The Risk of Active Learning in the Classroom: Negative Synergy and its implications for Learning

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Abstract

Teaching courses through Distance Learning (DL) is an integral part of the ever emerging paradigm of online education. The challenges of teaching via this ever changing and innovating platform poses special challenges, especially when one considers the use of active learning techniques and the concept of negative synergy. Because many employers seek prospective new hires that demonstrate the essential skills to write well, the ability to communicate effectively, and the ability to collaborate with others in addition to the research that indicates that active learning enhances, among other things, retention of materials presented in the classroom, active learning techniques have become common place in the traditional as well as online classroom environments. Active learning is an inclusive term that refers to several modalities of instruction and teaching which, specifically, address the special needs of distance learning students.. Bonwell and Eison (1991) popularized the approach and it became the educational model for the 1990s According to Mayer (2004) strategies like active learning developed out of the work of an earlier group of theorists who had promoted promoting discovery learning which had suggested that students who actively engage with the material are more likely to recall information later and be able to use that information in different contexts (Bruner, 1961). However, this claim is not always supported by the literature (Mayer, 2004; Kirschner, Sweller, and Clark, 2006). The author's experiences suggest that, at times, the inability of active learning techniques to work well in the DL environment depend on how active learning is implemented. Examples of active learning activities include: class discussion, small group discussion, debate, posing questions to the class, think-pair-share activities, short written exercises and polling the class (Bonwell and Eison, 1991)..

FORMS OF SYNERGY

Synergy is generally thought of only as a positive force in systems. However, as will be seen, negative forms may exist as well.

SYNERGY

Usually synergy is thought of as getting more done with less. (Francis & Young, 1979). In reality, synergy is found abundantly in a variety of natural systems. The idea that the whole is somehow greater than the sum of the parts of a system is divergently applied universally across such disciplines as engineering, medicine, chemistry, marketing, managerial leadership, psychology, and social logy. The benefits of shared energies are apparent. For example: a monkey and a gorilla stand under a banana tree each hungry for a piece of ripe fruit. Neither can reach high enough to gather it in. But, if the monkey stands on the shoulders of the gorilla, they can accomplish together what neither of them could have accomplished alone. Doctors know that certain medications are useful in treating diseases. A person who is diabetic may reduce the risk of death through damage to their heart, liver, eyes, nerves and kidneys by taking insulin injections. Or the patient may reduce the risk of death through blood clots which can induce strokes and heart attacks by simply taking a children's strength dose of aspirin every day. But when both are taken together, the risk of death is dramatically reduced to levels that greatly enhance longevity. A business that has a potential advertising budget of two million dollars might spend the entire amount on magazine ads and expect to gain an additional five million dollars in revenue. Or they may elect to apply the increase to their personal selling budget by that amount and obtain a four million dollar increase in revenue. But the more powerful result might be to apply one and a half million to advertising and the other half million to personal selling with a resultant increase of revenue of twelve million dollars. Why? The marketing manager would say that each promotion method reinforces the other.

But, in reality, this is but an excellent example of synergy. The whole is greater than the sum of the parts. Synergy has an important place in all aspects of systems theory and its application to science, medicine, and business. Understanding when and how to apply synergistic relationships may be a key success factor for implementing active learning in the distant learning classroom.

NEGATIVE SYNERGY

Negative synergy may be thought of as the logical opposite of synergy. (Phillips, 2001) What is often not as well recognized nor appreciated is this reverse effect: which represents a condition where the sum of the subsets of a system is less than the sum of the whole. But this negative synergy concept, too, has widespread but under recognized applications. For example, the loss of a right eye has serious consequences. The beholder may lose peripheral vision, there may be a loss of depth perception, and some disfigurement may exist. Likewise the loss of a left eye may result in similar serious consequences: the beholder may lose peripheral vision, there may be a loss of depth perception, and some disfigurement may exist. Either eye is obviously a subset of the whole vision system. The loss of either subset is not desirable. But now consider the loss of both eyes. The consequences are much more severe than the loss of either subset alone. Total blindness then has a negative synergistic effect that is much more adverse to the total visionary system than that experienced by the loss of either individual subsystem.

In the Sudan, relief efforts are frustrated. The region is characterized by overpopulation, too many people. Additionally, pool soil conditions coupled with low annual rainfall; result in overgrazing by the animal population to the point that herdsmen loose a significant number of animals each year due to malnutrition and drought. Likewise, the region will not provide enough surface crops to sustain the number of people living in there. An epic surge of HIV/AIDS related deaths has left entire generations of children without any surviving parents or home life of any form. Any of these issues would be difficult to overcome but the sum of all is devastating. The cumulative effect of negative synergy is so overwhelming that the solution to the situation in the Sudan is almost beyond human comprehension or understanding. The result of the effect of negative synergy leaves policymakers without a clue as to how to best proceed. (Mathews, 2006)

Hurricane Katrina provided an example of how a series of natural and human factors can saturate decision makers with conditions that are of such a magnitude that they are unsolvable. Driving winds and devastating rains set up conditions of failure that could have been anticipated: power outages, flooded streets, fallen trees, and damaged bridges. Rainfall caused Lake Pontchatrain to swell its banks but that, too, could have been anticipated based upon models in place by the National Oceanographic and Weather Service. The US Army Corps of Engineers certainly knew the design parameters for the levees surrounding New Orleans and must have certainly been aware of the effect of invasion of wetlands was having on the ocean shoreline. Each of these factors represented a significant threat. But no one recognized the impact that negative synergy would have on the city. None were prepared for an event where the result was much worse than the component parts. Negative synergy is a force to be reckoned with. Educators must be aware of its potential impact. They must be as aware of the possibility negative synergy appearing in relationships as they are of the occurrence of the effects of positive synergy.

GENERAL OBSERVATIONS ABOUT GROUP DECISIONS
CLASSICAL DECISION MODELS

There are four widely accepted models of group behavior that may be applied to classroom situations: the Rational or Classical Model, Simon's Bounded Rationality Model, Vroom and Yetton's Normative Model, and the Intuitive or heuristically based Model. In addition, there are a number of protocols for enhancing group decision action. This section of the paper will discuss the four decision models and various suggestions for improving the efficacy of group activity.

The Rational Model has been the dominate model of group behavior since WWII (Prusak, 2005). The model is based on the following eight steps:

1) identification of the problem
2) identification of the decision criteria
3) allocation of weights to criteria
4) development of alternatives
5) analysis of alternatives
6) selection of an alternative
7) implantation of the alternative
8) evaluation of the decision effectiveness (Robbins and Coulter, 2005)

The model, however, has inherent flaws. For instance, it assumes that the exact problem to be dealt with can be clearly identified.

So, for example, according to the Rational Model, if the manager sees there is a problem with turnover in the organization, the model assumes that turnover is the problem to be solved, not, perhaps, as a symptom of a larger problem in the organization. Possible errors in the identification of a problem can, obviously, lead to problems with the rest of the model since the original assumption in the eight step process may be erroneous. Other problems with the model lie in assumptions of rationality; that , for instance, assume that there is only one single-well defined goal to be obtained; all alternatives and consequences can be known; preferences are always clear and those preferences remain constant; there is unlimited time and monies available, and that a final decision can be an optimal decision. (Robbins and Coulter, 2005)

The Bounded Rationality Model The problems with the Rational Model, led some, like Herbert Simon, a political scientist, to explore the limits of rationality in the model. Simon suggested, in his investigation of the model, that the Rational Model "leaves no room for regrets, second thoughts, or 'weakness of will'." (Simon, 1986) He suggested, instead, that business decisions are made under conditions of "bounded rationality." (Simon, 1947). In this model of Bounded Rationality, the inherent flaws of the Rational Model are taken into consideration in the decision making process and suggests that managers make choices rationally, but are "bounded" by their inability to process the information required to make an optimal decision. Simon coined the term "satisfice" (Simon, 1947) to mean that managers, because of their limitations to process information, are not able to make an optimal decision, but merely a satisfactory and sufficient decision. (Robbins and Coulter, 2005).

The Intuitive Model The third widely accepted model of group behavior found in the business literature is the Intuitive or heuristically based model. The Intuitive model also points to problems in the Rational Model. For instance, Nutt said that when manager's use the Rational Model to make decision they "struggle to reach the 50% success mark." (Sinclair, Ashkanasy, 2005). The literature (Wally and Baum, 1994, Tomer, 1996, Kuo, 1998 an Agor, 1984) suggests that the Rational model is being replaced by a more "holistic model" (Sinclair, Ashkansy) model that takes into account the threat of high decision costs, increased time constraints and more ambiguous, dynamic environments. The Intuitive model suggests that manager's make "gut" decisions or decisions based on past experiences so they can "act quickly with what appears to be limited information." (Robbins and Coulter, 2005). One study "revealed that almost one-third of (them) emphasized 'gut' feelings over cognitive problem solving and decision-making." (Robbins and Coulter, 2005),

The Normative Model Whichever the model followed, the individual behavior is emphasized. Vroom and Yetton's Normative Model is one of the few business models that emphasizes consultation and group dynamics. (Vroom and Yetton, 1973). Vroom and Yetton based their group decision making model on the ideas that situational factors cause "almost unpredictable leader behavior." (faculty.css.edu, 2006)). The authors explain that five different decision procedures are followed: two autocratic, two consultative and one totally group based:

A1: Leader takes known information and then decides alone
A2: Leader gets information from followers, and then decides alone
C1: Leader shares problem with followers individually, listens to ideas and then decides alone.
C2: Leader shares problem with followers as a group, listens to ideas and then decides alone
G2: Leader shares problems with followers as a group and then seeks and accepts consensus agreement.

Vroom and Yetton assumes that participation of those involved in a process increases acceptance of the results and that increased acceptance increases commitment to the resulting actions taken as a result of their decision. (Vroom and Yetton, 1973). But even with the increased attention to participation by others in group processes, there are factors that suggest that the results of group activity are different than for individual activities. For instance, there "are some decisions which employees simply accept because they are indifferent to them." (Hoy,Tarter and John, 1993). In addition, if there is little group commitment to a decision, then participation in the decision making process should be limited because it may impact the direction in which the decision maker wishes the solution to turn. (Hoy, Tarter and John, 1993).

MANIFESTATIONS OF NEGATIVE SYNERGY UPON DL STUDENT GROUPS

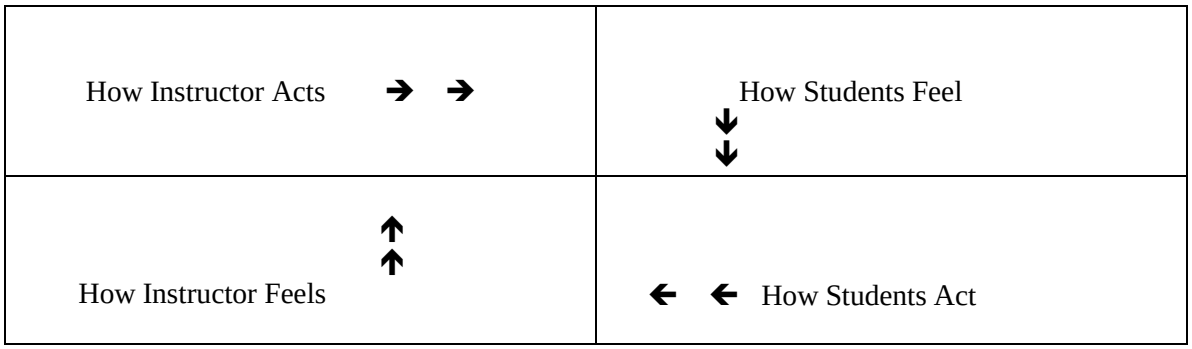
When someone is involved in active learning in a group setting, the possibility exists that the group or team may come to a better result or product than any one individual. This approach underlies the models previously discussed. But none address the effect of negative synergy. This, and its ramifications, will be discussed in a setting roughly based upon the popular communications model, the JoHari Window (Luft and Ingham, 1955) The JoHari Window is, "a model named after its creators, Joseph Luft and Harry Ingham (hence Joe/Harry…), and is a way of describing how we give and receive information about ourselves and others". (Team Building Tips, 2006)

The metaphorical model is a tool that is used to help people better understand the relationships in groups and is used primarily as a heuristic exercise. (Chapman, 2006) The model has been adapted into many forms (e.g.; NoHari (Hase, Davies and Dick; 1999) and JoHari (Luft and Klett, 1972).

Figure 1, titled Negative Synergy Group Activity Model, shows one variation that has been developed to facilitate discussions of negative synergy in group decision making settings. Four quadrants are used to categorize the relationships among self and groups on two dimensions – action and reaction. Hence, the four quadrants may be described as follows:

How Instructor Acts. This quadrant is where the instructor projects into the group. It is the outward set of clues as to an identifiable, open communications in either verbal or nonverbal form.

Figure 1Negative Synergy Group Activity Model



If the instructor is attentive, open, strong, secure and engages in imaginative solutions to problems; then that message is sent to the group.

How the Students Feel. The second quadrant shows how the group reacts inwardly to the actions that were processed. Such a reaction might be feelings of being conceptually supportive, seeking inward concurrence, striving to remain engaged, or identifying areas of future discourse. The reaction is inward with no outward manifestation of the secret internal process.

How Students Act. . This quadrant gives the external or public response to the internalization that has taken place within the group of students. The result might be to convey sympathy of concurrence. Or the group might convey confusion or a need for clarification. Again, this quadrant represents a public manifestation of the secret internalization that has taken place.

How Instructor Feels. Finally, it is here that the instructor processes the communications from the group. Inwardly the instructor may either accept or reject an interim decision or may feel confused and ask for clarification or may accept a degree of finality towards an action decision.

The inner ring of Figure 1 shows a group that is in a state of equilibrium in their decision making process. How the instructor feels is appropriate to how the student group has acted. The instructor's actions are proportional to the reactions by the group. The group properly reads external messages and reacts accordingly. Finally the group endeavors to continue the process and works towards an eventual decision about the action to be taken. The second ring represents the effect of injecting a positive relent into the process. Synergy has resulted in a new dynamic that is better than that seen before. A new advertising slogan has been suggested or a new line of products proposed. The key here is that the cumulative effect of the action process was as expected. The whole increased over its initial position. However, the shift does not continue indefinitely since such an action is resource constrained. Finite reality serves as a buffer or limit on unbounded increases due to a synergistic effect and that effect is beyond the scope of this paper

However, there exists a third possibility – that of negative synergy. If How Instructor Acts is smug or cynical or inflexible or unethical, that reaction is not positive. How the instructor acts then adds to the unfavorable situation. The actions may be loud or cowardly or aloof or insensitive. And those actions will not be well received. The student group might react in unimaginative or impatient or callous or insecure ways. And that reaction could be shown through group actions that are selfish or loud or lethargic or cruel. But negative synergy does not stop here. How the group acted may further affect how the instructor again reacts and the cycle continues over and over again. A spiral of negative synergy may set in and the group decision making process spirals inward and inward till the system decomposes into absolute failure. There is a popular model of group decision making gone awry, such as that described in Irving Janis'

Groupthink. (Janis, 1977) Janis describes how too much group cohesion can result in limited alternatives being considered in group decision making behavior and could result in the incorrect decision being made. But, if Groupthink is but a special case of negative synergy, at least the concept of Groupthink gives cause to consider the possibility for remedies under conditions or situations where negative synergy has resulted in a downward spiral in the decision making process.

PRESCRIPTIVE SUGGESTIONS FOR FAVORABLE OUTCOMES

An examination of the four quadrants in figure 1 quickly reveals that three of the four represent states beyond the instructor's control. The only quadrant that can effectively influence is How Instructor Acts. To do this, it is suggested that an instructor should

- Avoid situations that increase the probability of increased, unwarranted risk. Don't ask a question, in the online environment, that may pull the group apart and promote negative synergy.. For instance, discussion of subject relevant ethical dilimenas are a wonderful active learning tool; but work better in the online or distance learning environment for individual rather than group responses. Too often the group members may become bogged down in the dilemma itself and synergy dissipates. Ask questions that promote positive interactions and allow for a diversity of opinion rather than a question that presupposes consensus.
- Using active learning techniques as a reinforcing exercise works well in the online or DL environment; however, using them to introduce new material often proves counterproductive. It is suggested that instructors guide their students in the early stages of learning, and later let them practice their new learned skills or apply new information. (Seller and Cooper, 1985; Kirschner, Sweller, and Clark, 2006). Such an approach is well suited to the online or DL environment where it serves to complement the experience.
- Be careful that the moral actions proposed by the group are indeed also ethical. It is easy for the ethical opinions of individuals to become confused and even accepted as equal to the external ethical standards of a group. The instructor needs to raise the criteria to the appropriate group standard. For instance, it may be best for the Instructor to make sure that different members of the group take the leadership position during the tenure of the course. Rotating leadership and to an extent, control of the conversation, will ensure that vocal minorities do not overtake the group's position.
- In order to increase the efficacy of group activities, be aware that there are several suggested conditions that should exist. For instance, giving groups "task –relevant information that simplifies…their tasks…, more cohesive groups tend generally to be more productive, group norms that favor productivity..." (Kerr, Tindale, 2004),
- Increased group commitment to organizational goals and tasks and group expertise all enhance the quality of group decision making. Having the groups create "names" or "titles" for themselves, gives them a sense of identity and cohesion that may be lacking in the online or even video teleconferencing environment. Making sure that the group as a whole earns a grade may increase commitment to goals.
- In fact, even seemingly simplistic suggestions like larger groups allow for more diverse input, having an odd number of people in the group helps to avoid stalemates and having a group large enough to allow for members to "shift roles" but small enough for "quieter members to participate" (Robbins and Coulter, 2005) all enhance the group decision making process.
- It is important to not underestimate the competition and the competitive atmosphere that surrounds students in an active learning environment.
- Don't let the students feel that their team is invincible. They probably aren't. Also don't let the group fall into the trap of believing that an expression of an opposing viewpoint represents disloyalty to the group process, lest Groupthink set in. In reality the reverse is true. Giving a good counter argument is a very effective way to turn aside a cycle of negative synergy.
- In the same regard, don't let silence be misread as concurrence with the action by the group. Shift the focus. Don't let the group encourage complacency. Require that each member of the online or DL group participates actively in the discussion and grade accordingly. If the instructor does not concur with the signals sent by the group's actions, stop the spiral.

The only element of negative synergy that one can influence is how one acts. Therefore each action must send a clear signal as to where you see actions going. Otherwise, only you as the instructor can reverse the effects of negative synergy. You must make the proper choice.

SUMMARY

Negative synergy is a force to be reckoned with. Educators, and most especially DL educators, must be aware of its potential impact. They must be as aware of the possibility negative synergy appearing in relationships as they are of the occurrence of the effects of positive synergy sought through active learning .

Presented here has been a small step proposed to advance the online or DL education paradigm by expanding the original conditions assumed in major models to incorporate negative synergy into the dynamics of group activities. This paper has not attempt to derive proofs for the new models but instead proposed a paradigm shift that would accommodate negative synergistic effects within the framework of the existing body of knowledge. It advances only the concept. An additional challenge in the DL environment is the addition of electronic meetings or what many call video teleconferencing. The authors have included the idea of video teleconferencing in their definition of DL for this paper. According to a study done by PricewaterhouseCoopers, cited in Fortune (Fisher, 2004), 45 % of "lucrative " ideas come from employees via email and chat sessions; to stimulate that "in-house" gold mine of ideas is new frontier for managers concerned with decision making. No work is known to exist examining the effect of negative synergy in such an environment. Therefore a large balance of the work remains yet to be done in subsequent expanded versions of the material presented here.

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