An Investigation of Energy Consumption of 25 Universities in Measuring a Carbon Footprint Based on Carnegie Level Classification

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ABSTRACT

At various institutions of higher education all across the United States there is a substantial contribution of CO_2 emissions to the environment because of excessive amounts of energy consumption. These CO_2 emissions can be calculated by using a carbon footprint algorithm which finds the measurement of the impact of human activities on the environment as it relates to energy consumption and greenhouse gases produced. The standard of Carnegie classification will be used because of its attributes of classifying universities by undergraduate and graduate curriculum profile, enrollment profile, and the size/setting profile. This allows comparisons to be established between classification levels of Carnegie distinctions of universities.

Our team will try to find connections between energy consumption and CO_2 emissions. Our team will also evaluate amounts of emissions for a range of Carnegie Level Institutions.

Keywords

Carbon Footprint, Greenhouse Gases, Carbon Dioxide Emissions, CO_2, School Neutral, Clean Air Cool Planet, Carnegie Classifications

1. STATEMENT OF THE PROBLEM

Institutions of Higher Education across the nation emit a significant amount of CO_2 into the environment each year. Many of the colleges and universities are not aware or conscious that they are producing such an enormous amount of CO_2, with their daily, weekly and yearly actions and activities. Thus, they leave behind a carbon footprint higher than absolutely necessary.

2. INTRODUCTION

There has been a growing concern that greenhouses gases emitted into the earth's atmosphere have produced detrimental effects on the environment. The emissions of greenhouse gases have led to an increase of the earth's temperature.[1]Average global temperature has increased by almost 1ºF over the past century; scientists expect the average global temperature to increase an additional 2 to 6ºF over the next one hundred years. Dangerously high levels of greenhouse gas emissions can be lethal to humans, plants, and animals because of the changes in the earth's climate.

Scientists claim that greenhouse gases are emitted into the atmosphere through natural processes and human activities. Research has proven that an individual's activities contribute to the percentage of greenhouse gas emissions being released into the atmosphere. A carbon footprint is a representation of the effect human activities have on the climate in terms of the total amount of greenhouse gases produced (measured in units of carbon dioxide). The factors that influence a carbon footprint are electricity, natural gas and transportation usage. Each individual has a carbon footprint that is measured by his or her effects on the environment as related to energy waste and consumption.

Large centers and institutions like college campuses use large amounts of energy contributing to the emission of carbon dioxide and other greenhouse gases that accelerate the rise in temperature. Some colleges contribute to higher levels of greenhouse gas emissions than others.

2.1 Gasoline Usage

Gasoline is one of the most important fuels that is used in the United States as a type of energy for automobiles.[2]Gasoline is mostly carbon by weight, so a gallon of gas might release 5 to 6 pounds (2.5 kg) of carbon into the atmosphere. The U.S. is releasing roughly 2 billion pounds of carbon into the atmosphere each day. The gas that is being generated is one form of a greenhouse gas. The gasoline that is used produces a large amount of the C02 emissions and these emissions are used in conjunction with other factors to calculate the carbon footprint.

Transportation emissions are caused from the burning of fossils fuels like petroleum and diesel which are responsible for climate change and air pollution. Transportation is a vital aspect of an individual's life because it is convenient and time efficient as a basis for travel. Many college students use cars as a source of transportation for arrival and departure from their home institutions. Some students that commute daily use their cars for a source of transportation. Many of the commuter students do not carpool as a means of energy reduction or gasoline reduction. Buses are used as a secondary means of transportation on college and university campuses. Most college and university campuses use buses and shuttle vans to transport students around campus. Buses have a higher emission rate than cars because of the amount of gas that is needed to fuel a bus instead of a car. Thus buses cause more carbon emissions to be emitted into the atmosphere.

2.2Electricity Usage

Electricity is a source of energy that is created from coal, oil, and other natural gases. The use of electricity in the United States contributes to a large amount of greenhouse gas emissions released into the atmosphere. College and universities waste an efficient amount of electricity daily. Electricity is used in classrooms, research laboratories, offices, and buildings. Electricity is used for a source of energy to power these facilities by providing them as a source of light and a power supply source for appliances, computers, and heating/cooling. College and universities waste a large amount of electricity daily just by not properly turning off computers, lights, and appliances when they are not being used.

2.3 Natural Gas Usage

Natural gas is mainly composed of methane but also has other hydrocarbons like pentane, ethane, propane, and butane in its composition. [6] Natural gas ranks number three in energy use, behind petroleum and coal. Twenty-three percent of the energy we use in the United States comes from natural gas. On a university campus natural gas is used for many purposes such as heating for buildings, heating for water, cooking, and electricity. Natural gas contains less carbon than other fossil fuels but still produces methane emissions.

2.4 Project Aims

2.4.1 Influencing University Communities

Growing awareness of the issues associated with the increasing emission of greenhouse gases has pushed companies, organizations, and higher level institutions worldwide to implement energy saving practices. The desire to reduce individual and collective emissions has grown with more evidence showing the detrimental effects that increased levels of greenhouse gas emissions have on the environment and climate. The increase in greenhouse gases has accelerated changes in the Earth's temperature and climate affects the health of animal, plant, and human life. Each year companies and schools use increasing amounts of nonrenewable energy with disregard for its effects on the environment. The purpose of this report is to analyze the sources of these emissions at various universities and colleges in order to establish goals and identify strategies for the reduction of greenhouse gas emissions.

2.4.2 Increasing Awareness

Universities nationwide use energy in a variety of ways in order to supply students with electricity for heating and cooling, transportation, and water. With a need for universities and colleges to supply fully functioning learning environments for their faculty and staff while being environmentally conscious, it is important to find ways for schools to implement energy saving practices. Colleges are unaware of the large amounts of greenhouse gases emitted into the atmosphere due to the use of energy consumed through the use of steam, electricity, natural gas, and chilled water. Students and faculty contribute to large amounts of energy consumption unknowingly. Using energy in the dormitories, in computer labs, and in their travel to and from school, students emit carbon dioxide and other harmful greenhouse gases into the atmosphere. Faculty members use sizable

amounts of electricity to power and run computers, projectors, science labs, and lights for the classroom, and commuting to school. All universities and colleges have a distinct carbon footprint that can be measured and the measurements can be used to reduce carbon emissions in the atmosphere and increase awareness among other institutions of their carbon footprint.

With students having more knowledge about greenhouse gas emissions and their university's carbon footprint, they will make a conscious effort to use energy saving practices to improve the environment. As universities become more knowledgeable and conscious of reducing their carbon footprint, they will implement practices that save money while helping to save the environment such as switching to energy efficient light bulbs, providing shuttles for students, and installing automatic sensor switches to turn off lights when the room is not occupied. Educating college students to have a wider knowledge about carbon footprints can lead to future solutions of energy efficient practices. Students will become more conscious of their everyday activities and lifestyles by cutting back on energy usage such as turning off lights and television when exiting the room, cutting down on excess water usage, and carpooling.

The goal is to educate students and faculty about energy saving practices so that they will use them every day. With efforts to reach higher level institutions in the United States and spread awareness about the importance of reducing the amount of energy consumption and greenhouse gas emissions, these individuals will further educate younger generations. Increased awareness among universities will help in the reduction of greenhouse gas emissions produced by large institutions.

2.5What is a Carbon Calculator?

Carbon Calculators available online such as those made by School Neutral or Clean Air Cool Planet use several common factors to determine total carbon emissions. In addition to measurement of energy bought and used by an individual or organization, each calculator uses state standards related to energy for the calculations. They also take into account energy coming from renewable sources which are significantly better for the environment.

For transportation, they even take into account mileage and type of vehicle used. This is necessary because even if two cars are made by the same company, the amount of emission per mile depends on the model. Carbon calculators are useful ways to determine one's negative impact on the environment and the best ways to reduce that impact. Manipulation of the values placed into the calculator can show the best ways to reduce a carbon footprint. For example, suppose natural gas and electricity consumption are 100,000 therms and 7 million KWh per year. An organization can calculate their carbon footprint first using half as much natural gas and then again using half as much electricity. The calculations that show the lowest emission number represent the better way to reduce the carbon footprint. These are only a few uses for the carbon calculator [10].

3. METHODS TO SOLVING THE PROBLEMS

3.1 Discovery of the Variables

Several variables were factors in the study of the carbon footprint of the selected universities. The more variables used and plugged into the calculations, the more accurate and efficient the results will be in finding the amount of carbon dioxide emitted by the universities and colleges. [6]

One of the first variables needed for calculations is the state in which each particular college institution is located. The reason why this is such an important factor is, that certain states are governed differently. Each state has its own set of rules and laws on how they govern renewable and non-renewable energy consumption. Each state has its own distinct geographical location, thus exposing each university to a variety of environmental issues and sources. For instance, if a school is located near water or a dam, it might get some of its energy from hydro power as opposed to a nuclear power plant. The carbon footprint calculator that is used in this study, also take into account the fact that each state has a certain limit on electricity usage of average pounds of CO_2 per KWh.

The number of students attending each institution of higher learning is needed for calculations. For one, it is a determining factor for the classification of the Carnegie level. Also, the total number of students, whether graduate, or undergraduate was also used when calculating certain transportation data. The three main variables of computing the carbon footprint of a given college institution are natural gas, transportation, and electricity consumption. As we all know, the use of the automobile or some form of energy consuming transportation is prevalent everywhere. While calculating the transportation factors, one has to take into account that gasoline

and diesel have different burning and emissions rate. Thus, we have to separate the two. The total miles traveled by each school also must be calculated. The miles traveled by plane, train, automobile or any means transportation are taken into account into the total miles. [3, 9]

The second variable of the big three is electricity consumption. Knowing that we are dealing with a college setting, there is already an understanding that a great deal of electricity will be consumed to perform general activities of a college campus. Since tests, memos, notifications and many other documents are needed, one must use a copy machine to print all of these materials. Class rooms must be well lit, a comfortable setting must be provided for learning, so there has to be some form of central heating and cooling. Students and faculty members who choose to eat on campus will lean towards the cafeteria, where there is heating food in oven and microwave, cooking on stoves, and keeping food refrigerated. Another source of electricity consumption is the various computer labs and libraries that a campus has, where the computers are left running for extended periods of time. All of these everyday actions and routines require a great deal of electricity to be consumed.

Natural gas is the third main variable of the three. In college institutions there are three main uses for natural gases. Though electricity plays a role in heat and cooling, the use of natural gas is needed for the heating the building to desired temperatures. Like the heating and cooling systems, the cafeteria uses electricity as well as natural gas. In many kitchens, there is the use of natural gas for the cooking process. Science classes have labs everyday across the nation with some experiment or testing using a natural gas. This consumption of gas may be small in parts, but if you think about the many classes that have these labs each day, and tally them up for a year, the figures will be quite high.

3.2 Carnegie Levels

The universities and colleges selected were grouped with respect to their Carnegie level classifications. Carnegie level classifications are designed to assist researchers in studies of higher education. Universities' and colleges' Carnegie level help compare them based upon their similarities and differences. The classifications do not rank schools or exploit their differences. The Carnegie Level Classifications were created in 1970 by the Carnegie Foundation. The Carnegie Foundation's intentions were to use the classifications to compare very similar structured institutions. All accredited and degree awarding institutions of higher learning are eligible for Carnegie classification. [3]

Alterations to the Carnegie classifications were made in 2000, because in 1970 there were only about 2800 institutions of higher education. Currently there are about 4400 universities and colleges. Several factors contribute to the classification of a university or college. What is taught, to whom it is taught, and what is the setting in which it is taught are bases for classifying the institutions of higher education. [5]

The selected institutions in this research varied in classifications for which they were listed. The majority of the institutions in this research were classified as Doctoral/Research Universities and Baccalaureate Colleges. A list showing the Carnegie levels of the institutions and how the Carnegie levels are distinguished are located in the appendix.[1]

To conduct research on carbon emissions, factors that are used to classify the institutions are required. The number of students, the location, the level of research conducted and the Carnegie level classification of the institution all are important contributing factors to explaining why the carbon dioxide emissions are so large at the selected universities. [9] To make comparisons, the data from the selected universities and colleges will be grouped by their Carnegie classifications. Through this research it will determined if the factors that contribute to their Carnegie classification can also help to explain why the carbon dioxide emissions at the selected institution are so high.

3.3 Steps taken to obtain data

Research was done courtesy of the Internet to find a database that contained data from colleges that had already conducted energy consumption research. The Association for the Advancement of Sustainability in Higher Education provided a list of institutions of higher learning that had already conducted research on their respective universities' greenhouse emissions. With each addition to the list, the universities and colleges provided the data collected from their studies. To make this data available each institution supplied links to their research. [8]

There were several variables from each university that were desired. The amount of electricity used in kilowatts per hour, the number of students, the state

[1] Refer to the Appendix B to see the Carnegie Classifications levels and the institutions classifications.

of location, the amount of gasoline used in a year, the amount of diesel used in a year, the amount of natural gases used in a year, the amount of miles traveled in a year and the emissions of electricity, transportation, and natural gases in metric tonnes. These variables will all be used to make comparisons and determine whether the factors that determine their Carnegie classification also influence the size of emissions that a university or college has.

4. ANALYSIS

Figures 1.2 and 1.4 graph consumption by emission for electricity and transportation. A quick glance at the data points shows that there is likely no linear or logarithmic trend to the data. Another way to find a correlation between consumption and emission is to use a polynomial. Higher degree polynomials produce better approximations. Microsoft Excel's highest degree when calculating a polynomial trend line is six. The trend line represented in Figure 1.2 is $y = 4x10^{-10}x^6 - 3x10^{-7}x^5 + 9x10^{-5}x^4 - .011x^3 + .689x^2 - 19.14x + 212.3$. The trend line represented in Figure 1.4 is $y = -3x10^{-8}x^6 + 1x10^{-5}x^5 - .001x^4 + .081x^3 - 2.29x^2 + 29.15x - 114$.

5. RESULTS

The results of this paper show the levels of CO_2 emissions based on factors for selected universities. They also show the relationship between energy consumption and emissions totals. These results will be displayed in the following charts.

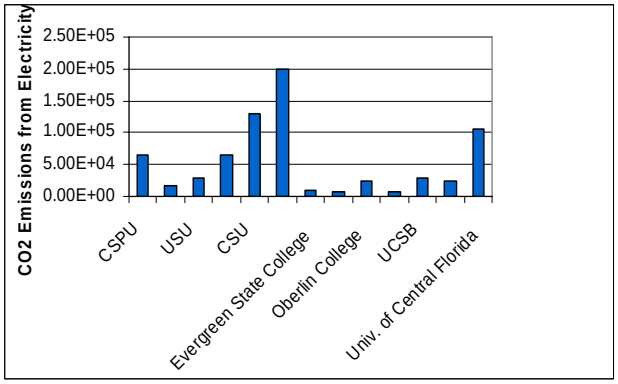


Figure 1.1 This chart displays the CO_2 emissions produced by colleges as a result of electricity consumption.

According to the data, three of thirteen colleges have carbon emissions levels below 9,000 tons. Rice University, Evergreen State College and Middlebury College have the lowest emission numbers. Duke University had the highest carbon emissions out of the thirteen colleges/universities selected.

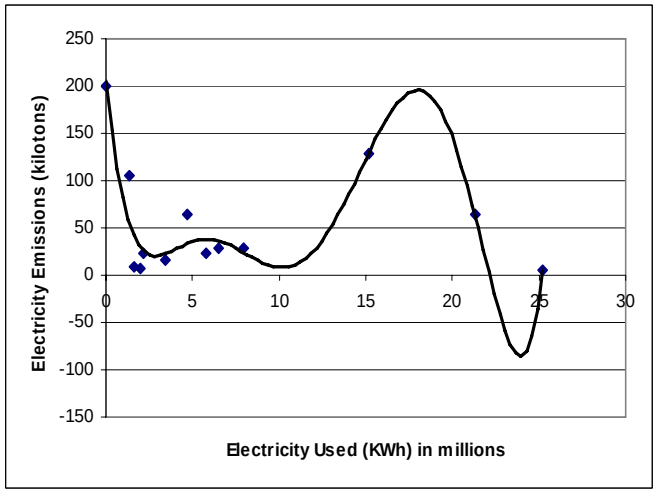
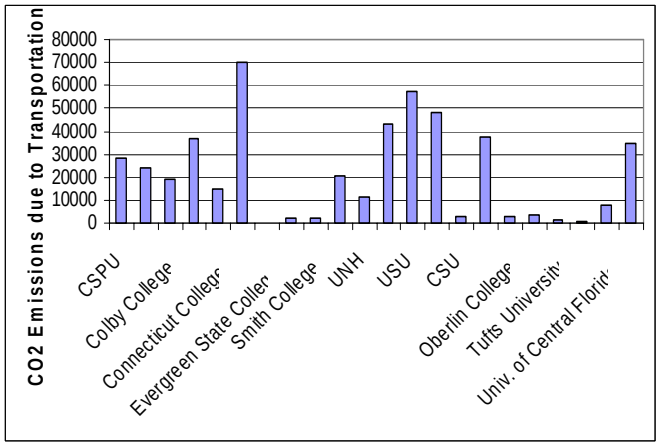


Figure 1.2 This chart displays the electricity emissions produced for a given amount of electricity used by colleges and universities.

The spread of data points in Figure 1.2 shows that there is not a set pattern for electricity used versus CO_2 emissions. We can conclude that there must be factors other than electricity usage that influence the total amount of electricity emissions. The trend line calculated in Excel is a polynomial and is the best fit line for this graph. This trend line has inaccuracies in the values ranging from twenty to twenty five where the polynomial gives negative emissions value.



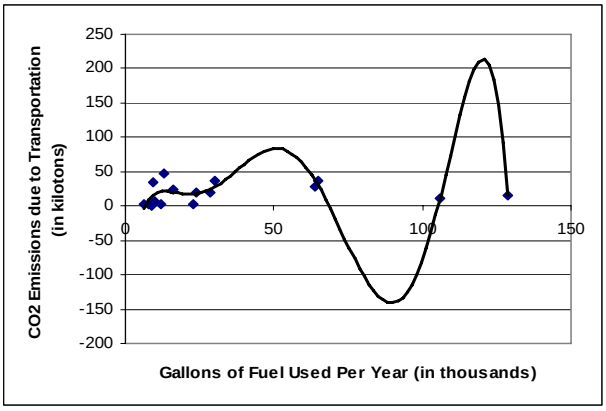


Figure 1.4 The data points on this chart display the transportation emissions produced for a given amount of fuel used per year by colleges and universities.

Similar to the curve of Figure 1.2 the best fit equation relating the gallons of fuel used and transportation emissions is calculated to be a sixth degree polynomial. However, again the polynomial is inaccurate because it gives negative emission values for some values of fuel consumption.

The following graphs relate the Carnegie levels of included universities to the amount of CO_2 emissions they produce. In Figure 1.5, the Carnegie Levels 16, 21, and 32 are significantly underrepresented in the number of colleges as compared to the other represented levels. The average total emissions of levels 15 and 16 are similar and level 32 is drastically lower than all other levels. The graph relating Carnegie classification and natural gas emissions shows that level 15 has approximately 16 thousand tons more emitted per year than the other Carnegie level represented. The natural gas data was not available for schools in level 32.

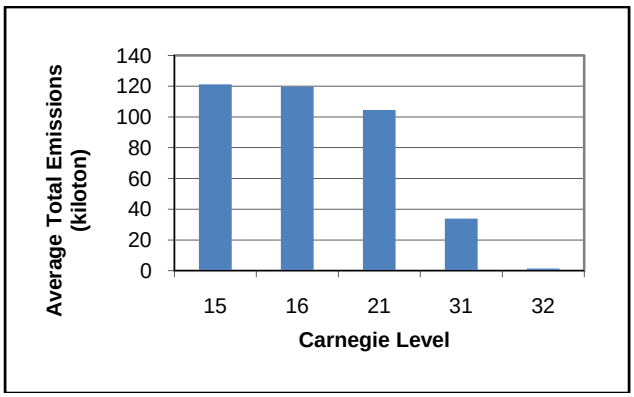


Figure 1.5 This graph shows the average total CO_2 emissions at each represented Carnegie Level.

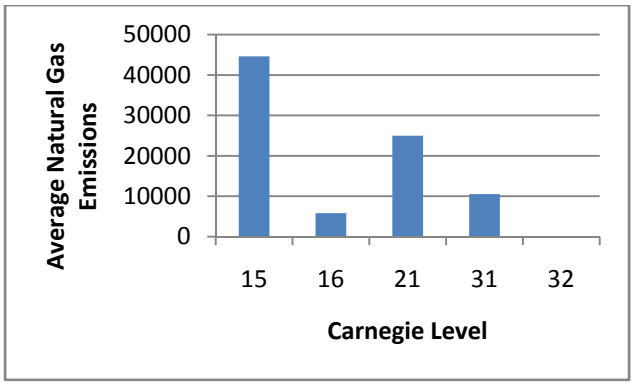


Figure 1.6 This graph shows average natural gas emissions per Carnegie level.

6. CONCLUSIONS

Carbon footprint is a representation of the effect of human activities. Electricity, natural gas, and transportation usage are three main factors that tie into ones carbon footprint. College and universities across the nation emit a large amount of CO_2 into the environment every day. Most institutions are not even conscious of the quantity of their emissions. We noticed that the upper level Carnegie level institutions had the highest total amount of CO_2 emission. This is mainly because there are more people, and there is more research going on that requires a great deal of resources.

Even at schools which have larger student populations, there are many ways to reduce a carbon footprint. Installing automatic lights and energy saving bulbs is a simple way to waste less energy. Students and faculty alike can practice energy saving practices such as enjoying shorter showers, not printing excessively in computer labs, and using school shuttles or public transportation instead of driving short distances or carpooling to campus. They can also unplug electric devices and appliances when not in use and prominently place recycle bins around campus. Finally, an important way to reduce wasteful energy usage is setting appropriate temperatures on thermostats and making the most of heat/air by keeping building insulation up to date and using fans instead of central air whenever possible.

The instrument used to calculate the emissions was very useful and impressive. There are some restrictions and inflexibility in the software, however, useful results were obtained. As the knowledge of this subject and the awareness of the general citizens increases, we may expect better and more

efficient calculators and instruments to be introduced.

7. FUTURE WORK

There is much that can be done to improve this research. The five main ideas that have been brought to attention are:

- Provide a more flexible, but extensive carbon calculator, to provide an even higher efficiency.
- Form a live supported database with information necessary for calculation of carbon footprint for every college and university.
- Find better correlation of Carnegie levels and CO_2 emissions.
- Determine which factors would be sufficient to achieve the greatest reduction in carbon emission.
- Tie in an Arima model and SVM, to give institutions a look at what could be in a future time span at their current rate.

8. ACKNOWLEDGEMENTS

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Appendix A

Year: Year data is collected in

Students: Number of students enrolled (required for some carbon calculators)

Elec.: kWh of electricity used

Mileage: total miles covered in transportation to or from the school

Gasoline: gallons of gasoline consumed

Diesel: Gallons of diesel fuel consumed

Nat. Gas: amount of natural gas consumed (mmBtu)

Elec. Em.: Tons of CO_2 emissions due to electricity

Trans. Em: Tons of CO_2 emissions due to transportation

Gas Em.: Tons of CO_2 emissions due to natural gas usage

CLC: Carnegie Level Classification for 2000

Figure 1.2

School	Elec.	Elec. Em.
CSPU	4.70E+07	6.40E+04
UIC	34113000	16072
USU	65257723	28693
UC Berkeley	2.13E+08	65000
CSU	1.52E+08	128740
Duke University	375903	200000
Evergreen State College	16459000	8954
Middlebury College	19915255	8000
Oberlin College	21664988	23703
Rice University	2.52E+08	6100
UCSB	79133909	28941
UNH	58103616	23913
Univ. of Central Florida	13671016	105950

Figure 1.4

School	Trans. Gallons	Trans. Em.
CSPU	6.40E+04	28000
Carleton College	1.61E+04	24000
Colby College	2.88E+04	19000
College of Charleston	6.52E+04	37000
Connecticut College	1.29E+05	15000
Yale University	9.10E+03	34904
Evergreen State College	8.97E+03	292
Middlebury College	8.02E+03	2.00E+03
Smith College	6.35E+03	2.00E+03
UCSB	2.40E+04	20436
UNH	1.06E+05	11615
UC Berkeley	1.30E+04	48000
CSU	2.30E+04	2816
Harvard	3.00E+04	37324
Oberlin College	1.20E+04	2919
Univ. of Central Florida	1.00E+04	7928

Consumption and Emissions Data:

School Name	Year	State	Student	Elec.	Mileage	Gasoline	Diesel	Nat. Gas	Elec. Em.	Trans. Em.	Gas Em.	CLC
CSPU	2005	CA	28000	4.70E+07				2.10E+05	64000	28000	11000	21
Carleton College	2004	MN	1966						13000	24000	22000	31
Colby College	2003	MA	1700						23000	19000	6000	31
College of Charleston	2001	SC	11332						30000	37000	39000	21
Connecticut College	2002	CT	1905						12000	15000	13000	31
Duke University	2003	NC	14075	375903		2.00E+05	190000		200000	70000	80000	15
Evergreen State College	2007	WA	4470	16459000	31790	25550	6240	115753	8954	292	6135	31
Middlebury College	2000	VT	2406	19915255	9970000	70221	71520	560712	8000	2000	7000	31
Pomona College	2007	CA	1550	2.30E+07				130000				31
Smith College	2007	MA	3113						10000	2000	15000	31
UCSB	2004	CA	20347	79133909	14423984	107490	6200	304315	28941	20436	16112	15
UNH	2005	NH	13165	58103616	2704756	148230	13014	82604	23913	11615	32562	15
UIC	2006	IL	13148	34113000				163105	16072	43271	163105	15
USU	2007	UT	18337	65257723	41324782	3799196	194910	60639	28693	57233	30753	15
UC Berkeley	2005	CA	23482	2.13E+08	2293064	100650	3390	238879	65000	48000	13000	15
CSU	2007	CO	26884	1.52E+08	16610943	251947	19718	2732810	128740	2816	16137	15
Harvard	2007	MA	6715			520000	10139		94174	37324	47127	15
Oberlin College	2000	OH	2762	21664988					23703	2919	4645	31
Penn. State	1999	PA	43048		200371							15
Rice University	1998	TX	5213	2.52E+08					6100	3400	2800	15
Tufts University	1998	MA	8058						9100	1500		15
Unity College	2006	ME	552						434.45	1043.36		32
Univ. of Central Florida	2007	FL	48000	13671016				895187	105950	7928	5837	16
Yale University	2005	CT	10206							34904		15
Lewis and Clark College	2003	OR	1960	15493177		9797			14209462	15212892	6745818	31

Appendix B

The 2000 Carnegie Classification includes all colleges and universities in the United States that are degree-granting and accredited by an agency recognized by the U.S. Secretary of Education. The 2000 edition classifies institutions based on their degree-granting activities from 1995-96 through 1997-98.

Doctorate-granting institutions

Doctoral/Research Universities—Extensive: These institutions typically offer a wide range of Baccalaureate programs and they are committed to graduate education through the doctorate. During the period studied, they awarded 50 or more doctoral degrees[1] per year across at least 15 disciplines.[3]

Doctoral/Research Universities—Intensive: These institutions typically offer a wide range of Baccalaureate programs and they are committed to graduate education through the doctorate. During the period studied, they awarded at least ten doctoral degrees[1] per year across three or more disciplines,[2] or at least 20 doctoral degrees per year overall.

Master's Colleges and Universities

Master's Colleges and Universities I: These institutions typically offer a wide range of baccalaureate programs, and they are committed to graduate education through the master's During the period studied, they awarded 40 or more master's degrees per year across three or more disciplines.[2]

Master's Colleges and Universities II: These institutions typically offer a wide range of baccalaureate programs, and they are committed to graduate education through the master's degree. During the period studied, they awarded 20 or more master's degrees per year.

Baccalaureate Colleges

Baccalaureate Colleges—Liberal Arts: These institutions are primarily undergraduate colleges with major emphasis on baccalaureate programs. During the period studied, they awarded at least half of their baccalaureate degrees in liberal arts fields.[3]

Baccalaureate Colleges—General: These institutions are primarily undergraduate colleges with major emphasis on baccalaureate programs. During the period studied, they awarded less than half of their baccalaureate degrees in liberal arts fields.[3]

Baccalaureate/Associate's Colleges: These institutions are undergraduate colleges where the majority of conferrals are at the subbaccalaureate level (associate's degrees and certificates). During the period studied, bachelor's degrees accounted for at least ten percent but less than half of all undergraduate awards.

Associate's Colleges

These institutions offer associate's degree and certificate programs but, with few exceptions, award no baccalaureate degrees.[4] This group includes institutions where, during the period studied, bachelor's degrees represented less than 10 percent of all undergraduate awards.

Specialized Institutions

These institutions offer degrees ranging from the bachelor's to the doctorate, and typically

award a majority of degrees in a single field. The list includes only institutions that are listed as separate campuses in the *Higher Education Directory.* Specialized institutions include:

Theological seminaries and other specialized faith-related institutions: These institutions primarily offer religious instruction or train members of the clergy.

Medical schools and medical centers: These institutions award most of their professional degrees in medicine. In some instances, they include other health professions programs, such as dentistry, pharmacy, or nursing.

Other separate health profession schools: These institutions award most of their degrees in such fields as chiropractic, nursing, pharmacy, or podiatry.

Schools of engineering and technology: These institutions award most of their bachelor's or graduate degrees in technical fields of study.

Schools of business and management: These institutions award most of their bachelor's or graduate degrees in business or business-related programs.

Schools of art, music, and design: These institutions award most of their bachelor's or graduate degrees in art, music, design, architecture, or some combination of such fields.

Schools of law: These institutions award most of their degrees in law.

Teachers colleges: These institutions award most of their bachelor's or graduate degrees in education or education-related fields.

Other specialized institutions: Institutions in this category include graduate centers, maritime academies, military institutes, and institutions that do not fit any other classification category.

Tribal Colleges and Universities

These colleges are, with few exceptions, tribally controlled and located on reservations. They are all members of the American Indian Higher Education Consortium.

2000 Carnegie Classifications

Values (In Database)	Carnegie Classifications
15	Doctoral/Research Universities—Extensive(Level 1)
16	Doctoral/Research Universities—Intensive(Level 2)
21	Master's Colleges and Universities I(Level 3)
22	Master's Colleges and Universities II (Level 4)
31	Baccalaureate Colleges—Liberal Arts (Level 5)
32	Baccalaureate Colleges—General (Level 6)
33	Baccalaureate/Associate's Colleges (Level 7)
40	Associate's Colleges (Level 8)
51	Specialized Institutions—Theological seminaries and other specialized faith-related institutions (Level 9)
52	Specialized Institutions—Medical schools and medical centers (Level 10)
53	Specialized Institutions—Other separate health profession schools (Level 11)
54	Specialized Institutions—Schools of engineering and technology (Level 12)
55	Specialized Institutions—Schools of business and management (Level 13)
56	Specialized Institutions—Schools of art, music, and design (Level 14)
57	Specialized Institutions—Schools of law (Level 15)
58	Specialized Institutions—Teachers colleges (Level 16)
59	Specialized Institutions—Other specialized institutions (Level 17)
60	Tribal colleges and universities (Level 18)

2000 Carnegie Classification

Category	Frequency	Percent
Doctoral/Research Universities—Extensive	151	3.8
Doctoral/Research Universities—Intensive	110	2.8
Master's Colleges and Universities I	496	12.6
Master's Colleges and Universities II	115	2.9
Baccalaureate Colleges—Liberal Arts	228	5.8
Baccalaureate Colleges—General	321	8.1
Baccalaureate/Associate's Colleges	57	1.4
Associate's Colleges	1,669	42.3
Specialized Institutions	766	19.4
Tribal Colleges and Universities	28	0.7
Total	3,941	100.0