

# Playing *The Cell Game*

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*We are all playing a kind of game in this country today.*  
—Larry Arrick

In recent years, schools in the United States have experienced a barrage of criticism from a disillusioned public. These attacks—"lack of discipline," "declining test scores," "incompetence,"—seem to have triggered or surfaced hand-in-hand with educational trends such as mainstreaming and accountability. The shift in educational emphasis has brought about instructional dilemmas of major proportions for science teachers. Perhaps teachers would be the first to acknowledge the nonconformity or incongruity between their teaching techniques and the attitudes and behavior of the "Now" genera-

tion in the classroom. More than ever before, teachers must resolve the conflict between their teaching techniques and the attitudes of today's students. Concurrently, teachers must find ways to cope with problems in implementing educational or legislative mandates to meet the needs of a variety of students (Hounshell and Trollinger 1977).

Of the numerous educational trends in instruction, simulations and games offer the greatest promise for changing the classroom into a laboratory of active participants in the learning process (Gordon 1970). Simulation games have not only the

potential to arouse curiosity but also to create an atmosphere that allows and encourages nonconformity in the classroom. Thus, instead of countering student attitudes with adherence to conformity, teachers can use conflict—"the bread and butter of gaming"—to resolve problems that call for a solution (Orbach 1979).

Gagné (1970) suggested that controlling and using existing motivation is the most serious issue faced by the schools. Though investigators have shown that using games motivates learning (Boocock and Coleman 1966; Gordon 1970; Coble 1977;



FIGURE 1. Simulation games provide great promise for changing the classroom into a laboratory of active participation in the learning process. Biology students find themselves engrossed in a game.

Carter and Lee 1979), why simulation games have this tremendous capacity has yet to be satisfactorily explained (Orbach 1979). Some of the investigative conclusions have been in direct conflict with one another (Hounshell and Trollinger 1977), but this does not decrease the value of simulation games as science teaching tools.

On the other hand, teachers should not go overboard with games. Games are intended as tools, but the instructor still “controls” the educational process. However, if games are effective in changing student attitudes and improving teaching processes, other media also can be used more effectively. In addition, an important aspect of gaming is its accessibility for comparative research (Baker 1980). The use of games could be compared with the use of traditional modes of educating and communicating. As Miller (1979) indicated, humans learn about communication and social behavior through a combination of social modeling and simple experience. Simulations and games provide such experiences in the classroom.

In the past, educational games were developed only commercially; but science educators have begun to develop games, as have math and language arts curriculum developers.

Carter and Lee (1979) observed that, despite the recent increase in the use of simulation and board games, such games are not extensively used in the science classroom.

According to Trollinger (1977), at least eight claims should be mentioned in order to justify the use of simulations and games as an instructional technique in the future. These include:

- Games teach factual knowledge by rewarding the correct usage of such knowledge during the play of the game.
- Certain games enhance critical thinking and decision-making skills of students.
- Knowledge retention is enhanced by gaming because of the active participation of the players.
- During a simulation, the teacher’s role is changed from an “endower of all knowledge” to a “facilitator and resource of knowledge.”
- Games are often models of real-life situations. Thus, many students may see the relevance of information for their future lives.
- Games motivate students because of the active participation in the learning process.
- Games are multidisciplinary. Games require the use of many

skills found in all of the major disciplines.

- Games may be adapted to meet the needs of heterogeneous classes.

## What Are Simulation Games?

Gordon (1970) defined games as any simulated *contests* (plays) among adversaries (players) who are governed by rules in order to accomplish an objective (winning). In this article, *simulation* and *game* will be used interchangeably. Of course, the best way to understand and analyze games is to play them yourself! Having done so, you would find a common denominator for *any* game:



The content of a game depends on its subject-matter and purpose. For example, the *Cell Game* requires players to assemble a “complete” plant or animal cell to win. The logic of the content determines the nature of the subtopics of the game. The structure takes into consideration a set of rules for starting, continuing, and ending the play of the game (Thiagarajan and Stolovitch 1979). In the case of the *Cell Game*, it

FIGURE 2. Educational games are teaching tools. The instructor still controls the instructional process.



includes the basic rule for drawing from a bank of tokens and “cell event” cards, using a game board, and assembling a complete cell in the process. As mentioned earlier, a game is just a simplified model of reality. Its structure exemplifies a real-world process for teaching or investigating, if not experiencing reality to a certain degree. Trollinger (1977) made this clear when he pointed out that for simulations to be successful, they must be operational and include only the significant characteristics of the real world event.

Games must be built around a *conflict* situation—and must resolve that conflict in the playing process. Otherwise, these games might not be “true” games. Furthermore, an educational game must be a “simulation” (e.g., a biological process or conception), as previously noted. Numerous kinds of simulation games are available for use in the science classroom. These range from race games (“Blood Flow”), elimination games (“Checkers”), competition games (“Extinction Game”), and role-playing games (“Possum Creek Valley”), to accumulation games (“Cell Game” and “The Energy Quest™”).

We have acquired three simulation games from Carolina Biological Supply Company (Burlington, North Carolina 27215), and have used them extensively in the biology classroom. These are *The Cell Game*, *The Blood Flow Game* and *The Energy Quest™*. A brief review of these educational games, with emphasis on the *Cell Game*, will encourage the “non-playing” or “non-game” biology teacher to consider games more seriously for use in the classroom.

### *The Cell Game*

In his popular book, entitled *The Lives of A Cell*, Lewis Thomas (1974) compared the earth to “a single cell.” Indeed, like the living cell in each of us, the earth is alive and behaves like a gigantic living cell. The microscopic living cell could be *simulated* and magnified for students

to play with—to learn more about the Cell through this model (fig. 3).

*The Cell Game* is a conflict situation that simulates the structure and function of a living cell. The game makes use of both plant and animal cells. It provides for both structural and functional comparisons of the two cell types and also draws attention to their similarities. The object of the game is to assemble a complete plant or animal cell. This is done in a series of moves that involves both chance and a logical assembly and exchange of cell parts and organelles. The game is played on individual game boards that represent the cells. The player’s move involves the chance of what the “cell event” card or cards will be drawn as well as the player’s logic and perception by the way s/he carries out the possible cell processes.

The game is designed for four players; however, to accommodate more people, it is possible for two players to work together on one board as a team. This allows more students to play and, as a result, often increases the competition of the game. Moreover, budgetary restrictions almost require the teacher to purchase a limited number of these games.

There are several places in the cell curriculum where this game may be included. For instance, in the unit on cytology, the study of the cell, the *Cell Game* may be played at the beginning of the study to stimulate interest, during the study to enforce basic principles, or towards the latter part of the unit to review cellular parts and operations. As the students learn, they will enjoy the competition involved in this game.

Like so many other educational games, the *Cell Game* playing pieces are very small and tend to be lost unless great care is taken. The teacher almost invariably must instruct students to return the pieces properly so that other players will be able to find them easily and account for each piece. Carolina Biological Supply Company does sell separate sheets of playing parts for those who

need them. We suggest that the instructor review the rules with the students because some rules are complex enough to warrant careful examination. The game is recommended for high school students, but could be used in other levels as well. Playing time required is one class period or about an hour. The first time the game is played it may take longer.

*The Cell Game* combines chance with a logical consideration of the alternatives. It is a tool that is fun and challenging. Our classes seemed to enjoy the game and benefit from it. In fact, it is sufficiently exciting to be used as a family game. (Price: approximately \$16.95.)

### *The Energy Quest™*

*The Energy Quest™* is similar to *Monopoly*; it requires players to buy property that will generate the largest amount of electricity. The player who has produced the largest number of KWH at the end of the game wins.

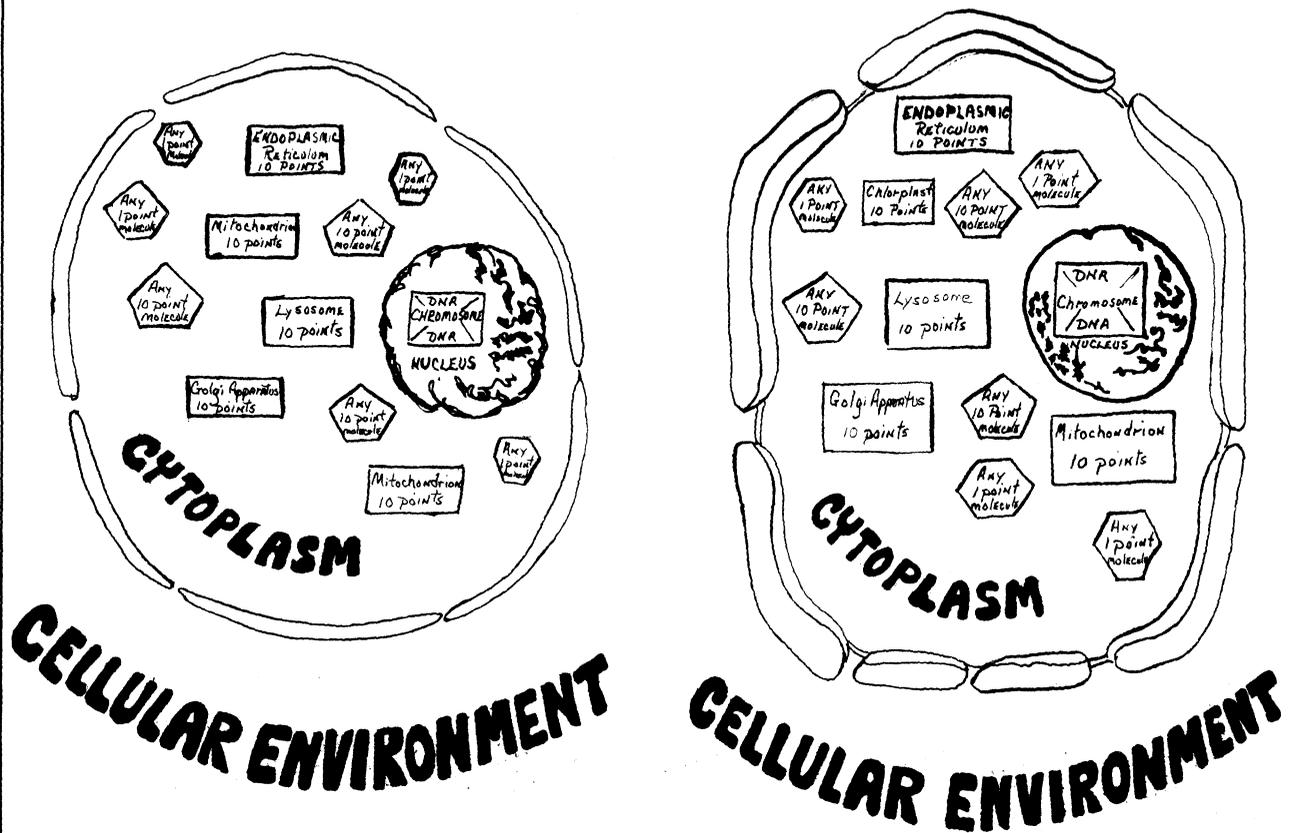
The game consists of a game board, play money and various cards and equipment. The rules are not complicated but they require explanation and a complete understanding before the start of the game. From two to six players can participate; ages can range from nine to adult. The game usually requires more than an hour’s time, and this could present a problem in some biology class periods. A delay in its completion often may cause a decrease in interest affecting both the completion of the game and the objectives of the game. Adjustments in time schedule might be needed but could easily be arranged in some schools. The game is relevant to today’s energy problems, particularly electrical energy. (Price: approximately \$9.95.)

### *The Blood Flow Game*

*The Blood Flow Game* attempts to illustrate the circulation of the blood through the human heart and body.

# ANIMAL CELL

# PLANT CELL



## THE CELL GAME

© 1978 Carolina Biological Supply Co.

## THE CELL GAME

© 1978 Carolina Biological Supply Co.

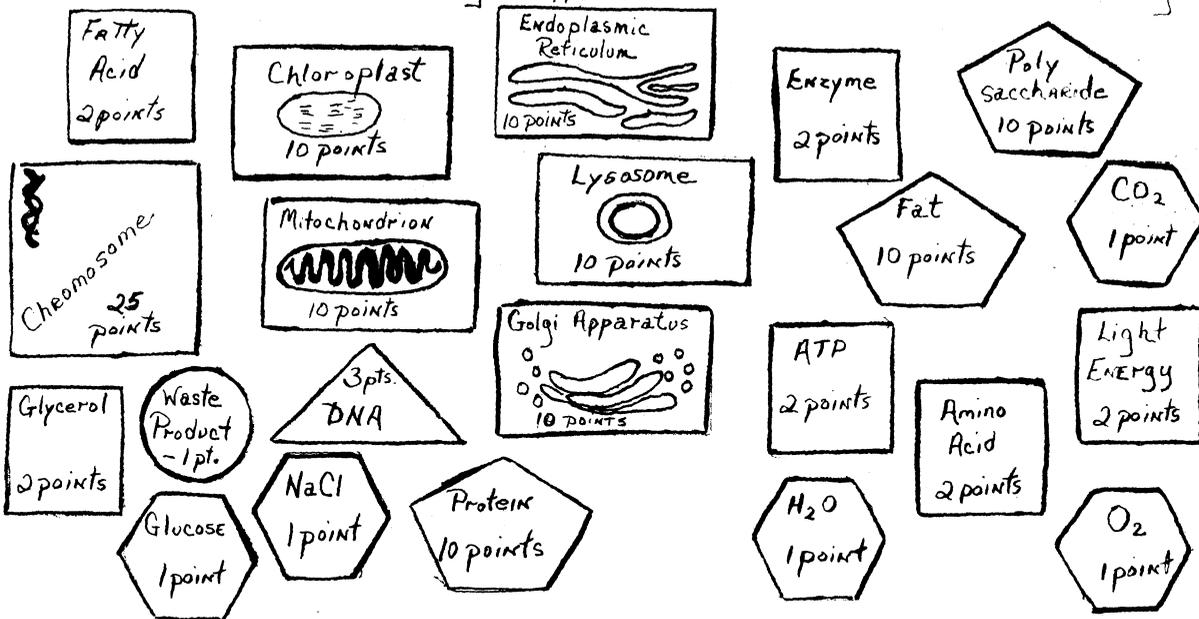


FIGURE 3. The Cell Game uses both plant and animal cells. It provides for both structural and functional comparisons of the two cell types as well as drawing attention to similarities.

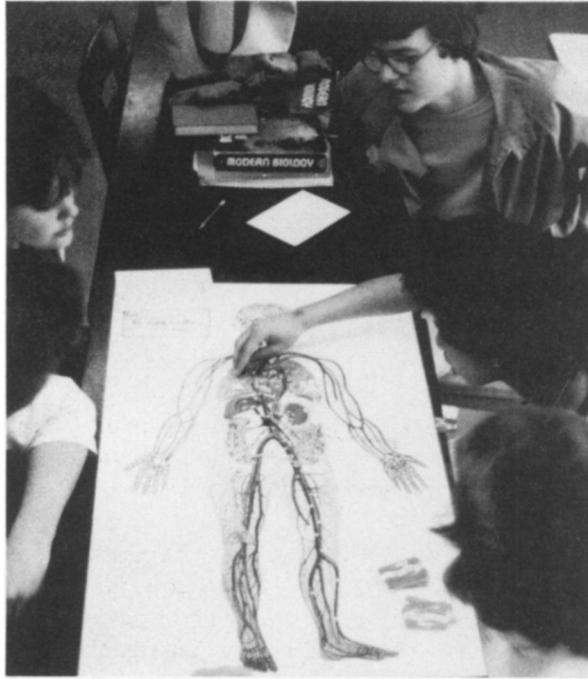


FIGURE 4. The *Blood Flow Game*™ attempts to illustrate the circulation of blood through the human heart and body.

Materials include a game board, cards, and tokens. The pieces are very small, hard to handle, and easy to lose. The game will be useful with middle school students or with below-average high school students. It accommodates two to six players. It requires an indefinite time limit according to the toss of the die. A class period of about an hour is usually sufficient to play the game. (Price: approximately \$16.95.)

## Conclusion

There are numerous classroom strategies which the science teacher could use to make science more fun—to facilitate learning scientific concepts and principles, to interpret the real world and life situations. Science classrooms are logical arenas for simulations and games. We advocate their uses in the biology classroom. Perhaps, they could help to solve some of the teacher's teaching

frustrations or alter the students' attitudes. Whatever your reasons are, perhaps it's time for you to play some games yourself!

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*Note—The Cell Game* discussed in this article is the revised version of *The Cell Game*, originally distributed by Tecolote Press, Inc., Box 217, Glenwood, New Mexico 88039. Carolina Biological now owns the rights to this newly revised game.