

Virtual U 1.0 Strategy Guide

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Introduction

Welcome to Virtual U! Few people involved in or concerned with higher education understand colleges and universities as dynamic, multifaceted systems. This includes the people at the institutions -- faculty, administrators, and students -- members of governing boards and state higher education coordinating boards, the press, alumni, parents, and the general public. Misconceptions abound, and these affect the higher education policy environment and institutions' ability to govern themselves. Until now, the numerous influences that affect colleges and universities have been within the purview of those few individuals who are known as chancellor, president, and provost. That is, until, Virtual U.

Virtual U is a powerful, user-friendly computer simulation that introduces users to the complexities of running a college or university and promotes thinking about colleges and universities as systems. Virtual U is a computer game that simulates the university environment while simultaneously guiding users through problem-solving scenarios. Virtual U targets both the institutional professional and the interested layperson to participate in leadership challenges in a college or university setting. Players set, monitor, and modify a variety of institutional parameters and policies, allocate resources as they see fit, and watch as results continuously unfold. The game provides an opportunity to experiment and succeed or fail in a safe and entertaining virtual environment. While Virtual U is necessarily a simulation of real academic life, it is grounded in authentic data and provides serious lessons in higher education. Toward these ends, Virtual U draws on data from 1,200 colleges and universities in the United States. This comprehensive database allows players to tailor their simulations to a range of university environments. Virtual U offers a variety of variables from which a player may choose when setting up his or her institution. For example, players can manage a small or large, public or private, or rural or urban institution. You can also specify the level of prestige enjoyed by your college or university. Virtual U then creates an institution that meets your specified parameters and sets challenges accordingly.

By taking the point of view of the president, the player is provided with a unique opportunity to see the operation of the whole institution. The player can make decisions concerning operating and financial reports and view these reports at any time and at a variety of institutional levels. For example, a player may set budget priorities for the whole institution or a given department, or view the research and teaching priorities for particular faculty members. Each player solves problems faced every day by college and university administrators concerning, among others, resource allocation, faculty hiring, enrollment management, athletics programs, and financial aid. Just like a president of a university, a player may set policies consistent with long-term strategies or intervene in a specific situation. And just like a real college or university, play continues as long as the Virtual U institution remains financially viable.

Virtual U Founders

Conceived of and written by Dr. William F. Massy, former Stanford University vice president and currently president of the Jackson Hole Higher Education Group, Virtual U is based on an underlying model that simulates actual conditions in real universities throughout the United States. Data from the Integrated Postsecondary Education Database System (IPEDS), the College Board,

and the High School and Beyond Survey serve as the database for the mathematical models that are the building blocks for Virtual U. For example, rather than just creating a hypothetical relationship between variables such as student enrollment and university prestige, the underlying relationship between these variables in Virtual U is based on real data compiled from hundreds of institutions similar to the one you will be administering.

Along with Dr. Massy, Virtual U's founders are Sally Vaughn of the Jackson Hole Higher Education Group, Jesse Ausubel of the Alfred P. Sloan Foundation, and Trevor Chan of Enlight Software.

Virtual U Advisors and Consultants

People who have served as advisors and consultants for the Virtual U project include

James Anker, John Barcroft, Robert Bernad, David Breneman, Richard Chait, Richard Detweiler, Winslow Farrell, Eric Goldberg, John Hiles, Dean Hubbard, Anita Jones, Jill Kidwell, David Kirsch, Donald Langenberg, Dale Langford, Arthur Levine, Gregory Lozier, Joel Meyerson, Andreas Ortmann, Terese Maier Rainwater, Linda Riley, Henry Rosovsky, Neil Salkind, Ben Sawyer, Daniel Shapiro, Rebecca Stafford, Woollcott Smith, John Williams, Gordon Winston, Marshall Witten, Will Wright, and Robert Zemsky.

Virtual U Data

Data for Virtual U were mostly assembled by Robert Zemsky, Daniel Shapiro, and their colleagues at the Institute for Research in Higher Education at the University of Pennsylvania. For example, data on faculty teaching loads by field came from the 1993 National Study of Postsecondary Faculty (NSOPF).

Data on research activity by field came from the National Science Foundation. Curricular requirements -- including major course requirements and electives by department, and levels of courses -- came from review of numerous course catalogs. Data on percent of female and minority faculty came from the American Association of University Professors.

Data on the distribution of undergraduate majors came from the Digest of Education

Statistics. Information on facilities came from Harvey H. Kaiser and Associates, Inc. Tuition, room and board rates came from the Integrated Postsecondary Education Database System (IPEDS).

For users of Virtual U interested in data, the IPEDS Web site, located at <http://nces.ed.gov/ipeds/> is an excellent starting point.

Strategy and Technical Guide Preview

Virtual U: The Strategy and Technical Guide is divided into six sections, including the Appendix.

Part I: General Strategies provides you with seven general strategies to follow as you learn how to play Virtual U. **Part II: Scenario Strategies** provides a synopsis for each scenario, the welcome letter the player will receive for each scenario, and strategies for resolving the issue at hand. **Part III: Specific Strategies** gives you in-depth strategies for each of the items on the Game Menu, which includes: Faculty, Students, Courses, Performance, and Finance. **Part IV: Random Objectives and Chance Cards** discusses strategies for how to handle unexpected challenges and events during game

play. **Part V: Under the Hood: How Virtual U Works** is a description of the modules and submodules that run the simulation. Appendix A is a glossary that provides easy reference to game-specific terminology.

Part I: General Strategies

Who among us hasn't longed to be in charge for just one day? Oh, the things we would change! Virtual U gives you that chance -- the chance to be a university president and run the show. By now you have probably opened up your game and flipped through the manual. Ready to go, you loaded your game and determined what kind of institution you want- and then quite possibly got lost in the vast amounts of information available about every faculty member, every department, every building, and every budget item that appeared in front of you. Of course, all of this information is necessary to running a university but what does it all mean? What are you supposed to do with it? In short, where should you begin?

This section offers players seven general strategies for getting started and playing Virtual U. These strategies are by no means all-inclusive and as you play the game, you may come up with other strategies that further improve the effectiveness of your administration. In the following section, **Scenario Strategies**, you will find more strategies to handle the preset challenges for each of the scenarios. Read through the strategies that follow and choose the one or two that make the most sense to you. Try them out. See how each strategy works and find the ones that work best for you.

Strategy 1: Learn about your institution and take notes

You have just been appointed as a new university president. What is the first thing you will want to do? Answer: Learn about your institution. As president, familiarity with your institution, its faculty, staff and students, its strengths and its weakness is key to your success. Knowledge of your institution is the root of many of the strategies that follow. One of the best ways to learn about your institution and keep track of the volumes of information that your new position requires is to slow down the speed of the game until it is completely stopped (on the lower left side of your screen, move the red bars to blue until no bars remain or press the number 000). Then ask yourself questions about your university with paper and pencil in hand. Make notes as you gather information and find answers. You will find yourself referring back to this information as you set your policies.

Questions you may want to ask yourself are: Who are your faculty members? Where is your top talent? Which departments are the strongest and the weakest? Do these strengths and weaknesses appear to be because of lack of talent, a lack of resources, or something else? How many faculty members are in each department? How many are close to retirement? How many have tenure? How many are seeking tenure? Which departments have the highest levels of sponsored research? Which departments have the highest level of educational quality? How do your students feel about your institution? What kind of athletics program do you have? Are students continually shut out of classes? How many women and minority faculty members do you have? How many minority students do you have? Do you have a high or low level of deferred maintenance at your institution? And so forth. Asking yourself questions such as these at the beginning of the game will help you throughout your administration.

Strategy 2: Familiarize yourself with your budget

After you have acquainted yourself with the faculty, students, staff, and departments on your campus, your next step should be to familiarize yourself with your institution's overall financial standing. If you have never managed an institutional budget, making sense of your institution's budget and budget plan is probably one of the more difficult aspects of playing Virtual U. And understanding the budget is vital to a successful administration. So give yourself some time to read

and review the budget. You should note that there are several budget screens that require you to scroll to the bottom in order to get all of the information you seek. Once again, take notes and ask yourself questions as you go.

Some questions you may want to consider are: What are your revenues? What are your expenses? How much income does tuition generate? How much money is spent on financial aid? What is the mix of revenues at your institution? If you are a public institution, how much state support do you receive? If your institution is private, how large is your endowment? In the case of either private or public institutions, how much sponsored research does your institution attract? How successful is your institution at attracting donors? What is the size of your operating revenue? What is the size of your capital reserve, what funds go into it each year, and what are the demands on it? The answers you find to these questions will help you establish policies and priorities throughout your administration.

Strategy 3: Choose a small institution

When you set up your university for a scenario game you are given a choice among four institutions: Private Research, Liberal Arts, Public Research, and Comprehensive. (The same choices can be accessed as **Express games** under the **Custom** heading.) In order to understand the wisdom of Strategy 1, it is helpful to distinguish the differences among the four types of institution. A Private Research University tends to be large, with both undergraduate and graduate schools. It has a research as well as teaching focus, receives no state support, and is funded through an endowment, tuition, and gifts. A Public Research University also tends to be large, with both undergraduate and graduate school programs. It, too, has a research and teaching focus but typically a smaller endowment. In addition, a public research university is funded by state support as well as by tuition and gifts. A Liberal Arts College is a small, private, undergraduate institution and has 2,000 or fewer students. It focuses on teaching over research, receives no state support, and is funded by tuition, gifts, and endowment. A Comprehensive institution is a four-year college or university that has lower selectivity requirements, a larger part-time student body, lower graduation rates, and somewhat more vocationally oriented departments.

Smaller institutions, such as the Liberal Arts College, are easier to learn about when you first start playing the game. There are fewer departments to evaluate and fewer faculty members with whom to acquaint yourself. Some issues, such as sponsored research, will not be addressed as frequently at the smaller institution and so learning the general flow of the game will be easier and prepare you for larger, more complex institutions later on.

Strategy 4: Set long-term policies at the beginning of your first year

One of your first tasks as president is to set the goals and priorities for your university. And after you have learned about your institution, setting priorities and policies should be the very next action you take. Faculty hiring is an example of a policy that should be set at the beginning of the game. In order to do this, you will first have to learn about the departments and their needs at your institution as mentioned in Strategy 1. The long-term policy decisions that you make at the beginning of the game will not only help you to focus on the direction that you want your institution to take but will affect the opportunities you have as the game progresses. It is important to note that the benefits of these policies may not be apparent in the first years of your administration. As a result, it is important to set long-term policies immediately.

Strategy 5: Decide who you are

One of the important aspects of managing a college or university is understanding who your institution is designed to serve and what your institution should focus on in order to best serve your students. This means that you understand the differences between the four types of institutions in Virtual U and play to each institution's strengths. For example, if you have chosen an institution that is a public research university with a high level of prestige you may want to focus on research over teaching as well as continuing to attract academically talented students.

If you have followed the first three strategies, you will choose to administer a small private liberal arts college and therefore, your focus will be most likely educational quality but as you choose larger institutions, your focus may shift to doing sponsored research. Questions you may want to consider are: Is your institution large or small? How prestigious is your institution? Is your institution primarily concerned with teaching and student success (issues of educational quality)? Is your institution focused on research and bringing in new research money (also known as sponsored research)? Or is it more concerned about scholarship - the integration and application of knowledge through teaching - as distinct from discovering new knowledge through research?

Strategy 6: Manage multiple goals

As you become more familiar with the game and as the game becomes more challenging, you may want or need to manage multiple goals. For example, Virtual U may challenge you to increase educational quality while simultaneously increasing research activity. To do this, you must survey each department's strengths and weaknesses. Departments such as English, History, and Philosophy that are traditionally associated with teaching and time spent outside of the classroom with students (also known as **student contact hours** in the game) should receive more resources for activities that affect educational quality. Departments in the physical and social sciences such as Physics and Economics are traditionally associated with research and should receive increased support for activities that increase sponsored research at your institution. Strategies for how to improve education quality or how to increase sponsored research are discussed in the Faculty and Courses Sections in Part III.

It is important to remember that setting multiple goals requires monitoring the strengths and weaknesses of your institution generally, but also requires a similar analysis of individual departments. If, for example, you choose to increase educational quality and sponsored research, your first step should be to divide your departments into predominantly **educational quality, scholarship, and sponsored research** categories. Your second step should be to evaluate each department's strengths and weaknesses given its categorization. Your third step should be to allocate resources appropriate to fund educational quality, scholarship, or sponsored research. As you will see, learning about your university, its collective strengths, its collective weaknesses, its departments, its faculty, and its students is key to a successful administration.

Strategy 7: Improve from the bottom up

Sometimes the best way to solve a problem is from the bottom up. Sometimes small changes at the bottom produce large changes throughout an organization. This strategy requires that you examine what is going on at the lowest levels of your institution and act according to the information that you gather. First, familiarize yourself with and evaluate each department and its faculty members carefully. Second, look through your budget and check for particular strengths and weaknesses. As

you learn about your institution, keep track of your observations on a checklist. Here are three steps you may want to follow:

1. Note the departments that have the most weaknesses. For example, your Chemistry Department, a department traditionally associated with research, is generating very little sponsored research money.
2. Note which departments are strong and need only small investment to become among the best at your institution. For example, your English Department is performing well in activities concerning educational quality but you notice that some students are being closed out of courses. In this case, adding one more faculty member to the department may be all that is necessary to meet the needs of the department and its students.
3. Strengthen weak departments by providing resources to key areas of concern while you continue to provide funds for the most successful departments.

Remember: Funds are always limited. If you increase spending in one area, you automatically decrease available funds for something else.

Strategy 8: Notice the anomalies

As with any game, notice occurrences that are unique to the game. When do these occurrences appear? What seems to affect them? How do they work? Make a note and use anomalies to your advantage.

Strategy 9: Use the score and performance to drive your strategy

The score and the performance ratings in Virtual U are amazing resources and can be put to good use. To make the most of them, you need to know how Virtual U develops performance ratings and the game score.

Performance ratings (in many cases) and your score (in all cases) are the cumulative results of a number of factors. By breaking down the factors that make up your score or a particular performance rating, you can look for the areas that are under-performing. By focusing on these weak areas, you can hopefully improve your performance and/or your score. You can also look over the score or a performance rating for a path of least resistance. Doing so can help you find factors that could benefit dramatically from a quick infusion of money or increased priority, resulting in an improved overall score or performance rating.

An example of how this strategy can work is in Educational Quality Performance. Use of information technology in teaching is 10% of the overall performance rating. By making an investment in your Internet connection, you can quickly improve this factor of overall Educational Quality, improving your performance in that area and increasing your overall score.

By dissecting the entire score and performance section, you can gain some great insight. Table 1 provides roadmap of what factors improve your game score most. While game score is based in general on the change in Trustee Evaluation from one month to the next, there are 15 distinct factors that affect the Trustees' overall evaluation.

Game score is actually a product of the change in ranking given to you by the Trustees. This itself is due to the change in each factor from its previous period. Thus you are always trying to improve various factors from their previous settings unless they are at their peak performance. This is why Table 1 is crucial. From it, you can discern a few key strategies:

- Nearly 1/3 of your score comes from Degrees Granted, improvement in Smoothed Surplus, and Sponsored Research. Therefore it is important to pay particular attention to these items.
- Even though they make up a small portion of your score, Student Morale, Staff Morale, Student Diversity, and Faculty Diversity each can be easily improved.
- The Educational Quality and Institutional Prestige performance factors each have sub-factors that contribute to their overall ratings. Thus, you should focus first on the sub-factors for each of these that are the easiest to improve. This subsequently boosts them, and their improvement positively affects your score.
- Research is king. Research-related factors are counted three times toward your score. How is this? First, the sponsored performance rating in your game score is directly factored (at a weight of 9%). Second, Faculty Research and Scholarship performance (across departments) is a combined 15% of the overall Educational Quality performance rating, which is itself a 7% weighted factor in your Trustee evaluation. Third, Sponsored Research and Faculty Research performance are a combined 80% (across all departments) of the Institutional Prestige rating, which itself is a 7% weighted factor in your Trustee evaluation. Finally, Faculty Morale, a 7% factor in Trustee evaluation, is greatly aided by good faculty research results. Thus, because it permeates so many aspects of the score and performance factors, research should be given a lot of attention.

In the end, it is difficult to tweak your overall score by focusing on individual scoring factors during play. However, taking the priorities found here that are derived from examination of Virtual U's scoring system can be a smart move. Also, during play you might be able to do a quick run through of the performance and game score graphs, noting areas that need improvement and making the necessary adjustments.

Scoring is one of Virtual U's **game elements** and while absolute **scoring** doesn't take place in the real world to the degree it does in Virtual U, understanding the scoring system will undoubtedly make you a better university manager.

Is there any way to truly fail at Virtual U?

Virtual U's board is fairly forgiving. Even several years of weak performance won't cause you to be removed from office. However, there is one thing that will cause you to lose at Virtual U - bankruptcy.

Bankruptcy occurs if you continue to run deficits and carry the University beyond its line of credit for bank loans. This is why it is critical not to run a very high negative balance or deficit for the year. Keep your university on as even a scale as possible and choose your moments to run a deficit.

Part II

Scenario Strategies

Scenario Strategies and Welcome Letters

Virtual U offers 10 different, preset challenges to help you learn how to play the game. Each scenario confronts the player with a particular issue that university administrators face every day. For example, you may be asked to balance your institution's budget or produce a winning athletics team. This section of Virtual U: The Strategy and Technical Guide will acquaint you with the issue presented in each scenario as described in the Welcome Letter you receive. Then it will offer some strategies to use when addressing the challenges in each scenario.

One of the primary lessons in Virtual U is that colleges and universities are interactive systems in which change in one area means change in another. This means viewing the whole game in terms of combinations of strategies. For example, educational quality can be improved by decreasing class size and increasing student contact hours. However, those changes may affect faculty morale, so strategies related to faculty morale must be considered simultaneously. The strategies provided here are only suggestions and are not the only solutions. As you play the game more, you may find a strategy or combinations of strategies that work even better.

Scenario 1 -- Pay Better

Faculty salaries at your institution are too low and key professors may leave for greener pastures. Your task in this scenario is to increase faculty salaries in five years without harming other aspects of your university's performance.

Your Welcome Letter reads:

The Board agrees with the concern you expressed about faculty salaries at our last meeting. At the meeting you convinced us that the salaries we offer are 14% below the market. Because competitive salaries are expected to remain constant, this means our salaries need to improve by 14%. We hope you can accomplish this within ten years, or in less time if possible.

Strategies

The problem before you is straightforward: You need to pay your faculty better. Generally, you need to increase the faculty salary line in the budget. However, if you do this and nothing else, you will run deficits. Increasing spending in one area means that you must make up the difference in new funds and/or decrease spending in other areas.

Short-term Strategies

Here are two short-term strategies to address the needed increase in funds. You may want to try one or both of the following:

1. Increase student enrollment.
2. Decrease staff salaries. Note that staff members are not the same as faculty members. Staff members are those individuals who support the daily operations of the university but are neither professors nor students.

Again, be careful. You will find that the university you are administering is an interactive, complex, and dynamic organization where one change affects the whole institution. In this case, increasing student enrollment is a solution you may want to try once in your first year, but do not become dependent on this strategy. You cannot constantly increase student enrollment and maintain educational quality. In addition, you run the risk of adversely affecting faculty and student morale as professors are asked to teach more classes with larger class sizes and as students are closed out of classes they are required to take. Finally, your infrastructure will not sustain the burdens placed on it by an ever-expanding student body. Likewise, decreasing staff salaries might be done once as an emergency response to the situation you face, but decreasing staff salaries to increase faculty salaries will dramatically affect staff morale.

Long-term Strategies

In the long-term, you want to tie salary increases to outstanding performance in areas you value. In this way you increase salaries, which you must do, while you are increasing faculty performance in certain key areas. Therefore, another strategy to consider that may be most helpful is to increase salaries either equally or variably across departments for certain activities that you value. This requires that you focus on one area and evaluate each department for performance in that area. For example, you may decide to increase salaries equally among those departments which show any increase in research funds, or you may decide to increase salaries differentially in only the top three to five departments that show the biggest increases in sponsored research.

Scenario 2 -- Allocate New Money

In this scenario, you have just received a major gift to your endowment and have a rare opportunity to increase academic and educational quality. Your task is to distribute the new income effectively to one or more of the departments specified by the donor.

Your Welcome Letter reads:

Congratulations. Juliet Rudnick has just pledged \$19,885 thousands to enhance the sciences and allied fields at our university. The pledge will raise next year's budget (for Yr. 2) by about \$994 thousand. (The name of the person and the size of the gift will vary from game to game.) The donor gave to improve biology, chemistry, physics and computer science. How will you achieve the goal for which she gave so generously?

You could concentrate big money on one or two departments or spend a little on many. The number of students affected by an alternative represents one criterion for selection. Another criterion is how your allocation of resources affects nonscience departments and such important facets of university life as the quality of teaching.

The Board will judge your success first in meeting the donor's expectations, which may encourage other donors, and then in lifting the prestige of our university.

Strategies

The goal of this scenario is to get you to think about how best to use donor gifts. First, invest your new dollars to generate more income flow and maximize your donor's gift. Second, if your donor specifies a liberal arts department as the recipient of the new funds, increase spending in areas that positively affect educational quality. This includes, but is not limited to, hiring more faculty members, increasing the number of seminar classes offered, and providing faculty more time to

spend with students outside of class. If your donor specifies a particular department (or set of departments) where sponsored research is important, provide more time to spend on research and scholarship. In both cases, you should consider increasing salaries and/or hiring more faculty. You might also wish to direct funds freed up by your new income to the athletics program.

However, there are consequences to these actions. For example, money spent on Department A but not on Department B could adversely affect faculty morale in Department B. In turn, loss of morale in Department B could lead to faculty attrition or students migrating to other departments. If you choose to spend money on athletics, remember that athletics programs are expensive to establish and only Division I institutions achieve the kind of success necessary to profit financially.

Scenario 3 -- Teach Better

Institutions are being increasingly criticized for not paying enough attention to issues of educational quality, e.g., class size, student course denials, and student contact hours. Your institution received a poor accreditation report. This report finds your resources are adequate but points to discontinued courses, low student morale, inadequate faculty time devoted to education, and poor teaching overall. Your task in this scenario is to improve educational quality in 10 years while maintaining other levels of institutional performance.

Your Welcome Letter reads:

The recent report by the accreditation team alarms the Board. Our proud university should not be cited for poor teaching. Something must be done.

The team attributes our failure to inattention to education rather than to lack of resources. They cited discontinued courses, student demoralization, and insufficient faculty time and attention devoted to students. They cited poor teaching in the classroom. While some departments received a passing grade, most cry out for improvement.

In five rather than the usual ten years, the accreditation team will return. At that time, the Board expects the University's educational quality will be rated good. When the team comes in ten years for our next regular examination, we expect our teaching will be rated excellent.

Remembering the team's opinion that a lack of physical and financial resources did not cause our poor teaching, the Board does not expect a mere plea for more money to achieve accreditation. Rather, we expect a plan to put in our classrooms a faculty that loves to teach.

Strategies

The problem you are faced with in this scenario is simply that the quality of education that students receive is low and needs to be improved. To begin this improvement, focus your attention on how each department is actually performing, not on how large the department is or how many students take courses there. Sheer size and numbers are not indicators of educational quality. After you have a sense of how each department is doing, there are several strategies that may help you improve educational quality at your institution. You may want to:

1. Reduce class sizes. Reducing class size means that students receive more attention from the professor during class time. In short, more attention increases the opportunities that students have to learn about and comprehend course material.

2. Increase faculty time spent on out-of-class contact with students. Students who want to explore class material more fully or who are struggling with class concepts must be able to access their professors not only in class but out of class as well. The time faculty members spend in class is determined by the game, but the amount of time faculty members spend with students outside of class is something you control and is one means of improving educational quality.
3. Improve the class-type mix. Ask yourself: How many lecture courses are given? How many seminar courses have breakout sessions? This strategy guides you to balance the number and types of classes given at your institution.
4. Increase spending on your libraries. Integral to the success of any university or college is an up-to-date library that has extensive holdings for research and learning purposes. Questions to consider: Does your library have enough money to buy new books and other types of media? Does your library have a large enough budget to maintain the holdings it already has?
5. Increase spending on information technology. Just a few years ago, the Internet barely existed. Now, who can imagine working, researching, and communicating without it? Keeping up with the latest developments in information technology is key to improving educational quality at your institution.

There are consequences, however. As always, you should be aware that each of the five suggestions above costs money and a budgetary increase in one area, or some combination of these areas, means a decrease elsewhere. For example, reducing class size means that you will need more professors to teach the same number of students. Another example is an increase in faculty time spent on out-of-class contact, which runs the risk of diverting faculty from their natural inclination to do research and thus may negatively affect faculty morale.

Scenario 4 -- Improve Research Performance

Research and scholarship are essential elements of academic quality. In this scenario you are presented with a negative report on research from the faculty's representative and governing board, the Faculty Senate. The report maintains that, while funds are sufficient, faculty teaching loads are too heavy and faculty research time is too low. Your task is to improve research and scholarship in seven years without undermining other areas of institutional performance.

Your Welcome Letter reads:

At our last meeting you convinced the Board that faculty research and scholarship at our university are mediocre by national standards. Something must be done.

The Faculty Senate Research Committee attributes this condition to a lack of commitment by both faculty and administrators rather than a lack of resources. The committee blames excessive teaching loads and insufficient research support. They blame low faculty morale. Most departments require improvement.

In ten years, the Board and the Faculty Senate want the University's performance rating in scholarship to be strong. Within another five years, we want it to be rated excellent. The rating reflects the scholarship of integration, application, and teaching as well as knowledge creation.

Remembering that the University's lackluster research performance is not due to a lack of physical and financial resources, the Board expects more than a plea for money. Rather, we expect a plan to breathe life into our laboratories and to re-establish the University's preeminence as a center of scholarship and discovery. How will you reach these goals?

Strategies

In this scenario, you are faced with poor academic quality and low faculty morale. Faculty members do not have enough time to pursue their own research and scholarship. This must be changed. Your first step is to evaluate which departments have the greatest research potential and focus your efforts on these departments. After this evaluation, you may want to do one or more of the following:

1. Decrease teaching loads. Low faculty morale and poor academic quality stem from an imbalance in the activities that faculty are asked to perform. One way to correct this is to decrease teaching loads so that faculty members have more time to pursue research interests.
2. Increase faculty time spent on research and scholarship activities. After you have decreased teaching loads, you have more time available, as mentioned above, to increase the amount of time faculty members have to spend on their research and scholarship. Increasing faculty time spent on research and teaching is another means of correcting an imbalance in the distribution of faculty time.
3. Hire more faculty members. Hiring more faculty members means each faculty member has fewer classes to teach and more time to pursue research and scholarship interests. This is another means available to correct low faculty morale and poor academic quality.
4. Improve your Internet connection. The Internet is key to successful and current research. To improve your Internet connection, go to the budget and increase the budget line for information technology.

Each of these strategies should positively affect faculty morale. As faculty members have more time to spend on research and scholarship, institutional prestige should also improve. However, the caution remains: think carefully about your priorities and be careful not to overspend.

Note:

Increasing the distance-learning courses will not help and should not be confused with improving your Internet connection. Distance-learning courses use technology to ease the constraints on class size. But spending money on courses that use technology is not the same as, and should not be confused with, spending money on improving your Internet connection. Improving your Internet connection is the means by which you increase spending on technology at your university or college overall.

Scenario 5 -- Win Games

A successful athletics program is an important contributor to an institution. It can encourage alumni to donate, attract applicants, and boost institutional prestige. In this scenario, you receive a negative Alumni Association report that details overly strict admissions, low athletics department budgets, and insufficient financial aid for athletes. Your task is to improve the football and basketball

programs by boosting each team's winning percentage in four years, and perhaps to also increase the NCAA competition level, without harming other aspects of institutional performance.

Your Welcome Letter reads:

The Alumni Association has impressed upon the Board the mediocrity of our athletes. The Board agrees that our institution should win more games, thereby strengthening the loyalty of alumni and attracting new students to all our departments. Something must be done.

The Alumni Association criticizes our admissions standards as too high and our athletics budget as too low. We are faulted in particular for providing insufficient financial aid for athletes. The Alumni expect our inattention to athletes to be corrected without damaging the academic performance that, at bottom, represents the worth of our university.

In four years, the Board and the Alumni Association will review your progress as reflected in our teams' victories. By then, we want our teams to win more than 60% of their games. We would be especially pleased if they were then winning more than 60% in a higher NCAA Division. How will you achieve these goals and at what cost?

Strategies

In this scenario, your basketball and football teams are not doing well and your Alumni Association is unhappy about it. But what can you do to make the teams perform better? You can't play the game for the students, but you can influence who plays on the team. To improve your institution's football and basketball programs, there are several strategies you may want to consider:

1. Change your admissions standards. Make it easier for athletes to matriculate.
2. Increase institutional priorities for the admission of student athletes. In the Admissions Office you have settings which allow you to determine whether you have a **high, medium, or low** institutional priority for the admission of student athletes. One way to improve the performance of your athletic teams is to increase your priority for student athletes to **high**.
3. Increase financial aid for student athletes. Money that you make available to student athletes in the form of financial aid increases the number of student athletes who can attend your college and signals to the faculty, staff, students, and board that this is an institutional priority.
4. Increase the athletics department budget. Like every department on your campus, the more money you spend on the athletics department, the better it will perform. An increase in funding also provides the athletics department with the means to expand its activities. In general, and as long as you are careful, increasing the budget in any department should show positive results.

As with other scenarios, you must be careful not to overspend. Increasing the amount of money you spend on student athletes, specifically, and the athletics program, generally, means taking money from somewhere else. If you don't adjust your budget accordingly, you will run deficits. Some bank debt may be necessary in the short-run, but in the long run, debt can lead to bankruptcy and the end of the game.

Scenario 6 -- Reduce Tuition

Continuously increasing tuition rates has become a pressing public policy issue in higher education. In this scenario, your Board informs you of a new policy that states tuition rates must decrease. The goal of the policy is to enhance financial discipline and attract more talented students to your institution. Your task in this scenario is to maintain institutional performance while decreasing tuition.

Your Welcome Letter reads:

The Board notes with alarm that our tuition has escalated at a real rate of 3% per year. Equal extravagance at other institutions does not relieve us of our responsibility to lessen the burden on our students and their parents. People will rebel if higher education continues to be seen as pushing aside their other needs.

Believing the time has come to take a stand, the Board notifies you of its firm policy that our tuition shall not rise. In fact, the Board would like tuition to go down.

Until now the University has estimated the growth of non-tuition revenue, funded new programs, salary increases, and other costs, and then closed the gap by raising tuition. You will now estimate tuition like other revenue and close the gap by disciplining expenditures. The new budgeting will strengthen internal financial discipline by forcing trade-offs among competing expenditures. Most important, tuition reductions will make us accessible to a larger pool of talented students, thus ensuring the worth and continuity of our university.

Strategies

This is a challenging scenario because it deals with controlling growth rates. As mentioned in your Welcome Letter, tuition has been raised 3% annually at your institution. Your Board's policy of tuition decreases means that you can no longer depend on that 3% increase in your budget, but you still must maintain institutional performance. You may want to think of ways to increase income without increasing tuition, but this won't help much in the shortterm.

Short-term Strategies

In the shortterm, you need to think of ways to immediately increase income or decrease spending. Two strategies that have only one-year lifespans but will serve to alleviate immediate budget shortfalls are:

1. Increasing the number of students attending your university by 3%.
2. Cutting your budget by 3%.

Obviously, you can't continuously increase your student body without putting greater stress on your institution's infrastructure, thereby increasing the amount of money you spend on your institution's facilities, faculty, and staff. Likewise, you cannot decrease your budget 3% every year and still maintain the levels of institutional performance you are currently experiencing. Fortunately, there are long-term strategies available.

Long-term Strategies

One long-term strategy involves increasing your endowment. As you increase your endowment, you can decrease the payout rate (how much money you spend from your endowment). In this way, the lower payout rate will increase the growth rate of your endowment, and thus the growth rate of

spending from endowment. You also need to focus on attracting more donors and then investing these funds. A more aggressive investment strategy can also increase the endowment's growth rate, but at the cost of increased year-to-year volatility. Thus, a more aggressive investment strategy should only be used by a university that doesn't have any important budget shortfalls to deal with and thus can withstand a bad year or two.

Scenario 7 -- Respond to Enrollment Shifts

Your institution is experiencing changes in student priorities and academic interests. As a result, some departments have more capacity than they do students while other departments are struggling to meet demand. You are faced with disparities in teaching load and class size and some departments where large numbers of students are being denied access to courses. In this scenario, you have 10 years to correct the imbalances brought on by enrollment shifts in order to maintain educational quality.

Your Welcome Letter reads:

Shifts of enrollment among departments have distorted course listings, overloaded some teachers and buildings, and left others idle. These shifts leave some courses half-filled while students are foreclosed from desired overfilled courses. Some departments have upped the proportion of lecture courses to accommodate increased student numbers.

Because the world has moved on and made a return to the previous pattern unlikely, the Board shares the concern you expressed at our last meeting. Going beyond describing misalignments, however, how will you restructure our academic programs and faculty resources to match today's needs?

By the second semester of year 11, the Board expects educational quality to increase, course denials to decrease, and average teaching load hours to rise substantially. What is your plan?

Strategies

This scenario is a classic budget reallocation problem. Generally, enrollment shifts mean you have to redistribute the resources from the departments that have too much to those departments that don't have enough. You may find this challenging as you try to balance limited resources with too many tenured faculty members in some departments and too few faculty members in others.

Short-term Strategies

In the short term, you need to take immediate action to alleviate the stress that those strapped departments are experiencing. Toward this end, you may want to try one or both of the following:

1. Increase class size in departments that are strapped for resources. You must be careful in applying this strategy and monitor it closely because changes in class size may affect educational quality and student morale.
2. Decrease departmental budgets that have excess capacity and increase departmental budgets that are experiencing shortfalls in faculty and course offerings.

Long-term Strategies

Even though you will need to take immediate action to alleviate the stress certain departments are experiencing, you also need to think in terms of long-term strategies. You should focus your energy on:

1. Finding more financial resources for strapped departments.
2. Encouraging early retirement among those departments experiencing excess capacity.
3. Investing any new income you acquire in new faculty hires and directing these hires to the most overburdened departments.
4. Setting institutional policy that makes faculty promotion harder. The goal of this strategy is to make it difficult for faculty members who are in unpopular departments to get tenure. While this may negatively affect faculty morale, it functions as a means to get faculty members to voluntarily leave by making tenure too difficult to achieve.

In this scenario, many of the strategy suggestions direct change at the departmental and faculty levels. Clearly, your actions in this area may strongly and negatively affect faculty morale. Think carefully about the combination of strategies you choose as you attempt to address the reallocation challenge. For example, you may choose to increase class size in those departments that are strapped as a stop-gap measure until more faculty can be hired. And in order to hire more faculty members in these departments, you need to reduce the budget and the number of faculty members in departments experiencing excess capacity.

You may decide to make tenure harder as well as reduce budgets in departments that have excess capacity. This may sound fine, but what you may achieve is low faculty morale and angry faculty members all around. Faculty in the strapped departments will be stressed by the increase in their class size. Weren't you listening? Faculty members in these departments were already running low on resources and they were expecting you to decrease their burdens, not add to them. Meanwhile, faculty members belonging to departments with excess capacity are stressed because they have fewer resources and their jobs are threatened. As president, your job is to perform a balancing act. You have to make necessary changes while simultaneously convincing the faculty, staff, and students that everything will work out.

Scenario 8 -- Enroll More Minority Students

For many institutions, increasing the number of qualified minority students is an important goal. At your institution there are relatively few minority students. Your task in this scenario is to increase minority student representation twofold in ten years while maintaining all other aspects of institutional performance.

Your Welcome Letter reads:

The Board shares your concern about the scarcity of minorities among our students. Further, because minorities are equally scarce among freshmen as among seniors, we see no evidence that time will cure the problem. Instead, you must act promptly to increase the number of minorities.

The Board sets your goal as boosting the number of minority students twofold in ten years, that is, from 9% to 18%. At the same time, we expect this will make us accessible to new pools of talented students, guaranteeing the worth and thus continuity of our university.

Strategies

You and your Board agree on the need to diversify the student body. Generally, you want to immediately increase enrollments with an emphasis on minority students. You need to act quickly because you want a significant increase in five years. As a result, the strategies you are concerned with have to do with admissions, enrollment, and financial aid. Toward these ends, you should:

1. Increase special treatment for minority students.
2. Enroll more students in absolute numbers to make room for an increased percentage of minority students.
3. Increase financial aid for minority students.

Remember, the student body will completely change every four years so the effect of your policy decisions should be evident by then. You also have a fifth year to show the stability of your programs or extra gains.

Scenario 9 -- Hire More Minority Faculty Members

Just as attracting more minority students is an important goal for many institutions, so is attracting more minority faculty members. There is a relative scarcity of women and minority faculty members at your institution. Your task in this scenario is to increase women and minority faculty member representation over five years and foster enrichment of institutional performance as a result of the changes made in the professorate.

Your Welcome Letter reads:

At our last meeting, you told the Board your concern about the few minorities and women on the faculty. We agree heartily and expect the shortfall to be redressed promptly.

You told us that the University has about the same under-representation in all fields, and that minorities are even more underrepresented than women are. The scarcity of minorities and women among young as well as old faculty shows the problem will not correct itself.

The Board sets your goal as boosting minority representation by 50% in five years. For women, the goal is a 25% increase in five years.

We ask how you will accomplish these goals and with what change in budget and staff size. At the same time, we expect the enhanced representation of women and minorities on the faculty to enrich all aspects of university life. (Percentages shown above are examples. Actual percentages are created dynamically based on conditions in the generated game.)

Strategies

This is a challenging scenario because you are expected to dramatically alter the diversity of your faculty in a relatively short time. The general strategy to follow here is to set new policies early in

the first year. The policies you need to set involve hiring, salaries, and increasing student enrollment. Therefore, you should consider:

1. Changing hiring policies to reflect priority on hiring women and minority professors. This will signal to the members of your college or university that you value women and minority professors.
2. Eliminating any gap between white male and women and minority faculty members. This is most easily accomplished when overall salary rates are increasing. (See the **Pay Better** scenario.) The benefits of this policy are twofold. First, it makes hiring women and minority faculty members easier as they will naturally be drawn to higher salaries. Second, it makes retaining women and minority faculty members easier. Their salaries are high and this signals to them that they are valued members of your institution. These are important benefits and ultimately ones upon which you will be judged.
3. Increasing, if resources permit, the overall size of your student body. This will allow you to hire more faculty members to meet demand and you can fill these new spaces with women and minority hires. In short, more students means more faculty members and thus more diversity.

You should note, however, that even though you are given more time, attracting women and minority faculty members is a more difficult task than attracting minority students. Students stay at your institution roughly four years. By contrast, tenured faculty members stay 30 to 35 years. This scenario challenges you to correct your imbalances in only a fraction of the time that you may expect a faculty member to stay at your institution. To correct these imbalances requires that you have the necessary funds available. And money spent here must be taken from elsewhere.

Scenario 10 -- Balance the Budget

This Virtual U scenario requires you to balance the budget. You are faced with large budget deficits that threaten your institution's financial reserves. In addition, your university is experiencing significant revenue loss. Your task is to make the necessary budget cuts and balance the budget in nine years while maintaining high levels of institutional performance.

Your Welcome Letter reads:

The budget deficit you project alarms the Board. Unexpected shortfalls in research grants, gifts, and other income have thrown the budget (\$5,711 thousands) into the red. Worse, hopes of more income anytime soon are vain. At our recent meeting, you disappointed the Board by advancing no remedy to cope with the new circumstances promptly. We are disturbed that you currently are targeting a 3 percent deficit for next year.

You must act immediately. Although some actions may require more than one year to phase in, you must balance the budget within three years from now. Furthermore, after achieving a balanced budget during years 4, 5, and 6, you should run surpluses for years 7, 8, and 9 or until reserves rise to their current level of \$9,000 thousand.

*You must accomplish the above without diminishing the average **Performance indicators** and **Attitudes toward the institution** scores (listed on the **Score** screen.)*

Strategies

This scenario requires you to cut the budget and minimize adverse effects on academic quality, financial viability, and university operations. The primary strategy for this scenario is to increase revenue and decrease expenses. You may want to try one aspect of this strategy -- increasing revenue or decreasing expenses -- first.

Short-term Strategies

In the short-run, you may find it difficult to increase revenue; thus, you may choose to focus first on making immediate reductions in the budget. To do this, evaluate each department at your institution with the following questions:

- What kind of courses is this department offering?
- Are they seminar courses where the student-to-teacher ratio is small?
- How many lecture courses are offered where the student-to-teacher ratio is much higher?

One way to reduce expenses is to decrease the number of seminar courses and offer more lecture courses. Another strategy option is to reduce faculty salaries. You may also increase student enrollment, therefore increasing tuition dollars. Or you may need to increase student tuition.

Be careful. Each of these remedies is only a short-term solution to the crisis at hand. Tuition increases are not popular or sustainable. Your university's infrastructure will not tolerate continual increases in student enrollment. It will also be hard to keep faculty members and attract new ones in the face of salary reductions. There are consequences for every action you take. A reduction in seminar courses may adversely affect educational quality, faculty morale, or student morale. Reducing faculty salaries and/or increasing student enrollment may seriously affect faculty morale. Faculty members will not be happy about salary reductions that occur while the number of students or courses they are expected to teach is increased.

Note:

You may only increase student enrollment provided that your institution is receiving sufficient applications to support an increase.

Long-term Strategies

To achieve long-term stability, you may want to do one or more of the following:

1. Increase the amount of gifts given to your university.
2. Increase research volume at your institution.
3. Increase the success of or the competition level of your athletics programs.

For more information on each of these long-term strategies see **Part III: Specific Strategies**.

Conclusion

As you have seen throughout this section, administering a college or university requires that you not only solve the problem presented in the scenario but that you also attend to the other aspects of running your university. Every action or policy you set has consequences. It is your job to control the outcomes so that they promote the well-being of your institution.

Part III

Specific Strategies

Introduction

The first two sections of this manual have given you some strategies to follow when playing Virtual U in general and playing scenario games more specifically. The goal of this section is to provide an in-depth understanding of the specific strategies available to you to improve your tenure as a university president. Continuing the focus on specific strategies, this section will review and provide strategies for each of the areas on the Menu Bar as well as provide strategies for those departments only accessible through the Campus Map. The areas covered in this section are in order of their appearance on the Menu Bar and include Faculty, Students, Courses, and Finances. The areas in this section that are found by means of the Campus Map are Admissions and Financial Aid, Development and Alumni Affairs, Athletics, Library and Information Technology, Old Main (Investments), Operations & Maintenance, Parking, and Police Station (Crime). Each section will provide a general description of the issues you face and provide strategies for each policy decision you can make.

Faculty

The faculty is central to the success of your college or university. Who you hire, when you hire, how faculty members are required to spend their time, and how easy or difficult you make tenure are all issues that attract or dissuade faculty members from working at your institution. The following will cover the numerous policy decisions concerning faculty members that you must make.

Faculty Hiring

As president, you determine how many women, minorities, tenured, long-term adjunct, and short-term adjunct faculty members will be hired at your institution. In real life, a university president must choose between equally necessary goods and services. You can steer the allocation of new hires, including those who replace faculty members who have departed, by adjusting the weight given to a department's teaching load, its relevance to institutional mission, its sponsored research volume, and the year-to-year change in faculty size. Often, each department only hires one or two faculty members each year, and in some years there are no hires.

Virtual U models this real world environment. Therefore, it is necessary to decide how you will distribute available faculty hires and to set hiring policies early. Slow the game down, evaluate each department and set hiring policies at the department level before you move on to setting university-wide policies. One exception applies here: the only other set of university policies with which players should concern themselves at the beginning of the game is budget priorities. Ideally, your university budget is as balanced as possible at the beginning of each school year.

If you do not set hiring policies early, Virtual U goes into a default mode that hires randomly. The default mode will not move your institution toward the goals you have set. Keep in mind that hiring tenured faculty members is controlled by three factors: teaching, scholarship, and research. Setting priorities for the kind of faculty talent you want to attract will have positive effects on educational quality, research, and/or institutional prestige.

Mission and Hiring

With regard to university mission, some departments will be viewed as critical to the player-created university's mission, while others will be viewed as peripheral. This will bias hiring decisions toward the highest mission-relevant departments. Suppose, for example, that chemistry is judged to be more mission-relevant than sociology. If the departments are about equal in teaching and sponsored research load, the new hire would go to the chemistry department.

Salary and Hiring

Salary at Virtual U can be manipulated by each player and is an important part of the hiring process. Basically, the higher the salary as compared to peer institutions, the better quality of the hire. The faculty salary market may also reflect a salary premium for gender and minority status. For example, you may have to pay more to get African American women faculty members than their white counterparts.

Strategy

There are two strategies in faculty hiring available to you:

1. Faculty members are concerned with teaching, research, and scholarship. When hiring faculty, you may wish to give priority to time spent on sponsored research. This will attract other talented faculty members to your institution.
2. Attracting talent will, in turn, increase prestige and sponsored research activities. But remember talent is expensive.

Note:

The market for faculty with strong research skills is the most competitive and the most costly -- a lesson you will learn as you attempt to upgrade a given department's research capacity.

Faculty Morale

How do your faculty members feel about your institution? One of the essential tasks of a university president is to create an environment where faculty members feel comfortable and successful. There are several strategies available that will help achieve this end.

Strategy

1. One obvious way to increase faculty morale is to increase salaries. This is a decision you have to make when you are setting the budget and it is dependent upon department affiliation.
2. Rewarding scholarship and research activities by increasing time spent on these activities or offering higher salaries will also improve faculty morale.
3. If you have a situation where teaching quality is low and you have relatively few faculty members, you should increase the teacher-to-student ratio. This means you should hire more faculty members. Remember that one action affects all other aspects of the university.

4. Reducing the number of students to teachers will increase faculty morale and improve education quality but the adverse effect will be costly. If you don't have a balanced budget, you will want to think of other less costly ways of improving morale.

5. You can also improve faculty morale through related activities such as giving faculty more class preparation time and out-of-class contact with students. The adverse effect is that faculty members have limited time. More time spent teaching means less time on research and fund-generating activities.

Note:

If you set every policy choice to its highest level, you are, in effect, making no decision at all. University presidents have to make difficult choices. The key to faculty hiring is balancing how faculty spend their time.

Promotion and Tenure

In Faculty Hiring, two of the most important policies you will set concern promotion and tenure. These areas are concerned with how easy or difficult promotion and tenure is to achieve at your institution. There are five steps you may want to follow.

Strategy

1. Carefully evaluate each department by slowing the game down so no time is passing while you acquaint yourself with your university. Evaluate and hire.

2. Promotion policies, unlike hiring policies, which are done at the department level, are done at the institutional level. Promotion is only considered once a year.

3. You must decide how difficult you want your promotion to tenure to be -- low, medium, or high - - and the degree to which the policies you use to adjust salaries (for example, research or teaching performance) are reflected in promotion -- low, medium, or high.

4. Review your tenure policy every five years. If you are not satisfied with the effects of your tenure policies, make tenure more difficult to achieve.

5. Review and balance your budget before hiring.

Faculty Time

Faculty members experience one central dilemma when it comes to managing their time at work: Do they spend more time on research or teaching? Between research and teaching, how do faculty members divide their time between course preparation, class hours, out-of-class student contact, educational development, scholarship, or institutional service? It is your job as president to be sensitive to this dilemma. This section will provide strategies for each of the areas on the Faculty Time screen. The greatest challenge you will have here is balancing the numerous activities that claim faculty time while trying to meet faculty needs and interests.

Normal Teaching Load

The normal teaching load is six hours a week. You can increase or decrease this. (If you are uncertain how many seminar classes, etc. each department is teaching, you may want to go to **Courses** to see the course mix at your institution). If you want to get the most mileage out of your

faculty's teaching time, shift class type from seminar to general. In every case, as you evaluate your departments, new professors should be teaching six hours per week.

Course Preparation

Course preparation is the amount of time that faculty members spend preparing for a class or lecture. If you increase the number of hours that faculty members spend here, you improve the quality of teaching and faculty morale.

Out-of-Class Student Contact Hours

Out-of-class student contact hours is the time faculty members spend with students outside of class. If you increase student contact hours, you increase student morale and educational quality. But there are consequences. The more you require faculty members to spend time with students outside of class, the more you move faculty away from their internal preferences: to spend time on their research and scholarship.

Educational Development

Educational development is the means by which you may develop new courses. The resources you spend here will take longer to produce results. However, there are three tangible benefits:

1. You will increase student morale.
2. You will increase information technology.
3. You will increase educational quality.

Research and Scholarship Defined

Research is defined as those projects in which faculty members are engaged that involve discovering new knowledge, the pursuit of truth, and discovery. Ideally, this is done without regard to politics or political agendas. Scholarship is based on Ernest Boyer's definition of scholarship, *Scholarship Reconsidered: Priorities of the Professorate*, 1990 but is more broadly defined. Boyer's definition of scholarship has four parts: the scholarship of discovery, the scholarship of integration, the scholarship of application, and the scholarship of teaching. The scholarship of discovery is best understood in terms of research as defined above. The scholarship of integration is fundamentally interdisciplinary and involves making connections across academic fields, interpreting existing research, and putting data or findings in a larger social context. The scholarship of application involves service to a faculty member's academic field, the university, and society at large. The scholarship of teaching is the transmission, reinforcement, and transformation of knowledge by professors to their students and to the broader social community. These are important definitions in Virtual U and provide the theoretical underpinning for faculty work.

Research and Teaching

For excellence in either Research or Teaching, you must keep in mind that all departments are different and have either a research or teaching focus. To identify the focus of a department, check your opening letter, look at the departments in the hard or social sciences -- departments usually associated with research. Research departments play an important role in your university since they have the potential to generate funding and prestige for your institution. Notice the ratio of research dollars to faculty members. The general strategy for improving research is to focus your energy and

funding on departments traditionally associated with sponsored research. The general strategy for improving student morale is to focus your attention and resources on departments associated with teaching, such as English, History, and Foreign Languages. In the case of both research and teaching departments, excellence equals prestige and prestige attracts students.

Research

Research is increased through increased research proposals. You will see evidence of this on the financial statement. The formula to follow is: increasing research dollars results in expanded overhead (**indirect cost**) recoveries, which will be reflected in your budget. Indirect costs are the percentage of each grant that the university charges each grant for facilities and utilities. Indirect costs are included in the **Sponsored research** revenue line of your budget but not in the **Sponsored research** expenditure line. The latter includes only the direct costs of research - the amounts that faculty members actually get to spend on their projects.

The Research button on the Faculty Activities screen has no place which calls for you to make a decision. But this is an important screen as it provides means for you to track each department's research activity and notice how much research is being generated. If the ratio between research proposal acceptances to rejections is too low, you should immediately reduce the amount you charge each grant for indirect costs. (The indirect cost rate is a variable on the **Budget Plan: Revenue and Expenditure** screen.) In the shortterm, your strategy should be to increase faculty time spent on research. In the longterm, you might try to improve the talent of the faculty at your institution through your hiring policies.

Research and Hiring

Hiring research faculty is essential for building a signature research program, but there are risks. Researchers may spend less discretionary time than teaching professors on education-related tasks. This can have a big effect on the educational quality at your university. However, there are likely benefits. Talented research faculty members who spend time on course preparation, course development, and student contact might produce high-quality education. However, institutions that choose not to hire the big research talent will retain faculty longer. Converting an institution to a signature research program does take time, particularly given the relative permanence of existing faculty.

Scholarship

There are many forms of faculty activity that fit into the category of scholarship; writing a new book on Beowulf, performing service in the faculty member's professional society, or presenting to the university community on the faculty member's latest research. The benefits of increasing scholarship priority are tangible in several areas and you should see:

- increases in institutional prestige
- increases in faculty morale
- increases in educational quality

Scholarship and Research

Scholarly work enhances teaching and institutional reputation but it does not increase the number of research projects your institution generates. There is an inverse relationship between research and scholarship. Faculty members need to do both. However, research-focused departments, like

Chemistry, should have higher research priority and lower scholarship priority. Teaching departments, like History, should be given higher scholarship priority and lower research priority.

Institutional and Public Service

There are several avenues available to faculty members who wish to serve their university or community. For example, faculty members who participate in the Faculty Senate Committee (the faculty governing board) or who work with local schools are engaging in institutional and public service. Increasing the priority for institutional and public service will show some increases in alumni goodwill and administrative morale. The consequence of such an increase is that faculty time is spent on an activity that draws them away from their research and teaching.

Faculty Retirement

A last minute addition and hidden aspect to Virtual U is the ability to offer individual faculty members early retirement. While you can't fire individual faculty members on a whim, the ability to retire some faculty members can be an important aspect of faculty management. It gives you some ability to shape the faculty of your university.

Faculty members over 55 years of age can be offered retirement. You can evaluate faculty members at this age and, if they lack some desired skills, are not performing as well as you want them to, or they are receiving exorbitant salaries, you can offer them early retirement. The faculty member's age and salary will have an impact on how significant the financial package must be to get them to retire. You can offer from 25% to three times a faculty member's current salary. However, in some cases they will reject even the highest of offers.

Retiring faculty members as a strategy should really only be pursued as part of a broader strategy. Early retirement is a tool that can be used to shape faculty hiring priorities, cut expenses, decrease the number of faculty members in over-staffed departments, or push faculty members to spend more time teaching or doing research. At no time do you get to choose incoming faculty specifically (you can only set hiring priorities), so you may find the replacement no better than the departed faculty member.

Tip:

Set your hiring priorities before you begin offering faculty early retirement. Also note which departments are now understaffed and will need new hires during the end-of-year budgeting process.

Strategy

When retiring faculty, consider one of the following strategies:

1. To decrease costs, simply offer the lowest possible amount (25 percent of current salary) to each faculty member of retirement age. After some faculty members have accepted (or declined) that offer, make a higher offer, if necessary. Repeat the process until enough faculty have retired to satisfy your need.
2. To change faculty demographics or talent mixes, offer specific faculty members retirement until they accept. If faculty members won't retire even for the maximum possible offer (three times their current salary), wait until they are older and try again (at lower amounts to start) until you have

successfully retired them. Obviously with this strategy retirements could be expensive undertakings. You might decide to retire specific faculty members only if they accept a certain size offer or less.

Students

Under this menu item you have two policy decisions to consider: student housing and student finance. If you decide to finance the resident halls, this means that you are building new residence halls even if none are added to the campus map. However, as you build new buildings, you also increase the cost for each average resident. If you decrease the number of students in residence halls, this means you will have unused beds.

Student finance is concerned with spending on activities for students, referred to as student life. Student life is directly concerned with how happy students are with their college or university.

Strategies

1. The easiest way to increase student morale is to increase the number of hours professors spend with students outside of class.
2. If you increase the attention given to other projects at your institution, it will decrease student morale.
3. If you are financially stable, you can increase spending on student life and you will see an increase in student morale. However, if you are financially unstable, be cautious about increasing the number of beds that you have. In effect, you will be building when you don't even have enough income to keep your institution stable.
4. Increase the budget for student life to increase student morale.
5. Increase spending on athletics or admit more top athletes to increase student morale. Students like to be at an institution with a winning team.

Courses

Courses provide their own unique set of challenges. What should be done when students are closed out of courses? Should you have a summer term? When you can't hire more faculty members, are there ways to increase class size or change course mix to meet student demand? Though there are only two screens under **Courses** where you make policy decisions. The choices you make here can affect issues of educational quality as well as student and faculty morale.

Course Mix

How you distribute the types of courses offered at your institution is an important measure for promoting student and faculty morale. Issues of improvement turn on student-to-teacher ratio and this ratio depends on whether you are running a public, private, or research university. You can find this ratio by looking at each department. Basically, a lower student-to-teacher ratio is better.

Strategy

1. Change class mix -- especially if you can't hire more faculty members. Increase the numbers of general courses and decrease the number of seminar courses. This saves money and makes the most of faculty teaching hours.

2. In terms of educational quality, smaller class size is better. You should increase the number of seminar classes and decrease the number of general classes.

3. If students are closed out of courses, student morale will decrease. To correct this, it is necessary to increase class size. However, there is a balance here. Getting into a large class is better than not getting into any class at all, but generally smaller classes will increase student morale most.

Summer Courses

At Virtual U, your school year begins in the fall and ends the following spring. However, you have the option of expanding the year to include a summer term. What are the benefits of a summer term? How do faculty members respond to teaching during the summer? Will a summer term ease financial problems? What percentage of classes is taught in the summer trimester? You determine the answers to these questions. You must decide if your need to expand course offerings should extend to the summer. While there are some negative consequences to this expansion, it is a good way to meet student course need.

Strategy

1. Summer classes spread need and create class sections.

2. However, expect faculty morale to decrease, particularly at the beginning of this policy. As people get used to teaching a summer schedule, you should see faculty morale improve.

3. If you are experiencing financial problems, one way to capitalize on the teaching resources you have is to create summer term and promote distance learning. In this way, you can increase the number of course offerings as well as increase the number of students in each class without having to hire more faculty members.

Finances

As mentioned in General Strategy 2, understanding the financial structure is perhaps the most difficult aspect of Virtual U and one of the most important to the success of your administration. If you have followed the advice suggested in General Strategies, you have familiarized yourself with your institution and your budget in particular. This section will provide a quick lesson on things you should look for as you review your budget and offer strategies for setting budget priorities.

A Quick Lesson in Reading Your Budget

Imagine this is your first week at your institution and you are trying to get to know your institution. Today you have decided to review your budget and set institutional priorities for the rest of the year. As you begin your review, there are several features of which you should be aware and several steps you should follow.

1. Go to Revenue and Expenses. Notice how much revenue you are generating and how much you are spending. What is your mix of revenue? Players should note:

- Financial statements for public institutions will show public funds.
- Wealthy institutions will have large endowments and cash resources.
- Struggling colleges might have little or no endowment and scant cash reserve.

Here, you will find information on the budget that was predicted versus the actual budget, i.e. what is actually being spent. As you examine each area, note the places that are strong and the areas that are weak. You will want to continue to provide strong areas with suitable resources. Some weak areas may require immediate attention. You will want to look at four areas in particular:

- Real growth of tuition rate.
- Real financial aid growth. Subtract this figure from tuition and you have the actual amount that tuition is contributing to your budget.
- Endowment spending rate. This is the amount of your endowment you are spending each year to maintain university functions.
- Indirect Costs. This is the overhead you charge sponsored research for the operation of facilities and utilities.

If you need to generate more income, you can increase tuition and indirect cost rate.

2. Next, go to your Balance sheet. You should pay particular attention to the:

- Operating Reserve. Think of this as your institution's savings account. It is from here that deficits will be taken. If the operating reserve runs low, you can take a short-term loan. However, you will need to limit the size of the loan balance or you will go bankrupt and the game will be over.
- Capital Reserve. Think of this as the bank book you have for facilities. This is the amount of money you have to spend on new facilities. If your institution grows, you will have to increase the amount in the capital reserve and build more buildings. You can do this by increasing the transfer to plant or directing more alumni gifts to facilities.
- Endowment Size. The size of your endowment determines the amount that you can spend from it. Because the endowment is liquid, the size of your endowment counts more heavily as an asset in the determination of debt limits than the physical plant does.

3. Note that you can influence some, though not all, external events including: endowment return, growth of sponsored research, growth of gifts, growth of athletics revenue, interest rate on bank debt, and growth of other income. For example, asset allocation might influence endowment total return. Expenditures on advancement and athletics might influence income growth for those categories. Heavy deficits requiring bank debt close to the credit limit might escalate the bank interest rate. It is important to note that your university has a borrowing limit. Your institution's credit rating determines the total amount of debt that can be outstanding at a given time. For simplicity, Virtual U makes no distinction between plant debt, residence hall debt, and bank debt. The institution's borrowing limit represents the difference between its overall debt capacity and the debt currently outstanding.

4. Go to the Budget Plan. Ask yourself: What policies are in place now? What have you inherited from the last president? Scroll completely through each screen including: Revenue and expenditure, Functions (real budget growth fuels growth in the university functions, and conversely), and Faculty Hiring.

Note:

You can view the revenue and expenditure statement at any time during the year. You can also rescind amounts from some expenditure lines if and when shortfalls arise. For example, rescissions can be from the student life and O&M budgets. However, Virtual U is not intended to be primarily a financial exercise. For example, there is no general distinction between restricted and unrestricted funds for most income and expense categories.

5. As you begin to set policy, imagine that you have given your Chief Budget Officer an instruction to develop a budget plan. He or she will try to meet your instructions and always produces an accurate set of results in the sense that income will always equal expenditures plus the surplus or deficit. However, the results may not always be what you wanted. The budget officer will come as close as possible, but if your requests are mutually inconsistent (e.g., growth in all expenses and a budget surplus), that may not be very close. That has a growth of, for example, 1%. Suppose you set the policy for real budget growth at 0%, for example. Then you'll fund your salary increases, but won't have any additional money to distribute among the various budget functions. In other words, the level real expenditures will be the same as last year. If you set your real budget growth at a number greater than 0%, you can have more books for the library or more faculty members. As you become more sophisticated in your game play, you can go to Detail for more specific information about your budget.

Strategy

1. Decrease expenditures on staff and you will see an adverse effect on staff morale because of the implications for increased workload and possible layoffs.

2. Decrease faculty hiring and faculty morale will decrease.

Other Campus Venues

Outside of the Menu Bar there are several areas on campus you will want to visit to set policies and priorities. Failure to visit these campus locations will result in lost opportunity to set policies vital to the success of your institution and administration. These areas include the Admissions and Financial Aid Office, Development and Alumni Affairs Office, Athletics, Library and Information Technology, Old Main (Investments), Operations & Maintenance, Parking, and Police Station (Crime).

Admissions and Financial Aid

One of the areas at your college or university that you need to track carefully is the number of undergraduate, graduate, and nontraditional students being admitted and how closely these numbers match the targets you have set for your institution. Among the targets you set are the percentage of students at your institution who receive financial aid and how much financial aid this group will receive. The purpose of this section is to give you strategies for setting admissions and financial aid targets.

As you set these targets there are several questions you may want to consider: How many students are attending your university? How many students would you like to see attending your institution? What are your university's peer institutions as seen by students? To what group of peer institutions does your university aspire? How should you classify potential students? What are the current profiles of your entering students? Are you satisfied with the profiles? If not, to what profiles do you aspire and what would it take to get there? To what extent do yield rates indicate that yours is a

first-choice or backup school for students? What, if anything, can be done to improve your institution's profiles, yield rates, or admit rates? What are the trends? Can you do anything to improve matters? How does spending per student, student-faculty ratios, faculty quality indices, endowment, and revenue mix measures differ from those of your actual and desired peer institutions? Have you assessed the impact of institutional changes upon student preference -- and hence upon your institution's application and yield rates?

Admissions

As you move through the four screens for student admissions, you will find many of the answers to these questions. The policies you set on these screens will determine how successful you are in attracting and keeping students at your institution. Low admit rates or high yield rates are set by sliding the bars to the number of students you want to matriculate. Note that the goals you set on these screens are your target numbers for the next year's students.

Strategy

1. If you are seeking to increase student quality and educational quality, reduce the number of students admitted to your institution.
2. If you are seeking to increase your student populations, increase the numbers of students in your target areas. However, you should note that a 10% increase in undergraduate students, for example, is a 10% increase across all departments. You cannot target one or two departments and increase their enrollments.

Note:

In nonselective institutions, setting admissions priorities that run counter to your institutional mission will not be effective in increasing institutional prestige. This means that your institution has a mission of serving all students regardless of their talent.

Financial Aid

Rising college and university tuition costs have forced students, parents, and college administrations throughout the country to think about how people will pay for college. This type of aid is traditionally referred to as **need-based** aid. Another type of aid is associated with academic talent and is often referred to as **merit** aid. To which students will you give aid? What kind of aid do you prefer to use? Are there students you would like to attract to your university who may qualify for both types of aid? As you administer your institution, you will have to address these issues, too. There are several strategies you may want to consider as you begin to set financial aid policy at your institution.

There are two types of financial aid in Virtual U: merit aid and need-based aid. Manipulating the kind of aid you give to students is your chance to shape the academic ability of the classes you admit to your institution. Toward this end, if you increase merit aid, especially if you are a highly prestigious institution you will increase the number of talented students, other things being equal. If you increase need-based aid, especially if you are a private institution, you will increase the number of students from disadvantaged backgrounds.

Strategy

1. In general, the more selective your institution is, the more you should move toward using need-based aid. The opposite is true as well.
2. The less selective your institution is, the more you should move toward using merit aid. You should think of this as your chance to shape the kind of academic talent that you attract to your school.
3. This is also your chance to diversify your student body by offering more need-based aid and establishing the level of special treatment you want to give to minority students and athletes.

Note:

Nontraditional students are part-time learners, but they pay tuition. The tuition these students' pay is a good moneymaker for your college or university. To increase tuition dollars, increase the number of nontraditional students. Keep in mind, however, that nontraditional students may want financial aid. You have to decide whether to give it to them. Distance learners also can be moneymakers. They are part-time students, but they attend classes over the Internet. This means that class size constraints are relieved and there is no draw on the on-campus facilities. You can attract more distance students by improving the quality of your internet connection and getting faculty to spend more time on using information technology in teaching.

Development and Alumni Affairs Office

There are two screens at the Development and Alumni Affairs Office that need your attention. The first includes a report on the alumni donations you received last year, your projections for this year, and how well you are meeting your targets. You may choose to increase the fundraising budget on this screen. The second screen shows how you use the gifts you receive. You can spend your alumni donations on current use, the endowment, and facilities. This screen also gives you information on alumni who have donated and the level of their satisfaction. Keeping donors happy has obvious implications for receiving future donations. If you have low alumni morale, then you will see a decrease in the number of alumni who give to the institution. The key question is: How do you increase alumni morale thereby increasing donations? There are several methods available to you:

- Spend more on development.
- Increase university prestige.
- Win more games.

Athletics

A winning football or basketball team can do wonderful things for a college or university. Winning a football bowl game or having a winning season can bring in large sums of money, increase institutional prestige, increase alumni donations, and increase applications. It sounds like a cure for many things, but athletics are expensive. In addition, only winning Division I teams receive all the benefits promised by a strong Athletics Department. However, not all schools will be able to sponsor Division I teams.

What does it mean to be a Division I school? Colleges and universities who wish to participate in sports nationally join the National Collegiate Athletic Conference (NCAA). Members of the NCAA view intercollegiate athletics as an important aspect of the educational process and recognize that

different schools have different competitive abilities. To this end, three divisions were created: Division I, Division II, and Division III.

Division I is the most competitive and has several requirements that universities must meet to maintain this ranking. These include sponsoring at least seven sports for men and seven sports for women, maintaining extensive athletic facilities for student athletes, playing a certain number of games each year, and meeting minimum and maximum standards for financial aid.

Division II is less competitive but still has several requirements that must be met to maintain ranking. These include sponsoring at least four sports for men and four sports for women, playing a certain number of games each year, and meeting maximum financial aid standards.

Division III is the least competitive but still has requirements that participating colleges and universities must follow. These include sponsoring at least four sports for men and four sports for women, playing a certain number of games each year, and awarding financial aid on a need-only basis. Virtual U stimulates these criteria with only two teams: Men's football and women's basketball.

As you can see, based on the NCAA Division requirements alone, running any type of athletics program is going to be costly. From a game perspective, investing in athletics early in your administration is likely to lose money. After you have been running your institution for at least five years and are looking to try something new, you may want to consider expanding your athletics program from one division to another. As you begin to expand, there are strategies you may want to follow.

Strategies

1. Change your admissions standards. Increase priority for enrolling student athletes. In Virtual U, you have settings that allow you to determine whether you have a "high," "medium," or "low" institutional priority for admission of student athletes. One way to improve the performance of your athletic teams is to increase your priority for student athletes to "high."
2. Increase financial aid for student athletes. This increases the number of student athletes that can attend your college.
3. Increase the Athletics Department budget. As you will see throughout Virtual U, the more money you spend on a particular department, the better it will perform. Just be careful not to overspend.

Library and Information Technology

Many of the resources for teaching and learning are found in your library. Likewise, the commitment to information technology and improving your Internet connection affects the resources your library has. Decisions you make here can affect educational quality, research productivity, faculty morale, and student morale. You want to be sure to fund your libraries and technology well. There are several ways to do this.

Strategies

1. Increase the time faculty members spend on course development. This is the way to develop distance-learning courses. If you want the money-making advantages of distance-learning and relief in class-size constraints, you must spend money here. Like many choices you make in Virtual U that involve advantages and disadvantages, increasing the time faculty members spend on course development may take time away from current course preparation, out-of-class student contact, scholarship, and research.
2. To increase the number of volumes in your library, increase funding for your library.
3. Since the library and technology are connected in Virtual U and have such an important relationship with each other, you must spend money here to improve your Internet connection. To do this, go to your Budget and increase the budget line for libraries and Internet connection. Seemingly small increases, 3% for example, may produce significant results. You should see increases in applications from distance learners, research productivity, educational quality, and faculty morale.

Old Main (Investments)

This is the location of your institution's investment portfolio and there are two screens in which you will have to make policy decisions: asset allocation and the endowment. There are several questions before you: How should you invest your money? What are the investment strategies that generate the most money? Which are the riskiest investment strategies? Ask yourself these questions as you make investment decisions.

Asset Allocation

Under asset allocation you have a choice between investing in large company stock, small company stock, and bonds. Bonds are the safest investment, but they will also show the least amount of return. Large company stocks are less stable than bonds since they are dependent on stock market fluctuations. However, they will potentially show a larger return. The least stable choice is small company stock, but this will show the greatest potential return on your investment. In short, the more volatile the stock, the more risk you take but the greater return on investment. In Virtual U, the stock market works on a randomized pattern of peaks and valleys as a means of simulating real stock market behavior.

If you are a small institution or an institution experiencing financial difficulty, you will want to make the safest investments possible. If the stock market crashes, you may not be able to absorb the hit. If you are a wealthy institution and have some money you are willing to gamble, now is the time to be more aggressive in your investment strategy.

Note:

If you play Virtual U with the primary goal of generating more money for your institution, you have focused your attention too narrowly. As president, your job is about managing multiple goals that produce multiple results.

The Endowment

Your endowment is key to the financial stability of your institution. On this screen you must decide what kind of smoothing you want and whether to increase or decrease endowment spending.

In general, more smoothing means that the “endowment spending” component of your current revenue is less impacted by stock market fluctuations. However, more smoothing will affect fluctuations in the size of the endowment, which in turn may lead to greater budget impacts later. More smoothing or less smoothing? It is a trade-off. Five-year smoothing provides more budget stability and less endowment stability than three-year smoothing. Three-year smoothing provides more endowment stability but less budget stability. Using no smoothing is probably not a good idea. However, the initial smoothing setting is zero to simplify understanding and give the player a taste of unmitigated market volatility.

The second area on this screen where you must make a decision is the endowment-spending rate. When should you increase or decrease endowment spending? You can increase the endowment-spending rate when you have a short-term need for money. Increasing the spending rate will provide an immediate source of funds for the budget, but you will pay a price later on as the endowment market value fails to grow or perhaps even declines. Investing in small-cap stocks (which have higher return but also greater risks) or increasing the fraction of incoming gifts going to the endowment may compensate for an increased spending rate to some extent.

As president, you should decrease endowment spending when you can spare the cash currently and want to grow the endowment. It is just the opposite of the above. When dealing with the endowment, you should be careful about:

- Balancing your current spending with your ability to spend in the future. The key variables here are the spending rate, the investment mix, and the fraction of new gifts going to the endowment.
- Balancing greater investment return against greater volatility. You will also need to decide how much to mitigate the effects of volatility through smoothing. Key variables are the investment mix and the smoothing rule mentioned above.

Facilities

The Facilities Office deals with the upkeep of the current facilities and the building of new ones. “Operations and maintenance” addresses current facilities. The other three areas deal with construction.

One of the troubles facing many colleges and universities is that not enough resources are devoted maintaining campus facilities. When this happens, you have deferred maintenance. Buildings that need repair aren’t repaired. For example, roof replacement may be delayed or routine servicing of mechanical equipment is not done. Deferred maintenance begins to build up if you’re not spending the minimum amount needed to maintain the number of square feet of buildings you currently have. (New construction will increase this minimum.) Once deferred maintenance becomes a pattern, it may be hard to fix. You should be aware that the figure for closing the gaps between what needs to be fixed and how much you can afford might be prohibitive.

You can track needed space versus actual space by looking at the “Space in use” graph. The “Norm” depends on the number of faculty, the number of students (other than distance learners), and expenditures for staff. For example, a decision to add faculty may need to be accomplished by extra funding to add facilities, just as in a real university. If you do not act, Virtual U goes into default mode to determine the annual spending for capital projects. You can override these defaults at any time by setting specific figures for the transfer to the capital reserve, new debt, and the flow of gifts to the facilities. New space becomes available one year after it is allocated.

Questions you should ask yourself are: How large is the deferred maintenance backlog? Do I need more buildings, and if so, how do I build them?

Strategies

1. Your first step is to assess whether you need more buildings on your campus and how well your current buildings are maintained.
2. Increase O&M budget line to avoid shortfalls and deferred maintenance backlog. O&M budget surpluses reduce deferred maintenance backlog.
3. If you decide that you need to build more facilities, there are several ways that you can pay for the new construction.
4. Allocate alumni donations to facilities. To do so takes alumni donations away from current use and the endowment
5. Increase the amount you send to the capital reserve. Capital reserve is the amount of money you divert from your budget each year to fund the construction of new ones.
6. Increase your debt limit. The debt limit is the amount of debt you are willing to carry for the construction of new facilities. This will increase space but you have to borrow the money to do so. Be careful not to overspend. Note that the financial markets impose their own debt limit. In a well-run institution, the university debt limit will be less than the market-imposed limit to allow room for additional debt in an emergency such as a fire or earthquake.

Note:

The buildings on the campus map do not change even though you are constructing new buildings.

Parking

Your institution, like any other university, has parking lots for students, staff, and faculty. However, you do not need to worry about building more parking garages or issuing parking stickers and tickets. Parking reports are made available to you, but your institution’s parking needs are taken care of by Virtual U based on a formula of supply and demand.

Note:

Urban and some suburban settings may require parking structures in addition to parking lots. Virtual U will build parking structures when required, but it will withdraw funds from the capital reserve and/or issue new debt in order to do so. (Parking lots are free in Virtual U.)

Strategy

You cannot set or change policy so there is no strategy to follow here.

Police Station (Crime)

To find out the level of crime in your institution requires that you visit the police station. There are no direct methods of solving the question of crime on campus, but it is an issue you want to monitor. Petty crime on campus will cause low morale throughout your institution. However, there are strategies available to you that will indirectly address the issue of crime.

Strategy

1. To reduce crime on your campus, spend more on Administration in your budget. (The Police Department is funded as part of your administration.)
2. You may also want to increase your spending on staff salaries.
3. It is important to note that increasing student morale numbers will not correlate into lower crime rates. Virtual U assumes that students do not commit crime, so having happier students does not affect the level of crime at your college or university.

Performance Indicators

As you play Virtual U, there are several indicators that show how well you are doing in your administration at both the departmental and institutional levels. Two of the indicators you may want to pay particular attention to are Educational Quality and Prestige. There are several ways in which you can raise your performance in these areas.

Educational Quality

If you are consistently scoring low on educational quality, it is time for you to examine the quality of teaching at your institution. Are your courses well balanced among the choices available? Do you have predominantly general courses? Are students frequently shut out of courses? The key factors in establishing good educational quality are:

- Balanced course mix
- Low number of students receive course denials
- High levels of teaching talent among faculty
- Small class size
- High faculty morale
- The amount of time faculty spends on teaching, course preparation, course development, and out-of-class conduct with students.

The easiest first step toward improving educational quality is to boost the amount of time faculty spends on the teaching-related activities mentioned above. The second step is to reduce class size.

But be careful, you don't want the balance of faculty activities or faculty morale to drop. And you must stay within class size constraints or students will be closed out of classes.

Prestige

Prestige is a measure of how your institution is perceived. There are several factors that build prestige including the faculty research talent you attract and the amount of sponsored research your institution generates. Generally, departmental and institutional prestige is gained through a successful research program. However, here you encounter a problem: research activities compete for faculty time and other resources that might not otherwise be used to improve educational quality. (Research does enhance educational quality through its contributions to intellectual prowess, but it also consumes significant resources.) In general, you need to focus on either educational quality or on building up your research program. It is important to remember "General Strategy 5: Know Who You Are." If you are a liberal arts college, you'll see more success if you play within your role. Do not try to turn a liberal arts college into a research institution and vice versa.

Conclusion

The specific purpose of this section has been to offer specific strategies for the numerous policy decisions you must make in your tenure as a college or university president. The next section will review some of the special features of Virtual U that increase difficulty of game play and it will offer strategies for each of these areas.

Part IV

Chance Cards and Random Objectives

Chance cards are incidents that happen suddenly during game play and require your immediate attention. They are in the game to simulate the unexpected happenings that all administrators must deal with during their tenure. Perfect plans or stabilized systems can go perfectly awry when a chance card hits in Virtual U.

With chance cards, your objective is to capitalize or minimize the effects of the news you receive – e.g., the football team wins an important game, there is an earthquake on campus, or the stock market plunges leaving your institution with a revenue shortfall or an endowment loss.

There are 18 chance cards in Virtual U. Some of them have obvious strategies and some do not. The goal of this section is to give you information about the chance cards that exist in Virtual U, what outcomes you should anticipate, and strategies you might employ as a result.

Note:

When you receive a chance card during game play, you are being informed of an event that has happened, not a goal you are expected to achieve. This is an important distinction. Chance cards should not be confused with Random Objectives, which are discussed later in this section.

Chance Cards

As mentioned, there are 18 chance cards in Virtual U. Many will appear only once during play – but some might repeat. Here is a complete breakdown of strategies for each one:

1. Alumnus dies

An alumnus leaves a specific amount of money to the University. This of course provides you with a nice windfall (as well as other chance cards) so you should go to the development office immediately. Given the gift's size you might adjust spending strategy for the rest of the year for alumni donations to direct that extra largess to any of the three areas donations can be sent to (endowment, current spending, or facilities). Another idea, if the budget is tight, would be to lower the development budget and redirect funds to other areas because the large gift means you are less in need if alumni donations for the time being.

2. An assault occurs on campus

This chance card creates a serious dip in morale – especially among students on campus. It also represents a need to spend more money in the next few budget cycles on administration (which includes spending on campus security). You will also need to put in extra time in raising student morale since it will take a hit during this crisis.

3. More physically challenged students require upgrading facilities

Several chance cards such as this one will affect the maintenance and facilities budget. Your only strategy is to assess the cost and effect on the deferred maintenance backlog and space in use, to see if more money needs to be appropriated to service the needs. As a short-term measure, you might visit the Development Office building and route more incoming donations to the facilities budget.

This will hurt money going to current use and the endowment somewhat, but can be an effective way to deal with unexpected budget problems concerning facilities.

4. Earthquake strikes campus – space in use drops dramatically

Like the need to upgrade facilities for physically challenged students described earlier, an earthquake is a facilities and maintenance issue – albeit a much more drastic one since it will dramatically affect the space in use in the facility. The only strategy to deal with this is to quickly get the space back in order to deal with student housing and classroom shortfalls. As with other facility issues, directing more incoming donations to the facilities budget will immediately up investment in this area. You may need to increase the transfer to the capital reserve and also the university's debt load because the size of the problem created by an earthquake.

5. Congress changes research funding policy negatively

The government is a huge funding source for university research, but cycles in Washington being what they are this source fluctuates. This chance card will cause research funding at your university to drop. Remember that research is a key contributor to your university's income so a drop in funding by Congress not only affects the amount of research your faculty will conduct but it will affect income. You probably won't notice its effect until budget time, however. Give this card a few months to play out and then assess your strategy. One thing to do is increase the amount of time faculty members spend on research. By increasing the amount of time they spend, you might make yourself more competitive for the fewer dollars that exist. You might also lower the indirect cost rate to make yourself more competitive in price. Another strategy would be to increase money for current use supplied by alumni donations to offset the short-term shortfall from reduced research funds.

6. Stock market soars or crashes

Your endowment, however well allocated, will always be at the mercy of the stock market. There is no way to time the market perfectly, so your strategy should never be to anticipate this card landing one way or the other. Instead, you need to be reactive to the card's effects and manage the short-term boost or loss it creates for you.

If the stock market soars, you might subsequently reallocate the endowment investment strategy to include more bonds for the next few years. Although while the endowment growth will slow as a result, you will lock in the gains from equity growth while protecting against a downside due to market volatility. Another strategy might be to leave the endowment investment strategy as is, but reallocate incoming donations so less money is going to the endowment and more money is going to current use and facilities for the next few years. This would represent a cash-flow bonus gained because of the stock market.

If, on the other hand, the stock market crashes, you should react by cutting the budget a bit and reallocating more money to the endowment to make up for the decrease in endowment distributions to current use. Once the market has rebounded somewhat or the endowment is growing again, you can stabilize the growth. It's important not to reallocate too much after a loss in the market. Otherwise you would lock in losses. Instead focus on tightening the belt and riding out the short-term effects.

7. Scandalous use of funds

This chance card will cause two problems. First it will cause an immediate loss of operating reserves, which will compound your problems if you are already running a deficit and have a big bank loan. You'll have to cut costs quickly if this is the case. The second problem is a shortfall in incoming donations as alumni hold back funds while they assess what the problems are. This means income for a few years might take a hit or not meet growth projections. One strategy to deal with this situation is to spend more time on recruiting donations. Work harder to win over alumni by communicating more with them. Another strategy is to focus even more on prestige issues that attract university donations. This includes winning sports programs.

8. A new governor wants to spend more on prisons and university appropriation drops (public universities only)

As the Rev. Jesse Jackson once said, "It costs more to go to jail than it does to go to Yale." With this chance card it becomes clear that your new Governor and the state legislature agree and thus they have to cut your budget so they shift more money into their crime bill to build more prison cells. There is little you can do to change the basic nature of the appropriation you get. While in the real world you could fight the political powers and increase time spent lobbying legislators, in Virtual U you must deal with the shortfall as it comes.

9. Court bans favoring admissions based on race and ethnicity (public universities only)

An affirmative action admissions policy is a staple of many universities. In Virtual U, you may decide whether your admissions policy will include favorable treatment of minorities and, in some scenarios, you are encouraged to improve the population of minorities in the student body. However, as seen in California and other jurisdictions, there is a clamor to stop such favorable treatment. Should this chance card appear, you will need to accept the court order. The result may be a drop in minority enrollment as funds and initiatives previously used to encourage minority enrollment cease. One of your few remaining strategies to increase minority enrollment is to recruit more minority faculty, which in turn may lead to grabbing more of the minority students who are still applying.

10. Risky genetic research attracts protestors who cause \$1 million in damages

Genetic research, whether it be human, animal or vegetable, is causing concern in a broad cross section of the public, and universities that are involved heavily in genetic research can be just as much a target as global multinationals and pharmaceutical companies. There's nothing you can do to mitigate the immediate problem, so you will have to live with its budget implications. Over the long run, you can cut the chance of this happening again by decreasing the pressure on faculty in the Biology Department to do research. However, this will hurt your overall research program and perhaps also the university's financial condition.

11. Your athletes took illegal drugs. Your athletic talent drops and you cannot recruit for three years. Donations fall.

In Virtual U, you cannot affect the drug problem. However, you can try to mitigate adverse effects on alumni morale by spending more on development and building university prestige in other ways.

12. A professor receives the Nobel Prize, prestige soars

As the home of a Nobel Prize winner, your university will see a considerable rise in prestige. Since prestige helps in many areas, it's probably a good time to take advantage of the bump. This might

include being more selective about incoming students or expanding the budget for alumni giving, which will be indirectly affected (positively) as a result.

13. The engineering department signs a deal to receive royalties on some technology it developed

This is a great chance card to get because it will improve funding by several millions for five full years, making it one of the biggest budget boosts you can receive in Virtual U. The best thing to do is to reallocate your budget to take care of some previously neglected or underfunded problem areas (especially deferred maintenance.) You might also increase the amount of money sent to the endowment by alumni donations. Since this money will flow into current use funds, you can reduce that allocation from alumni donations and as a result save more money to the endowment, thus increasing its value and resulting pay-out in future years.

14. You announce a capital campaign; spending on development increases

When this chance card appears, it indicates that as president you have begun a campaign to accelerate donations to the university. In so doing, you increase your development budget by some amount, and then growth in that budget is locked in at 0 for the next five years. At the same time you will see a noticeable increase in gifts to the university. You have two critical issues to deal with. First is where to direct incoming gifts. Since gifts will increase noticeably, you should consider reallocating alumni donations to the endowment, facilities needs, or current use depending on where the need is greatest. The second issue to deal with comes at the end of the five-year campaign. The game will unlock the development budget, which will allow you to regain control and either pare its growth or keep it growing as your budget needs dictate.

15. Plagiarism occurs on campus; students are dismissed and morale falls

This chance card will wreak all sorts of havoc, given the severe effect that cheating and wide-spread plagiarism can have on an institution. The first thing you need to deal with is that there will be an immediate impact on the number of students in the university. Visit the admissions department and think about increasing the number of accepted students for the coming academic year to help make up the revenue shortfall that all those expelled students will cause. More important, you need to assess and address the damage to student and faculty morale. This may mean an increase in funds for areas that tend to raise the morale of each of those groups (e.g., boosting faculty salaries, reducing teaching load, improving student housing).

16. For-profit universities are growing fast, competition for students increases, tuition hikes must be curtailed.

Raising tuition is always one of the easiest ways to push revenue up in a university, but this chance card's appearance means that competition for students won't let you do that. In real life, this would result in a budget shortfall as inflationary effects in other areas of the budget would create pressure to raise tuition to keep revenues in place. Virtual U doesn't feature inflation, so that's not as much of a problem in this simulation. However, it still means that as debt load picks up or the need to spend in other areas forces you to search for ways to increase revenue, you won't be able to get it from tuition for three years after this chance card appears. A way around this would be to increase the number of students accepted and subsequently matriculated, although you must be able to handle the increased student load or run the risk of this strategy backfiring.

17. The football team wins the national title

This is good news, but there is more for you to do here than just enjoy it. You have three tasks you need to perform simultaneously. First, you need to apply this new income to departments or facilities that will benefit most. Second, you need to capitalize on new donations (perhaps increase the budget for fundraising by 5% during these heady times). Finally as a direct result of new applications, you have an opportunity to increase student selectivity and hence increase prestige at your institution.

18. The basketball team wins the national tournament

This works in the same way as the football championship title. Keep in mind that these cards are triggered only by building a winning program. This requires plowing more money into athletics and being aggressive with recruiting.

Random Objectives

In addition to chance cards, Virtual U also features random objectives. These are events that pop up during play and outline a specific goal to achieve. If you achieve the goal in the allotted time, you will receive a specified number of bonus points.

Random objectives can be anything from increasing faculty morale overall at your institution to increasing the research performance of a specific department. For example, you might be challenged to raise faculty morale at your institution by the end of the semester or in X number of years. If you meet this deadline, extra points will be added to your score.

Each objective may be different, and specific strategies for objectives can be found by utilizing many of the specific strategies outlined earlier in this game. The difference is that with a random objective you will have a timeframe attached to achieving the goal.

Specific strategies aside, there are some basic strategies to employ for all random objectives in Virtual U:

1. Don't get sidetracked by an objective.

All objectives carry a big danger - that you will become so focused on them that many other issues that need attention will fall by the wayside. In Virtual U it's easy to become focused only on a random objective, and in an attempt to beat the clock, you may completely overcompensate toward the goal. This can include pushing the budget too far in one direction to achieve the objective, or you might let months tick by just to see if there is a positive trend toward the objective's goals while not doing anything else.

2. Determine if an objective is truly achievable in the time given.

When an objective first appears, check to see if it's even achievable--especially in the given timeframe. The biggest way to waste time with an objective is to get only halfway toward it by the end of the given period. If you think an objective is doable, pursue it--but be ready to ignore it too. Remember you are not penalized by the game or the Board for failing to achieve random objectives. And while the game will reward you if you achieve random objectives, the Board doesn't take such achievement into account.

3. Be sure you make steady progress toward an objective.

Another pitfall to consider with random objectives is that you start out on the right track making progress but not fast enough. Chart your progress toward a random objective closely (on paper

because the program will not offer any notes on progress until the deadline is up) to ensure you are on schedule to complete it. If you fall too far behind, give up and refocus on other personal or board-oriented objectives.

4. Don't forget the Board's objective either.

The true work of the year is to achieve the overall objectives that the Board defined for you, because those objectives outline the weakest performing areas for the university. Random objectives on the other hand may not be asking you to improve a weak aspect of the university.

5. Pause the game as soon as a Random Objective appears.

As soon as a random objective hits, you need to assess the possibility of achieving it. The faster you do this and set in any changes that will accomplish it the better. Thus, it pays to pause time in Virtual U immediately when a random objective hits and take the time to go around to all the necessary screens and implement your strategy.

Part V

Under the Hood: How Virtual U Works

Overview of the Drivers

Virtual U operates on seven computer modules. Knowing a little about how these modules work will help you play Virtual U and be a better university president. This section describes each of the modules that run Virtual U. Keep in mind that much of what is described below is invisible to the player. However, how well a player manages his or her institution does affect what each module does. Toward this end, it is useful to understand the manner in which the simulation is divided and the assumptions built into the game.

Virtual U's seven modules are: the Enrollment Management Module, the Faculty Hiring and Retention Module, the Academic Operations Module, the Non-Academic Operations Module, the Physical Plant Module, the Resource Allocation and Budget Module, and the Endowment Asset Allocation & Total Return Module. The following material briefly describes how each module works behind the scenes.

Module 1: Enrollment Management Module (EMM)

The Enrollment Management Module simulates the behavior of students as they choose a university to attend and the behavior of the university as it chooses students to admit. The EMM is broken into six submodules, three of which provide the actual number and descriptions of the students admitted to your university while the other three provide the actual numbers for the "universe" of other institutions. This means that Virtual U sets up and operates your university's enrollment activities based on the parameters you set at the beginning of the game. To compare how you are doing, the game also keeps track of how your institution does in comparison with all of the institutions in the database. These parallel submodules generate data for three phases of the ordinary enrollment process:

1. Application submissions
2. Admission offers
3. Matriculation decisions

In sum, the EMM calculates applications, offers, and matriculations for both your university and the universe of other colleges in the database.

How the EMM Works

The EMM runs once before each new academic year as the game progresses. This approach generates an appropriate mix of new students each year for your institution. Here's how the EMM actually works:

1. The EMM has a permanent database of student information from which it operates.
2. From this database, the EMM first determines the number of student applications for the universe of colleges and universities that can be attended. The EMM immediately takes this number and breaks it down into who applies where.

3. Next, the EMM takes these data and compares them to the policies and parameters of the player created university. It then calculates the number of applications the player-created university gets for each year the game is played.

4. From here, the EMM decides which students the player-created university will admit. This is based on the policies and parameters of the player-created university. Basically, Virtual U assigns application choices based on the type of student and types of school that would give the students the most for their dollar, e.g. financial aid, prestige, etc. This means that students send out their applications according to the likelihood of their acceptance. Are they long-shots? Likely? Shoe-ins? One of Virtual U's lessons is to internalize the idea that how you administer your institution affects student preference and, hence, demand.

How does Virtual U simulate admissions decisions? First, Virtual U does the reverse for students that it did for institutions in the applications submodule of the EMM. This means that Virtual U over-admits students, because not all students matriculate. While Virtual U automatically performs these two tasks, it also allows admissions decisions based on race and gender. However, it is the player, not Virtual U, who sets the policies concerning race and gender. The player also manipulates decisions concerning financial aid. These decisions are key to the success of the player-created university. Virtual U allows for three types of financial aid:

- Merit-based aid -- aid based on academic excellence
- Need-based aid -- aid based on the economic needs of the student
- Universal aid -- aid given to doctoral candidates.

5. Finally, the EMM simulates the behavior of students who have been accepted as they decide to matriculate or not. In effect, Virtual U simulates how the player-created institution looks to the prospective student because application and matriculation decisions are made by the students themselves. If, for example, the player-created university looks like a private generic institution, one can expect that it will draw applications from students' market segment at rates typical of that kind of institution.

In the real world and in Virtual U, there are hundreds of institutions from which potential students must choose. When playing Virtual U, your challenge is to take actions that will attract prospective students to your college or university. The policies you set should create an institution that is attractive to students. This may seem obvious, but it is the details that matter here. For example, do your financial aid policies make your institution more attractive or less? Does your institution experience a high or low level of prestige? Do you have a winning football team? Financial aid policies, institutional prestige, and athletics are factors that attract students to your college or university. And one of the central lessons in Virtual U is to get the player to think in terms of how your actions as President trigger marketplace reactions. Toward this end, focusing on enrollment management will help you understand the **great sorting** that takes place when students are selecting an institution and the institution's need to employ strategies to manage enrollments effectively.

Module 2: Faculty Hiring and Retention Module (FHRM)

As the name suggests, this module handles faculty hiring based on player policies for the type of faculty needed (see the **Faculty: Hiring** screen) and the department where the hiring is to take place

(see the **Budget Plan: Faculty Hiring** screen.) The model also handles the promotion of faculty from one rank to another (See the **Faculty: Promotion** screen), the aging of faculty, and the departure of faculty from the institution (which depends on salary, morale, and other factors).

1. The hiring model is called from the last stage of the resource allocation and budget model. It uses inputs from that screen and also the Policy screen under the Faculty: Hiring menu item.

2. The new faculty budget is converted from dollars to the total number of faculty positions available or the year. Next the budget model counts the number of faculty remaining in each department after departures have been determined. Subtracting the number of remaining faculty from the total number of budgeted faculty determines the **open to hire** number. (Players can adjust the **open to hire** number using the slider on the third-stage resource allocation screen.)

3. The hiring model creates new faculty in the departments and with the characteristics targeted by the player. The departmental targets, on the budget screen, determine where the faculty will be hired. Policies like **emphasize new blood** determine what kind of faculty will be hired (in this case, assistant professors). Some of the criteria, like **new blood** and **experience**, are mutually exclusive: emphasizing both will cancel each other out. Other criteria are not mutually exclusive: e.g., one can emphasize **new blood**, **minorities**, and **teaching talent** at the same time.

4. New faculty members will be created as part of the hiring process. The player's policies will determine a unique rank, age, talent level, gender-ethnic status, and salary level for each new individual. (These can be viewed on the Faculty: Detail screens.) The new individuals will become available for teaching and research immediately after hiring.

Module 3: Academic Operations Module (AOM)

Once students have arrived at your institution, how do they behave? What classes do they choose? What departments do they choose as their major? How do faculty members act? Do you continue to attract research sponsors? How well are your departments performing? The Academic Operations Module answers these questions by simulating four areas of the university environment at the department level. These are:

1. Behavior of students once they have reached the institution
2. Behavior of the research sponsors
3. Faculty behavior
4. Departmental performance

The AOM operates from the data contained in the EMM, the faculty roster, and other items contained in the game database and the player-created policies and parameters. The AOM has six submodules that are designed to simulate the university environment and mimic the behavior of faculty and students:

1. Student submodule

2. Course demand submodule
3. Faculty submodule
4. Course supply and teaching load submodule
5. Faculty discretionary time submodule
6. Sponsored research submodule

The results of these faculty and student simulations affect the performance of the department (and therefore your university) in four areas: quality of teaching, progress on educational development projects, the amount and quality of research, and faculty and student morale. In this simulation, players cannot directly control student behavior, but players can set policies that affect how students will react.

Here's how the AOM works:

1. The AOM model begins by simulating students' choice of major and movement toward graduation or dropout. This Student Submodule produces figures for the number of majors and undecided students in each department, and the number of graduates and other departures for each type of student at your university e.g., athletes, high achievers, low achievers, and average students.
2. Then the Course Demand Submodule determines students' course choices as a function of major and student level. At Virtual U, course supply and demand follows a simple formula. Course demand is determined by student decisions about majors and student commitment to a major. Course supply is determined by faculty decisions about what to teach. The Course Supply and Demand Submodule translates full-time students (gained by the program) by student ability and student commitment to a major into course enrollments by department, course, and semester. This is done for you by Virtual U, though you can set policies that influence financial aid and athletics. AOM admits students according to the student's department major. This means that students are either admitted to a program (e.g., master's or doctoral) or a department major (Chemistry, Communications, History, Math) or are considered undecided student status for undergraduates.

Note:

Students who have not decided on a major may move from one department to another. Migration by students to various departments depends on department prestige (which can be influenced by the player -- more research dollars, more discretionary time, more teaching training, more faculty directory). Student migration is also determined by built-in factors, i.e., national trends that are built in to the program. For example, if Chemistry is popular, then student migration is to Chemistry.

This part of the AOM simulates what happens to a student once he or she has entered the player-created university and is applied to each combination of student level and gender/ ethnic group. It calculates the proportion of existing students who graduate, drop out, and change fields. These transition rates change every year. Changes depend on external factors like national trends in graduation rates and time-to-graduation, and internal factors like departmental performance at your institution. For example, if Psychology improves educational quality while quality in Chemistry

declines, more students will transfer from Chemistry to Psychology. Psychology also will lose fewer students to other departments, fewer will drop out, and a larger fraction will graduate with diminished average time to graduation.

3. The Faculty Submodule determines the faculty resources that will be available to fulfill course demand and other departmental obligations. Working from the results of the FHRM and player policies, it determines the faculty's teaching load and the number of class sections that can be offered in response to student demand. For example, in every trimester, each faculty member is assigned a number of teaching contact hours based on the normal teaching load for his or her rank and age, academic discipline, the amount of sponsored research brought in, and your priorities for teaching as opposed to other uses for faculty time. The faculty also has preferences for class size and the mix of course types. Many faculty members may expect lecture courses with 100 or more students and seminar classes with 15-25 students, for example, but there are exceptions. Adjuncts teach more students and full professors teach less. Research professors do not teach as much as regular professors and spend more time on research programs. The research professor's work is evaluated and incentives are given for the amount of research done.

4. Working from the data on course demand and faculty availability, the Course Supply and Teaching Load Submodule generates each department's course offerings and faculty teaching assignments. At Virtual U, just like any college or university, each department requires certain courses for certain majors. Once a course is full, however, no more simulated students may enroll. Students may then choose other courses but the substitutions may diminish and may not satisfy degree requirements.

The course supply-and-demand module contains two important features of the Virtual U academic year:

1. Regular trimesters
2. Summer trimester

The regular trimesters represent the normal academic year. The summer trimester allows the player to move to year-around operation, for example. See the Courses: Summer Teaching and Technology screen.

5. The Faculty Discretionary Time Submodule simulates how faculty members allocate their time outside of direct student contact hours. At most academic institutions, faculty members generally have a significant amount of discretionary time. **Discretionary time** refers to activities other than in-class contact. It includes class preparation and grading, out-of-class student contact, research and scholarship, institutional and public service, and educational development.

6. The results from the Faculty Discretionary Time Submodule inform various departmental performance models dealing with the quality of research, and faculty and student morale. Each player will need to increase incentives to encourage faculty members to use discretionary time in a way that enhances department productivity. Extrinsic incentives stem from player-generated policies. Virtual U provides opportunities for players to describe policies that favor course preparation, student contact, educational development, research, or institutional services. Examples include statements about the criteria for gaining tenure and salary increases, use of teaching ratings,

and the volume of sponsored research expected from faculty in different categories. Some Virtual U policies will be issued at the departmental level and some at the institutional level.

7. A separate Sponsored Research Submodule determines each department's proposal and award volume. In higher education, institutions often depend on externally sponsored research to fund activities that generate prestige and contribute to fixed costs. Faculty members submit proposals for the work they would like to perform and learn if the proposals are successful. The market for sponsored research funding is highly competitive, and usually only a small fraction of submitted proposals result in awards.

Each element of the AOM runs once per trimester. The results of the AOM inform the resource allocation module, physical plant and institution-level performance modules, and the EMM when it is run for the next year. The discussion of the resource allocation module, physical plant and institution-level performance modules follows.

Module 4: Nonacademic Operations Module

The Nonacademic Operations Module includes Athletics, Libraries and Information Technology, and Development and Alumni Affairs

Athletics

1. The athletics module consists of models to determine wins and losses in football and basketball, and athletics revenues. (Expenditures are determined by the budget models, subject to some random variation.)
2. Win probabilities depend primarily on the athletic talent available in the traditional undergraduate student body (i.e., the number of star athletes and the average athletic talent of the remaining students), and on the amount of money being spent on athletics. The expenditure effect depends on the level of competition: it costs a lot more to compete successfully at the Division I level than it does in Division II. And competing in Division II costs more than competing in Division III.
3. Athletic revenues depend on the win-loss record and the level of competition. As in real life, it is difficult to break even at the Division I level and almost impossible to do so in the lower divisions.

Libraries and Information Technology

4. Spending more on libraries increases the number of books in the library, and spending more on IT improves the University's Internet connection. These two outcomes stand as surrogates for all the aspects of service in these two functions. They affect a variety of other game aspects of game behavior, in the quality of education, research, and scholarship.
5. IT performance also affects the number of courses taught using distance technology and the University's attractiveness to distance students. These variables also depend on the amount of faculty effort put into course development and the emphasis placed on using technology in teaching.

Development and Alumni Affairs

6. Spending more on this function boosts alumni morale and the volume of gifts raised by the University. These variables also are affected by a host of performance factors ranging from prestige and admissions selectivity to the current athletics record.

7. Gifts can be directed to current operations, where they turn up in the **New gifts** line in the revenue and expense statement, or to endowment or the capital reserve. How the gifts are directed has no bearing on the volume of gifts received.

Module 5: Resource Allocation and Budget Module (RABM)

Resource allocation is the central policy focus of Virtual U because the creation and distribution of resources drive most of a college's or university's functions. Here, resource allocation is the same as budgeting -- the annual process that determines tuition rates, salary guidelines, plans for increased costs, and the amount spent on academic and nonacademic operations. The Budget Module's two main outputs are your university's annual budget and capital budget. This module determines:

- Prices
- Salary guidelines
- Provisions for rising costs
- Net changes in expenditure authorizations for academic and non-academic operations.

In addition, the Resource Allocation and Budget Module (RABM) simulates several areas of the university financial environment, including: tuition, room, and board rates; student financial aid budget; projected income and inflation; allocation of funds to the various central and departmental expenditures as well as capital; additional sources of capital; capital expenditure allocations; faculty and staff salaries; faculty hiring and other related expenses; student life; fund-raising; and plant operation and maintenance.

Here's how the Resource Allocation and Budget Module works:

1. The RABM begins by defining the player-created university's financial structure -- that is, its financial resources and use of funds. This is largely determined by the player's institution selection, e.g., public or private. The resulting financial statements vary in structure and content depending on the player's choice of institutional characteristics. The statements for public institutions will include state support. Wealthy institutions will have large endowments and cash reserves; struggling colleges might have none. The financial statements provide the initial conditions for the RABM that determines revenue and expense.

2. Once the player selects and sets institutional parameters and policies and creates a university, Virtual U creates the RABM. It has three components: revenues and expenditures, allocations, and faculty functions.

3. Each spring you allocate resources for the next year. The RABM assumes accurate estimates for the current year's financial outcomes. The RABM uses the current year's figures as a baseline to project the budget adjustments that will have to be made. The player determines admissions targets as part of budgeting but deviations may occur as part of the RABM from the targets you set.

The new budget takes effect on July 1 and remains in effect for the next 12 months, unless the player decides to rescind expenditure authorizations. Actual revenues and expenditures will tend to conform to the player-created university's planned budget, but some deviations may occur. These deviations are designed to simulate the real world fact that some events remain outside of your control. The RABM uses the coming year's budget as the initial condition for the coming year's revenue and expenditure statement. Changes occur as a result of:

- Internal events: These are events that randomly occur within the university system. For example, suppose the EMM produces a shortfall or overflow of students. If this occurs, the RABM will adjust tuition dollars and financial aid flow accordingly.
- External events: These are events that randomly occur outside the university system. For example, a plunge in the stock market will produce a drop in gift income and investment return. This in turn will affect the resources available to the institution.
- Random events: Small random deviations are also programmed to affect most or all of the revenue and expense items. For more information on random events, see Part IV.

Module 6: Physical Plant Module (PPM)

The Physical Plant Module (PPM) contains all of the programs that simulate physical plant operations at the player-created university. This module deals with the buildings and grounds at Virtual U. Here the term **physical plant** is defined as all the buildings on campus except residence halls and food service. The PPM runs once per simulated year and simulates the effects of:

- Operations and maintenance decisions on building condition and depreciation.
- New construction of academic buildings and residence halls.

The PPM has five primary components of a college or university:

1. Space needs and the use of existing space. This component translates information about space requirements for each academic department, the central administrative functions, and the support functions at your university. Funding data for your institution come from the Resource Allocation and Budget Model. One of the key assumptions in this first component is that campus buildings and facilities do not last forever and must be maintained.

2. Operations & Maintenance. This component determines the yearly cost for your university's existing space needs and tracks the rise and fall of deferred maintenance. Studies show that modern academic facilities require maintenance in the order of 1% to 2% of the replacement cost of a building or facility in order to avoid building up a deferred maintenance backlog. Virtual U simulates the depreciation of buildings and facilities. Players can set policies that control the size of their institution's deferred maintenance backlog.

3. Facilities planning and construction. This component contains your university's capital reserve and plant debt, determines the level of funding for the each year's construction program, and then allocates these funds among alternative construction and conversion projects. New academic programs create demand for new facilities. Even when demand is steady, deterioration of facilities creates gaps between need and availability. In other words this component determines the funds available for closing these gaps.

4. Residence halls. This component tracks demand for residence hall space and constructs new capacity if needed or decided by the player. Following real-world practice, Virtual U treats residence halls and food service operations as an auxiliary enterprise, that is, separate from main university expenses. This means that the residence halls and food service must cover their own costs from their own revenue sources -- i.e., in this case room and board fees paid by traditional undergraduate students. (Graduate students and nontraditional students are assumed to be ineligible for campus housing.) It also sets room and board rates so that it only breaks even. Operating costs are determined as a function of occupancy and capacity.

5. Parking. While not on the Facilities screen, parking also can represent a draw on the University's capital reserves. (The parking report is accessed from the Reports list or by clicking on a parking lot or structure.) In Virtual U, parking demand depends on the total number of students, the total number of faculty, and the total budget for staff, divided by a national average staff salary. Because land is cheap, rural campuses always meet parking demand by using parking lots, which are assumed to be of negligible cost. Rural campuses are endowed with a certain number of lots, but any additional demand due to expansion probably will have to be satisfied by building expensive parking structures. Suburban campuses fall in between these extremes. The cost of structures comes from the capital reserve, which leaves less money available for constructing buildings.

Module 7: Endowment Asset Allocation and Total Return Module (ETRM)

The Endowment Asset Allocation and Total Return Module analyzes and generates output for which endowment assets should be allocated among the following asset categories: large-company stocks, small-company stocks, and bonds. Total investment return is an input to the RABM. The player decides how these assets should be allocated. Changes in asset allocation can be introduced at any time, but they will not take effect until the beginning of the next fiscal year. The player's main budget decision comes near the end of each fiscal year and takes effect at the beginning of the next fiscal year (the fiscal year runs from July 1 to June 30). By managing asset allocation, players are encouraged to learn that boosting total return -- e.g., increasing the percentage of stocks (particularly small-company stocks) -- comes at the price of increased risk.

How Virtual U's Budget Office Carries Out Your Instructions

The manual describes how Virtual U's budget office tries to carry out your instructions. You may have wondered just how that is accomplished.

Recall that your inputs include a target, the relative importance of the target (**preferences**), and acceptable upper and lower limits for each decision variable. In carrying out your directions, the budget office sets its recommended values to minimize an index equal to the weighted sum of squared deviations between these values and the targets. This index, called an **objective function** in the vernacular of modeling, uses your preferences to determine the weights. If you targeted tuition growth at 2.5% and financial aid growth at 3%, with the financial aid target being twice as important as the tuition target, the part of the objective function that deals with these variables would be $1 (\text{tuition_growth} - 2.5)^2 + 2 (\text{aid_growth} - 3.0)^2$.

In a perfect world, the budget office would be able to meet your objectives exactly: for example, by setting $\text{tuition_growth} = 2.5$ and $\text{aid_growth} = 3.0$ to produce the smallest possible objective function value, 0. But the world isn't perfect. Achieving these targets might preclude you from

achieving other targets - e.g., such as for real expenditure growth and the surplus-deficit. The model includes the accounting identities needed to make revenues and expenses add up to the surplus-deficit in the first stage of budgeting, the expenditures for each function add up to the available dollars of real expenditure growth in the second stage, and the number of faculty hires add up to the available faculty budget in the third stage. In other words, you don't have to provide the budget office with a mutually consistent set of targets: your loyal staff will impose consistency and then meet your instructions as closely as possible.

The upper and lower bounds provide you with another way to communicate with the budget staff. For example, you might say that tuition growth shouldn't go above 2.75% if at all possible. In effect, this temporarily overrides your preference weight by **penalizing** the objective function if tuition tries to go above 2.75%. (The model assesses the penalty by adding a big number times the amount by which tuition growth exceeds 2.75%.) The budget office may propose values outside your upper and lower bounds, but only if it has to in order to make things add up. If you don't like the proposal, you are free to change any of the targets, preferences, or bounds, and then re-optimize.

How Virtual U's Underlying Mathematical Engine Works

You may be wondering how the mathematical engine underlying Virtual U works. Space doesn't permit a detailed explanation here, but you are welcome to read the technical documents posted on www.virtual-u.org. The following provides a general overview of the programming approach.

Virtual U's so-called main loop drives the calendar and schedules all the activities and events embodied in the game. The game starts on September 1 of Year 1, which happens to be the beginning of the fall semester. The first thing that happens is that students decide what courses they want to take and faculty decide what courses they want to teach. (The resulting interaction between course supply and course demand determines class sizes and the number of students denied entry to courses.) So how is this accomplished?

The first thing to know is that Virtual U simulates every student and every faculty member as an individual. You can see this by looking at the faculty detail screens, where you see demographic, talent, activity, and other data for every faculty member. (Similar data are tracked for each student, but there are too many students to warrant looking at the detail.) The courses desired by each student are determined by his or her major and year in program. Virtual U contains program profile tables, which describe the numbers of introductory, intermediate, and advanced courses in each department typically taken by students in a given major. (The model is based on research by William Massy and Robert Zemsky, and the data were provided by Zemsky's team at the University of Pennsylvania.) Random numbers based on the profiles determine each student's specific course requests. Each request will be granted as long as space is available in an existing course OR a faculty member is available to teach a new course in the area desired. However, no new courses will be offered by a department once every faculty member is teaching at the maximum permissible load.

Simulating students and faculty members as individuals is not difficult in the C++ programming language used in Virtual U, and it provides a powerful benefit in terms of realism and simplicity of concept. For example, the aforementioned course selection procedure directly mimics the one actually used. Other examples include the simulation of student graduation (which occurs when a sufficient number of courses have been completed successfully) and dropout (the probabilities

increase as graduation is delayed), and faculty promotion (depends on performance and longevity) and departure (depends on morale and age). These and other student and faculty behavior patterns depend in easily understandable ways on the individual's characteristics and past behavior. Moreover, the model eliminates individuals from the population when appropriate (e.g., due to graduation or dropout) and creates new ones on demand (e.g., due to student admissions and faculty hiring). The general technique, called **micro-analytic simulation**, is a mainstay of economic and behavioral modeling.

Virtual U's other behavior patterns are modeled at the aggregate rather than the micro-analytic level. For example, the university's staff members are treated as a group - or rather as a series of groups, one for each function (e.g., administration, development office). Their behavior is modeled using "S-shaped response functions," where the middle part of the "S" is elongated so the curve always moves upward and to the right. These functions transform inputs such as salary growth, workload, and office space into behavioral indices such as morale. Actually, Virtual U employs two kinds of response functions: the single-S and the dual-S. As the name implies, the single-S produces the biggest effect in the middle of its range (where the curve slopes most strongly upward) and flattens out at the two tails. The dual-S stacks two single-S curves on top of one another so that the largest effects occur on both sides of the middle, with the middle being rather gentle. (This simulates a situation where not much happens as long as the input is near its norm, but where the effect grows with deviations from the norm before flattening again at the tails.) The S-curves provide a flexible method for the judgmental specification of behavior while ensuring that the result remains within predictable bounds. In addition to determining aggregate behavior, they also are used to modify the probabilities that drive the behavior of student and faculty members in light of Virtual U's current environment, morale, salary levels, etc.

Virtual U also makes use of a number of other mathematical techniques, some of which are quite advanced for simulation games. For example, linear programming is used for faculty hiring and in parts of the student admission process, quadratic programming is used in student admissions and as the central budgeting engine, and Poisson probability models are used to determine sponsored research proposals and awards. Rectangular (equal probability) and bell-shaped random number generators are used liberally throughout the game engine. Because of their complexity, parts of the engine were prototyped in the Mathematica programming language.

Virtual U is mostly database-driven. That is, most of the important parameters and initialization elements are stored in text files that can be modified without reprogramming. This includes the aforementioned student program profiles, student dropout, and faculty promotion probabilities, and parameters for the S-shaped functions, as well as data for determining student application and yield decisions and the characteristics of the different kinds of institutions the user can choose to simulate. (See www.virtual-u.org for more detailed descriptions of these data.) Among other things, the database-driven architecture opens the possibility of customizing Virtual U to different countries, university systems, or even institutions.

Appendix A: Virtual U Glossary

Academic Operations Module (AOM): Simulates behavior at the departmental level and generates output for student and faculty behavior.

administrative effectiveness: The measurement used to determine the effectiveness of administrative activities at the player-created institution; high values translate into high faculty, staff, and student morale; low values translate into lower morale and also increase the probability of adverse administrative outcomes (e.g., audit problems).

alumni donation: Measured in terms of the percentage of alumni who have donated in the last five years and can be used in place of the effectiveness of fund-raising efforts and alumni satisfaction.

alumni morale: The attitudes alumni have toward the institution.

asset accumulation: The degree to which the player-created institution is accumulating total assets on an inflation-adjusted basis.

assets to liabilities ratio: The degree to which the player-created institution is burdened by debt.

assistant professor: A beginning faculty member.

associate professor: The middle rank of professor.

average class size: Average, over all courses in the department or institution, of class size as appropriate to the teaching methodology (norms for classes with breakout sections are greater than those for seminars).

average teaching load: Average number of classes taught by a tenure-track faculty member.

budgeting: The annual process that determines prices, salary guidelines, provisions for cost-rise, and the amount spent on academic and nonacademic operations.

comprehensive university: One of four categories of Virtual U institutions; these are four-year colleges and universities, have low-selectivity requirements, have a large part-time student body, are for students who want a specific course rather than a degree, and have low graduation rates.

course demand submodule: A submodule of the Academic Operations Module which determines students' course choices as a function of major and student level.

course supply and teaching load submodule: A submodule of the Academic Operations Module which generates each department's course offerings and faculty teaching assignments.

departmental performance modules: Submodules of the Academic Operations Module that deal with the quality of research, and faculty and student morale.

deferred maintenance backlog: Size of the physical plant repair and maintenance that has been set aside at the player-created institution.

degrees granted: A widely used measure of educational output that indicates how many students are graduating.

departmental academic standing: The player-created institution's average academic competitiveness as opposed to the public perception of the institution.

departmental faculty members: Size of the faculty roster for each department.

development and alumni affairs: The office whereby players can increase or decrease spending on fund raising, alumni affairs and governmental relations.

deviation from long-run financial equilibrium: The degree to which the player-created institution departs from long-run financial equilibrium; equilibrium requires that the surplus/deficit and rate of change in the deferred maintenance backlog be zero, and that the growth rates of income and expense be equal.

discretionary time: Faculty activities other than in-class contact with students including class preparation and guarding, out-of-class student contact, research and scholarship, institutional and public service, and educational development.

doctoral students: Highest level of graduate student; the number and quality of doctoral students is dependent on departmental standing and the overall performance of the player-created institution.

education quality: The measurement of each department's, and ultimately the university's, success in educating students as determined by class-size, student contact hours, course mix, and library development.

Endowment Asset Allocation and Total Return Module (ETRM): This module analyzes and generates output for endowment assets that should be allocated among the following asset categories: large-company stocks, small-company stocks, and bonds.

endowment spending rate: relative to the equilibrium spending rate; for endowed institutions, indicates whether financial policies will be viable over time.

endowment spending rate: Percentage of endowment market value that can be spent each year; market value grows or declines in response to general economic conditions and the player's investment strategy.

enrollment management: Success here depends on the effectiveness of the admissions office, the financial aid office, and institutional advertising such as brochures and recruitment in attracting and keeping students.

Enrollment Management Module (EMM): This module analyzes data and generates output for three phases of the enrollment process: student applications, institutional admission offers, and student matriculation decisions; module runs before each new **academic year**.

FTE: Stands for **full-time equivalent** and represents the faculty and staff who are employed full-time.

faculty discretionary time module: A submodule of the Academic Operations Module which simulates how faculty allocate the time available over and above direct student contact hours.

faculty diversity: Success here depends on the degree to which faculty diversity goals have been met -- calculated for each faculty and gender-ethnic group, by faculty group, by gender-ethnic group, and overall.

faculty educational development time: Average number of hours per week professors spend on developing courses, including use of information technology and other nontraditional methods of instruction.

faculty expense: Increase or decrease of funds available for faculty after taking account of salary increases; translates roughly into how many faculty members the player-created institution will lose or gain.

faculty morale: The attitudes faculty have toward the institution (as opposed to attitudes toward individual departments) and is important for long-term institutional well-being.

faculty research performance: Average of research performance ratings for all regular faculty (adjunct faculty do not conduct research and are not included in the average).

faculty salaries: Faculty salaries are determined according to the priorities you set as president, with the one requirement that the sum of all salaries equals the budget.

full professor: The senior rank of professor.

faculty scholarship performance: Average of scholarship performance ratings for regular faculty members (adjuncts do no scholarship and are not included in the average).

faculty submodule: A submodule of the Academic Operations Module which determines the faculty resources that will be available to fulfill course demand and other departmental obligations; it simulates faculty hires, promotions, departures, and retentions.

faculty teaching performance: Average of teaching performance ratings for all faculty members including adjuncts.

financial aid: Money made available to students to assist with tuition expenses as well as room and board.

graduate student: A student who is pursuing a graduate or professional degree.

graduation rates: Measures the percentage of entering students who graduate by student level.

hiring: The number of new faculty hires possible is determined by the salaries offered; lower-salaried hires will increase the total number of available positions and inversely, higher salaries decrease the total number of available positions.

indirect cost rate: Overhead rate (i.e., a percentage of each grant) charged by the university for sponsored research projects; covers administration, support services, and plant operations.

information technology: Success here depends on the degree to which the information technology infrastructure supports teaching and research; this includes equipment resources, training, software, and service provision.

institutional advancement results: This is the dollar value of gift income; total gift income is divided into gifts for current use, gifts for endowment, and gifts for plant according to player-determined percentages.

intercollegiate athletics: The institution's overall effectiveness in athletic competitions; translates into wins and losses in the key sports of football and basketball (which occur in the fall and winter trimesters, respectively) -- which in turn affect morale and attitudes toward the institutions.

libraries: Measurement used to determine the degree to which library operations provide effective support for teaching and research programs; this includes both library collection development and service provision.

long-term adjunct: A faculty member who teaches one class per term over several terms but is neither a researcher nor a tenure-track professor.

matriculations: People who have been offered admission into a college or university and accept the offer.

medallion: One of four categories of institutions which includes public and private research institutions and private liberal arts institutions; these institutions have several common features: market dominance, substantial endowments in the case of the private institution, substantial state support in the case of the public institution, highly selective, and graduate a very high proportion of those who matriculate.

Non-Academic Operations Module: The Non-Academic Operations Module contains programs that simulate all operating activities of the player-created university except Academic Operations (AOM) and physical plant; four submodules: student life, resident hall operations, fund raising, and endowment management.

operations and maintenance: The physical plant and how well it is maintained; high values translate into high faculty, staff, and student morale; low values translate into lower morale and also increase the probability of adverse administrative outcomes (e.g., building and equipment malfunctions); operates through the physical plant to increase or decrease the deferred maintenance backlog.

operating budget: Money that is available to administer and maintain the player-created institution.

Physical Plant Activities Module: This module contains all of the programs which simulate the buildings and grounds at Virtual U; runs once per simulated year and simulates the effects of: operations and maintenance decisions on building condition depreciation, and new construction of academic buildings and residence halls.

preference: The four levels of preference given to the player when setting budget priorities and includes: low priority, medium priority, high priority, and required.

prestige: Measure that is used as one indicator of institutional quality but is based largely on subjective information (e.g., how talented the basketball team is).

research faculty: Faculty members who have been hired for their research skills and spend less discretionary time in education-related task; attracting research faculty is competitive and costly but can positively effect the number of sponsored research projects generated at the player-created institution.

research performance: A performance indicator that measures the aggregation of departmental research performance scores to the institutional level; high scores may result in favorable comments from the media and high placement in the government scientific research rankings.

Resource Allocation and Budget Module (RABM): This module determines: resource allocation, prices, salary guidelines, provisions for rising costs, and net changes in expenditure authorizations for academic and non-academic operations.

scholarship: The by-product of professors who create knowledge, are able to put this knowledge into larger social context, serve their academic fields and university with this knowledge, and communicate this knowledge to the student body and the general public through teaching.

sponsored research: Research projects conducted at the university but funded by groups outside of the university; reflects the success in the competition for funding, which in many fields correlates with the quantity and quality of research.

short-term adjunct: A faculty member who teaches one class per term for one or two terms but is neither a researcher nor a tenure-track professor.

smoothed surplus: Degree to which the budget tends to enhance or erode the player-created institution's financial well-being.

sponsored research submodule: A submodule of the Academic Operations Module that determines each departments' proposal and award volume.

STE: Stands for student full-time equivalent and represents the full-time undergraduate and graduate students.

staff morale: The attitudes of the employees who provide support services toward the institution.

student diversity: The percentage of students who are members of a minority.

student life: Measures the effectiveness of student life programs and student services to meet the needs of students; and includes: extracurricular activities, intramural athletics, counseling and medical care, and other services provided to students.

student morale: Measures the attitudes of students toward the institution (as opposed to attitudes toward individual departments).

student submodule: A submodule of the Academic Operations Module which produces figures for the number of majors in each department (and in an **undecided** category), and the number of graduates and other departures, for each student level.

surplus or deficit: Total revenue minus total expenditure; the bottom line of the budget; surpluses flow into the institution's operating reserve and deficits are taken from the reserve.

tenured faculty: Professors who have passed the tenure review process based on their teaching, scholarship, and research.

threshold amounts: Large sums of money at low interest rates.

top athlete: One of the student market segments and includes students who are star athletes and not members of the blue chip, scholar, and extra-curricular active categories.

transfer to plant: Percentage increase and decrease in funds transferred from the operating budget to the capital budget.

trimester: The length of time each school term lasts and is divided into three terms -- Summer, Winter, and Spring.

tuition: Cost of attending the player-created institution for one academic year.

tuition discounting: Represents the degree to which the player-created institution discounts its sticker price through financial aid.

undergraduate student: A student who is pursuing a bachelor's degree.

universe of other institutions: The average of all of the institutions in the database so that the information may be expressed as a single number.