind Map exercise can also be used to re-energize a course in mid-semester. Duffy and Jones (1995) refer to the middle of a semester as the doldrums and recommend changing the nature of classroom activities to break out of this lull. In my experience, having students use colored markers to create Mind Maps on large sheets of paper is a significant change from other course activities and increases the level of energy in the class. Moreover, applying the research on how

music can stimulate greater brain activity (Miller and Schyb 1989; Shaw 2000; Taylor 1997), I have music playing—such as Mozart—in the background during the creation of the Mind Maps. This seems to add further energy to the exercise, and the class.

Survey evidence cautiously supports some of these assertions. I administered an online survey during Spring 2002 to the students enrolled during Spring 2001 when the Mind Map exercise was used. Thirty-nine surveys were anonymously completed for a response rate of 60 percent. The respondents were asked to evaluate various course exercises and also completed Kolb's (1984) learning style inventory.[5] This inventory has four dimensions: active experimentation (doing), abstract conceptualization (thinking), reflective observation (watching), concrete experience (feeling).

On the question "I learned a lot from…" (1=strongly agree, 3=neutral, 5=strongly disagree), the overall average response for the Mind Map exercise was neutral (3.08). However, there is a significant correlation ($r = -0.31$, p-value $= 0.051$) between this rating and the active experimentation score—students with higher scores for a "doing" learning style were in more agreement with the statement that they learned a lot from the Mind Map exercise. Moreover, consider the categorization of those with the highest score for active experimentation as doers and those with the highest score for abstract conceptualization as thinkers.[6] Thinkers rated lectures significantly more favorably than the Mind Map exercise (difference $= 1.67$, p-value $= 0.0002$). However, for doers the Mind Map exercises rating is essentially the same as for lectures (difference $= 0.27$, p-value $= 0.60$).

The survey also asked whether it is important to have "learning exercises in which I am actively engaged" and "varied learning exercises (not all the same type)." For those who strongly agreed or agreed with the importance of active learning exercises, the amount they learned from

the Mind Map exercise was rated more favorably (difference = 1.307, p-value = 0.06). This is also the case for those who thought it important to have varied exercises (difference = 0.83, p-value = 0.15), though it is not statistically significant at conventional levels. In sum, although the sample only has 39 observations and only represents a single course with one instructor, the results are consistent with the Mind Map exercise connecting with individuals with different learning styles, especially those that prefer active experimentation.

CONCEPT MAPS

The nature of Mind Maps and their application as a classroom exercise are further revealed by a comparison with concept maps. A concept map is a hierarchical display of propositions that connect important concepts (Novak and Gowin 1984; Novak 1998). The central concept is at the top of the map and the various subcomponents are networked down the map from this central concept. Mind Maps are radial with branches flowing from the center of the map. Color and graphical images can be used in concept maps, but are not emphasized to the same degree as in the creation of Mind Maps.

Concept maps can be effectively incorporated into university-level teaching (Jacobs-Lawson and Hershey 2002; Novak and Gowin 1984; Trepagnier 2002), but Mind Maps are not concept maps and the use of Mind Maps described in this article is different from the use of concept maps. The Mind Map classroom exercise is intended for classroom topics in which the instructor wants students to wrestle with creating themes, subthemes, and supporting examples—such as specific determinants of supply and demand or the effects of labor unions (see Figures 1 and 3). As noted above, topics that fit into a traditional outline are good subjects for Mind Maps. In contrast, concept maps emphasize the linking of important concepts. Unlike Figure 1, a concept map on supply and demand would likely focus on the concepts of the derivation of

supply and demand, shifts in supply and demand curves versus movements along the supply and demand curves, market equilibrium, and elasticity. As such, concept maps are often used as assessment devices to evaluate student understanding (Jacobs-Lawson and Hershey 2002; Novak and Gowin 1984). The Mind Map exercise described here is presented as an opportunity for greater student exploration of a focused concept, not as an evaluation mechanism of student understanding of the linkages between concepts. As with other teaching tools, the appropriateness of using Mind Maps in the classroom depends on the subject matter and the instructor's goals.

CONCLUSIONS

To move beyond "chalk and talk" by incorporating active and collaborative learning into economics courses, instructors can use a variety of exercises and tools. One such exercise is the in-class creation of Mind Maps on a specific topic by small groups of students. Buzan and Buzan (1993) argue that Mind Maps better harness the way the brain works. The radiant structure is consistent with the radiant nature of the brain. And the use of colors, graphics, and nonlinear branches stimulates the entire brain.

Although these reasons potentially make Mind Maps powerful tools, the usefulness as a classroom exercise is not dependent on any claimed superiority of Mind Maps over other forms of outlining and categorization. The benefits of this exercise derive from its active and collaborative nature. Modifying the popular collaborative, active learning exercise "think-pair-share" (Millis and Cottell 1998), the Mind Map exercise is "think-rap-map." And the uniqueness of this activity relative to usual course activities can connect with diverse learning styles and re-energize a course.

In sum, the in-class construction of Mind Maps furthers an instructor's fulfillment of Chickering and Gamson's (1987) seven principles of good teaching practices.[7] As the students are engaged in actively creating their own representations of the topic through their Mind Map, this exercise supports active learning (principle 3). Working in small groups as the instructor consults with each group facilitates contacts between students and faculty (principle 1) and develops cooperation among students (principle 2). With its use of drawing and graphics, this exercise is different from many course exercises and therefore respects diverse talents and ways of learning (principle 7).[8]

At the same time, the application of Mind Maps is limited to problems or exercises that are amenable to a traditional outline. Mind Maps are not a new teaching method with which to teach an entire course. But they are another option that economics instructors can consider using once or twice during a semester as part of a broader repertoire of diverse, active learning exercises.

REFERENCES

Angelo, T. A. 1993. A 'teacher's dozen:' Fourteen general, research-based principles for improving higher learning in our classrooms. *AAHE Bulletin* 45 (April): 3-7, 13.

Bartlett, R. L. 1996. Discovering diversity in introductory economics. *Journal of Economic Perspectives* 10 (Spring): 141-53.

Becker, W. E., and M. Watts. 1995. Teaching tools: Teaching methods in undergraduate economics. *Economic Inquiry* 33 (October): 692-700.

Becker, W. E., and M. Watts. 1996. Chalk and talk: A national survey on teaching undergraduate economics. *American Economic Review* 86 (May): 448-53.

Buzan, T., and B. Buzan. 1993. *The Mind Map book: How to use radiant thinking to maximize your brain's untapped potential*. New York: Plume.

Carlson, J. L, and N. T. Skaggs. 2000. Learning by trial and error: A case for moot courts. *Journal of Economic Education* 31 (Spring): 145-55.

Chickering, A. W., and Z. F. Gamson. 1987. Seven principles for good practice in undergraduate education. *AAHE Bulletin* 39 (March): 3-7.

Claxton, C. S., and P. H. Murrell. 1987. *Learning styles: Implications for improving educational practices* (ASHE-ERIC Higher Education Report No. 4). Washington, DC: Association for the Study of Higher Education.

Driscoll, M. P. 2000. *Psychology of learning for instruction, 2nd ed.* Boston: Allyn and Bacon.

Duffy, D. K., and J. W. Jones. 1995. *Teaching within the rhythms of the semester*. San Francisco: Jossey-Bass.

Herz, B., and W. Merz. 1998. Experiential learning and the effectiveness of economic simulation games. *Simulation and Gaming* 29 (June): 238-50.

Huba, M. E., and J. E. Freed. 2000. *Learner-centered assessment on college campuses: Shifting the focus from teaching to learning*. Boston: Allyn and Bacon.

Jacobs-Lawson, J. M., and D. A. Hershey. 2002. Concept maps as an assessment tool in psychology courses. *Teaching of Psychology* 29 (Winter): 25-29.

Johnson, D. W., R. T. Johnson, and K. Smith. 1991. *Active learning: Cooperation in the classroom*. Edina, MN: Interaction Book Company.

Kagan, S., and M. Kagan. 1994. The structural approach: Six keys to cooperative learning. In Shlomo Sharan, ed., *Handbook of Cooperative Learning Methods*. Westport, CT: Greenwood Press, pp. 115-133.

Kolb, D. A., 1984. *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice-Hall.

Lage, M. J., G. J. Platt, and M. Treglia. 2000. Inverting the classroom: A gateway to creating an inclusive learning environment. *Journal of Economic Education* 31 (Winter): 30-43.

Maier, M. H., and D. Keenan. 1994. Teaching tools: Cooperative learning in economics. *Economic Inquiry* 32 (April): 358-61.

Manning, L M., and C. A Riordan. 2000. Using groupware software to support collaborative learning in economics. *Journal of Economic Education* 31 (Summer): 244-52.

Meyers, C., and T. B. Jones. 1993. *Promoting active learning: Strategies for the college classroom*. San Francisco: Jossey-Bass.

Miller, L. K., and M. Schyb. 1989. Facilitation and interference by background music. *Journal of Music Therapy* 26 (Spring): 42-54.

Millis, B. J., and P. G. Cottell. 1998. *Cooperative learning for higher education faculty*. Phoenix: American Council on Education and The Oryx Press.

Novak, J. D. 1998. *Learning, creating, and using knowledge: Concept maps as facilitative tools in schools and corporations*. Mahwah, NJ: Erlbaum.

Novak, J. D., and D. B. Gowin. 1984. *Learning how to learn*. Cambridge: Cambridge University Press.

Palloff, R., and K. Pratt. 2001. *Lessons from the cyberspace classroom: The realities of online teaching*. San Francisco: Jossey-Bass.

Sarasin, L. C. 1999. *Learning styles: Impact in the classroom*. Madison, WI: Atwood Publishing.

Shaw, G. L. 2000. *Keeping Mozart in mind*. San Diego: Academic Press.

Slavin, R E. 1995. *Cooperative learning: Theory, research and practice*. Boston: Allyn and Bacon.

Spencer, R. W., and D. Van Eynde. 1986. Experiential learning in economics. *Journal of Economic Education* 17 (Fall): 289-94.

Taylor, D. B. 1997. *Biomedical foundations of music as therapy*. St. Louis, MO: MMB Music.

Tinari, F. D., and K. Khandke. 2000. From rhythm and blues to broadway: Using music to teach economics. *Journal of Economic Education* 31 (Summer): 253-70.

Trepagnier, B. 2002. Mapping sociological concepts. *Teaching Sociology* 30 (January): 108-119.

Truscott, M. H., H. Rustogi, and C. B. Young. 2000. Enhancing the macroeconomics Course: An experimental learning approach. *Journal of Economic Education* 31 (Winter): 60-65.

Wycoff, J. 1991. *Mindmapping: Your personal guide to exploring creativity and problem-solving*. New York: Berkeley Books.

Ziegert, A. L. 2000. The Role of personality temperament and student learning in principles of economics: Further evidence. *Journal of Economic Education* 31 (Fall): 307-22.

Figure 1. A Mind Map for housing prices.

Figure 2. A Mind Map of this article.

Figure 3. A student-produced Mind Map of the effects of labor unions.

ENDNOTES

[1] Unless otherwise noted, this section draws heavily from Buzan and Buzan (1993).

[2] This is perhaps the key test of whether a certain concept makes sense as a Mind Map. Although a Mind Map is different from a traditional outline in its use of radial, nonlinear associations, it nevertheless relies on associations. Concepts or classroom exercises that are not amenable to a traditional outline are probably not good candidates for the creation of a Mind Map.

[3] There are a number of other elements of Mind Maps. For example, lines should only be as long as the attached key word (so that words can be closer together to facilitate additional associations) and printing should be upright when possible because it is easier to read. The interested reader is referred to Buzan and Buzan (1993) for these and other elements.

[4] I am not aware of research comparing the effectiveness of Mind Maps to other note-taking or outlining methods. However, the utility of Mind Maps as an in-class exercise does not depend on it being a better outlining tool. Rather, the distinguishing features are that this exercise is collaborative, active, and responsive to different learning styles.

[5] Kolb's (1984) learning style inventory and the model of experiential learning that it is based on are widely used. Examples in economics include Herz and Merz (1998) and Spencer and Van Eynde (1986). The Experiential Learning Theory Bibliography prepared by Alice Kolb and David Kolb lists over 1500 entries (accessed at

http://trgmcber.haygroup.com/Products/learning/lsius.htm on April 25, 2002).

[6] This categorization yields 18 thinkers and 11 doers. With only 39 respondents, the two remaining categories have only 10 individuals.

[7] Other lists of best teaching practices are similar (e.g., Angelo 1993).

19

[8] The other three principles are giving prompt feedback, communicating high expectations, and emphasizing time on task. The first two can be fostered as the instructor circulates among the groups as they construct the Mind Maps.