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ABSTRACT

This paper explores the use of technology in teaching business topics at the university level. The use of technologies in the classroom has been developed in a greater degree for non-business disciplines. Specific software programs are listed as well as business games. Finally, a listing of external funding sources is presented to assist in financing technological innovations which cannot be funded from the usual university sources. Included in the appendices are computer and high technology grants and foundations which emphasize education. (Contains 4 references.) (Author/JLB)

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Technology in the Classroom: Current Developments and How They can be Funded

1993

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Abstract

This article explores the, relatively, sparse use of technology in teaching business topics at the university level. The differences in availability of business software as compared to scientific software are observed. Sources of business-related software are listed. An analysis of the leading business games is presented which enables a potential user to choose the game best suited for the topics to be covered. Finally, a listing of external funding sources is presented to assist in financing technological innovations which cannot be funded from the usual university sources.

Technology in the Classroom:**Current Developments and how They Can Be Funded****History of Technology in the Classroom**

"The history of technology in education has not been a stellar one," was an observation made by Bruce Goldberg, Associate Director of the Educational Issues Department of the National Education Association (Business Week, Information Processing, p. 158). Such a comment seems to be at variance with what had been expected of the role of technology in education if technology is viewed in its usual way.

The usual view of technology is that of innovation in the context of high technology. In today's world, it normally has at least some reference to computers and/or other forms of applied science. However, technology, in a pure sense, does not have to refer to "new" technology but can refer to technology of any vintage.

For instance, chalk, blackboards, books, pencils, writing pens, overhead projectors, etc. are applications of technology and were new technology at the time of their introduction. They had a tremendous impact on the

teaching/learning process and are still in widespread use. In fact they continue to serve as the main foundation of much of what is done in education. Their impact on the learning process has been so profound that one could spend a great deal of time on its examination, but the readers of this paper are already familiar with it. Consequently, the rest of this paper will be devoted to the current uses and future applications of technology in hopes of improving its contribution to the teaching/learning process.

Current State of the use of Technology in the Classroom

If the impact of technology has been less than stellar in the past (and some would argue currently), some of the reasons may have been (Ehrhardt, 1988, p. 15):

1. The limited types of technological developments.
2. The limited nature of many academic disciplines.
3. The limited training of university faculty.

When one thinks of technological developments, one immediately thinks of various

imaging devices (that do not manipulate symbols) such as projectors (movie and still), television sets, and video cassette recorders/players.

Beyond this point one would think of computers and their various applications. Many people would have trouble naming additional devices without considerable thought. Consequently, one might speculate that the developments, or at least the limited knowledge of the developments, has played a role in their impact.

The second basic reason shown above may have been influenced by the popularity of the functional delineation of academic disciplines and of the lecture format. As courses become more nearly interdisciplinary in nature, this may change. Collaborative learning experiences may also have an impact. However, up to this point in time, the limited nature of many academic disciplines does seem to have been an influencing factor.

The third reason, the limited training of university faculty, seems to have clearly been a factor. The reward system under which faculty work has not encouraged them to invest time and

effort in innovative teaching activities that require additional training for the faculty member.

The current state of the usage of technology in the classroom seems to have developed to a greater degree for nonbusiness disciplines than for business disciplines. For example, the Spring 1992 Intellimation catalog (a listing of educational software for Macintosh computers) although showing numerous packages for the arts, sciences, and education areas did not even have a business category in its table of contents. Similarly, the following services (with a brief description of each) available through the National Aeronautics and Space Administration (NASA) are, primarily scientific in nature (Barnes, 1992).

NASA News: This service gives a day-to-day update on launches and progress in shuttle missions.

NASA Spacelink: This service gives history, current news, and information relative to the future of NASA and space flight. It also provides information on curricula

materials and technology transfer. The information is provided by the Marshall Space Flight Center.

Space FAQs: This service provides fifteen lists of frequently asked questions, information on tidal bulges, information on interpreting satellite weather photographs, databases on constellations, and nearby stars.

SpaceMet: This is a bulletin-board system which is useful to science educators for exchanging information about space exploration.

Astronomical Databases: This service provides information on astronomical objects.

Lunar and Planetary Institute Information: This service provides information about NASA's Lunar and Planetary Institute and its services.

NASA/IPAC Extragalactic Database: This service contains information on over 200,000 astronomical objects including publications.

National Space Science Data Center: This service allows one to connect to other NASA database catalogs and centers.

Space Telescope Science Institute: This service contains information about the Hubble Space Telescope and the Institute.

One can easily see from the descriptions shown above that a science teacher has ready access through technology to state of-the-art information about technology. Similarly, the Intellimation catalog makes information (programs etc.) available in many other educational areas.

Unfortunately, information, programs, applications, etc. have not been as readily available in the area of business. This has probably been an influencing factor in the slowness with which business education has moved to use high technology in the classroom. If one examines the uses of technology in business courses, he/she will certainly find widespread use of the older technologies such as movies and overhead projectors. The use of later technologies has largely been limited to word processing, spread sheet applications, and the use

of computerized statistical packages. There has been limited use of business games and video taping of student presentations.

Certain factors seem to be at work which will encourage a greater emphasis on the use of technology in colleges of business in the future. Some of these factors are:

1. The current criticism of business schools for not putting enough emphasis on teaching.
2. Budgetary constraints which will limit the number of faculty members available to teach classes resulting in larger class sizes.
3. The need to provide educational services at remote locations.
4. The need to involve students in team projects.
5. The need for a greater emphasis on international business topics.

The application of computer technology through the use of business-related software packages and business games (particularly those

with an international emphasis) can make a significant contribution in these areas.

Obviously, one would be in a better position to select the type of application that would offer the greatest benefit in a given set of circumstances if he/she were well informed relative to the types of programs/packages available. Two categories of available software are discussed below.

Software Sources

Presumably one could start using computer-related technology in the classroom earlier if he/she had an easily accessible source of software as distinguished from having to write his/her own. A number of programs which may be helpful are available from the University of Wisconsin--Madison. Those specifically related to business are:

1. FABRIC, which is a set of tutorials designed for use in basic accounting.
2. FEASIBILITY STUDY, which is related to the preparation of a feasibility study.
3. FUTURE-TIME, which is related to time-series forecasting.

4. HEDGESIM, which simulates commodity marketing and hedging.
5. INTERNATIONAL MANUFACTURING COST COMPARISON, which relates to make-or-buy decisions in an international market.
6. LOT, which relates to lot-sizing decisions.
7. MARKET, which relates to a segmented housing market with random investments.
8. POP, which relates to the optimization of profit for multi-use real estate projects.
9. POWER, which relates to organizational and personal power.
10. PURCHASING MODEL, which relates to the simulation of firm that purchases and sells a particular part.
11. SONATA, which relates to financial analysis and strategic financial planning within a firm.
12. VAL, which relates to security valuation and the management of investment portfolios.

13. ZTEST, which relates to the various uses of the statistic "Z."

Detailed information on these packages is available from the Academic Computing Center, University of Wisconsin-Madison, 1210 West Dayton Street, Madison, Wisconsin 53706.

Another opportunity to use technology in a business setting is the use of business games. Games will help with the integration of the various disciplines, enhance team building, and, if international in focus, help globalize the students' orientation.

Some of the more widely used international games are:

1. Worldwide Simulation Exercise (Barker, Temple, & Sloan, 1988)--WISE.
2. Multinational Management Game (Keys, Edge, & Wells, 1991)--MMG.
3. International Operations Simulation (Thorelli, Graves, & Howells, 1964) and INTOP Classic PC (Thorelli & Graves, 1989)--INTOP.
4. Thunderbird International Management Simulation (Hoskins, 1989)--TIMS.

5. Stratplan (Hinton & Smith, 1985)--SPLAN.
6. The Business Strategy Game (Thompson & Stappenbeck, 1990)--BSG.

How well a particular game meets the needs of today's students is, at least partially, dependent on how well it addresses issues that are critical to the international environment. These issues were examined by Professor Joseph Wolfe of the University of Tulsa and are presented in Table 1 (Wolfe, 1991). The rankings used in the table are:

- 0 Critical issue was not treated in the game.
- 1 Critical issue was treated but in a static or fixed fashion throughout the simulation's run; a minimal treatment of the critical issue.
- 2 Critical issue was treated and could be influenced exogenously by administrative intervention during the simulation's run; a moderate treatment of the issue.
- 3 Critical issue was treated in a dynamic fashion both exogenously through administrative action or using a real-

world indicator, and endogenously through player interactions with the simulations model or other simulated companies; a completely elaborated treatment of the issue.

Insert TABLE 1 about here

Most of these games will run on mainframe or personal computer platforms and are, therefore, not sensitive to hardware requirements. Professor Wolfe's work in analyzing these games should be very useful in helping potential users select the games best suited to their needs. Once one decides to institute a greater use of technology in the classroom, the issues of how to finance the purchase of additional hardware and software in a time of declining university budgets must be considered.

Funding Sources

Most state supported universities have only three basic sources of revenue: state appropriations, tuition, and fund raising. The current economic environment, which is expected to continue throughout the 1990s, does not offer much

hope of increased state funding. Further, there seems to be limits on how high tuition can go. Consequently, fund raising seems to hold more promise for the financing of technological improvements than the other two sources.

Because fund raising seems to be the most viable source of financing, a search was conducted to identify organizations that place a high priority on the support of educational institutions. The results of that search are presented in Appendix A classified by support for educational institutions, buildings and equipment, and technology. Hopefully, this information will make it easier for schools implementing more technology in the classroom to secure the necessary financing.

Conclusion

Although the use of technology in the classroom has progressed at a pace slower than many would desire, there is significant material available to accelerate that pace. The use of this material (or that that faculty members may write themselves) will also aid in the delivery of educational services to remote locations, enhance

the development of teamwork skills, address international issues, and aid in the teaching of large sections. Obviously, the funding issue will have to be addressed, but the prospects for external funding are reasonably good. Other problems, such as changing faculty evaluation criteria to appropriately reward those who work on this problem, although still present can, hopefully, be overcome in light of the increasing pressure on colleges of business to increase their emphasis on teaching. Management education will, no doubt, respond to the needs of the 1990s as it has in the past by overcoming whatever obstacles are in its path.

References

- Barnes, James L., The Space and Technology Education Connection for Middle School Education, The lists and descriptions were taken from a report given on November 9, 1992, by Professor Barnes on work accomplished up to that time on a research project relating to technology in education. 1992, pp. 6-8.
- Business Week, Information Processing, November 11, 1991, pp. 158-162.
- Ehrhardt, Michael C., "Technology in the Classroom: Are We Using It to Our Best Advantage?," Reproduced in Survey of Business, Fall 1988, pp. 15-18.
- Wolfe, Joseph, Information shared with the author by Professor Wolfe which is based on an analysis of the games examined.

Table 1

Critical Issue Comparisons

Critical Issue	INTOP	TIMS	MMG
Comparative Advantage	1	1	2
Differential Inflation	3	2	1
Economic Growth/Development	1	2	3
Trade Protectionism	2	2	1
Sociocultural Factors	2	0	2
Intracompany Trans. Pricing	2	2	2
Technological Transfer	0	0	0
Consol. Fin. Statements	2	3	3
Imperfect Competition	3	2	1
Nationalism and Visibility	1	1	0
Direct Foreign Investment	3	3	3
Exchange Gains and Losses	0	2	0
Hedging	0	3	0
Exchange Rates	0	3	2
Offshore Sourcing	1	3	1
Political Risks	0	2	0
Value-Added Taxes	0	0	1
Income Taxes	1	2	1
Patent/License Agreements	2	0	0
Totals	24	33	23

Critical Issue	WISE	SPLAN	BSG
Comparative Advantage	2	2	2
Differential Inflation	2	0	0
Economic Growth/Development	2	1	2
Trade Protectionism	1	0	3
Sociocultural Factors	1	1	0
Intracompany Trans. Pricing	3	1	0
Technological Transfer	0	0	0
Consol. Fin. Statements	3	3	3
Imperfect Competition	3	2	1
Nationalism and Visibility	0	0	0
Direct Foreign Investment	3	3	3
Exchange Gains and Losses	2	0	2
Hedging	2	0	0
Exchange Rates	2	2	2
Offshore Sourcing	2	1	2
Political Risks	0	0	0
Value-Added Taxes	2	0	0
Income Taxes	1	2	1
Patent/License Agreements	0	0	0
Totals	31	18	21

APPENDIX A
COMPUTER AND HIGH TECHNOLOGY GRANTS

COMPUTER AND HIGH TECHNOLOGY GRANTS

1. Aldus Corporation

411 First Avenue South, Suite 200
Seattle, WA 98104
Contact : Corporate Contributions Dept.

2. Apple Computer, Inc.

20525 Mariani Avenue MS : 38J
Cupertino, CA 95014
Contact : Community Affairs Dept.

3. Gifts In Kind

700 N. Fairfax Street, Suite 300
Alexandria, VA 22314
Tel : (703) 836-2121
FAX : (703) 549-1481

4. IBM Corporation

2000 Purchase Street
Purchase, NY 10577

**5. National Association for the Exchange of
Industrial Resources**

P. O. Box 8076
Galesburg, IL 61402

6. Tandy Corporation

1800 One Tandy Center
P. O. Box 17180
Fort Worth, TX 76102

7. United Way

Consult Local Tel. Directory for United Way
Regional Office

APPENDIX B
FOUNDATIONS WHICH EMPHASIZE EDUCATION

FOUNDATIONS WHICH EMPHASIZE EDUCATION

1. **Anderson Foundation**
Tel : (612) 439-5150
EIN : 416-020-920
2. **Anderson (Hugh J.) Foundation**
Tel : (612) 439-1557
EIN : 416-020-914
3. **Baker (George F.) Trust**
Tel : (212) 755-1890
EIN : 136-056-818
4. **Baker (R. C.) Foundation**
Tel : (714) 750-8987
EIN : 951-742-283
5. **Balfour (L. G.) Foundation**
Tel : (617) 573-6415
EIN : 046-397-138
6. **Bay Foundation**
Tel : (212) 509-7337
EIN : 135-646-283
7. **Bingham (William) Foundation**
Tel : (216) 781-3275
EIN : 346-513-791
8. **Blum-Kovler Foundation**
Tel : (312) 664-5050
EIN : 362-476-143
9. **Coleman Foundation**
Tel : (312) 243-2700
FAX : (312) 243-5504
EIN : 363-025-967
10. **Commonwealth Fund**
Tel : (212) 535-0400
EIN : 131-635-260

- 11. Crown (Arie and Ida) Memorial**
Tel : (312) 236-6300
FAX : (312) 899-5039
EIN : 366-076-088
- 12. Davis (Edwin W. and Catherine M.)
Foundation**
Tel : (612) 228-0935
EIN : 416-012-064
- 13. Davis (Shelby Cullom) Foundation**
Tel : (212) 425-3212
EIN : 136-165-382
- 14. Delany (Beatrice P.) Charitable Trust**
Tel : (212) 730-3093
EIN : 136-748-171
- 15. Dow (Herbert H. and Grace A.)
Foundation**
Tel : (517) 631-3699
FAX : (517) 631- 0675
EIN : 381-437-485
- 16. Educational Foundation of Americ**
Tel : (818) 999-0921
EIN : 136-147-947
- 17. El Pomar Foundation**
Tel : (719) 633-7733
FAX : (719) 577-5702
EIN : 846-003-273
- 18. Ford Foundation**
Tel : (212) 573 - 5000
FAX : (212) 599 - 4584
EIN : 131-684-331
- 19. Ford (Henry) II Fund**
Tel : (313) 259-7777
EIN : 386-066-332
- 20 Ford (Walter and Josephine) Fund**
Tel : (313) 259-7777
EIN : 386-066-334

- 21. Frost Foundation**
Tel : (303) 388-1687
EIN : 720-520-342
- 22. Frueauff (Charles A.) Foundation**
Tel : (904) 561-3508
EIN : 135-605-371
- 23. Fry (Lloyd A.) Foundation**
Tel : (312) 580-0310
EIN : 366-108-775
- 24. Gerstacker (Rollin M.) Foundation**
Tel : (517) 631-6097
EIN : 386-060-276
- 25. Getty (Ann and Gordon) Foundation**
Tel : (415) 788-5853
EIN : 954-078-340
- 26. Hearst Foundation**
Tel : (212) 586-5404
EIN : 136-161-746
- 27. Hearst (William Randolph) Foundation**
Tel : (212) 586-5404
EIN : 136-019-226
- 28. Herrick Foundation**
Tel : (313) 963-6420
EIN : 386-041-517
- 29. Hess Foundation**
Tel : (212) 536-8421
EIN : 221-713-046
- 30. Hewlett (William and Flora) Foundation**
Tel : (415) 329-1070
EIN : 941-655-673
- 31. Kellogg (W.K.) Foundation**
Tel : (616) 968-1611
FAX : (616) 968-0413
EIN : 381-359-264

- 32. Mars Foundation**
Tel : (703) 821-4900
EIN : 546-037-592
- 33. Olin (John M.) Foundation**
Tel : (212) 661-2670
EIN : 376-031-033
- 34. Stranahan Foundation**
Tel : (419) 882-6575
EIN : 346-514-375
- 35. Cherney (Edward) Charitable Living Trust**
Tel : (313) 855-1664
- 36. Chrysler Corporation Fund**
Tel : (313) 956-5194
- 37. Cline Foundation, The**
Tel : (313) 548-1140
- 38. Demino's Foundation**
Tel : (313) 930-1855
- 39. Dow (Alden and Vada) Fund**
Tel : (517) 835-676
- 40. Dow (Herbert H. and Grace A., The) Foundation**
Tel : (517) 631-3699
- 41. Dow Chemical Company Foundation, The**
Tel : (517) 636-1162
- 42. Dow Corning Foundation**
Tel : (517) 496-6290
- 43. Flint (Mary G. and Robert H.) Foundation**
Tel : (313) 538-6800
- 44. Ford (John B. and Peggy) Fund**
Tel : (313) 884-5856

45. **Ford Foundation**
Tel : (212) 573-5000
46. **Ford Motor Company Fund**
Tel : (313) 845-8711
47. **Frey Foundation, The**
Tel : (616) 451-0303
48. **Fruehauf Foundation, The**
Tel : (313) 774-5130
49. **Fruman (Albert and Dorothy)
Foundation**
Tel : (305) 358-9393
50. **Gabooney Foundation**
Tel : (313) 961-0200
51. **General Motors Foundation**
52. **Shenson (Charles H.) Trust**
Tel : (313) 256-7800
53. **Gerstacker (Rollin M.,The
Foundation**
Tel : (517) 631-6097
54. **Green (Albert M. and Lyda)
Foundation**
Tel : (313) 225-1249
55. **Herrick Foundation**
Tel : (313) 963-6420
56. **Kellogg Foundation**
Tel : (616) 968-1611
57. **Kowalski Sausage Charitable Trust**
Tel : (313) 225-3124
58. **Kresge Foundation, The**
Tel : (313) 643-9630

59. **Manoogian (Richard and Jane) Foundation**
Tel : (313) 274-8799
60. **Maranatha Foundation, Inc.**
Tel : (313) 582-4700
61. **Masco Corporation Charitable Trust**
Tel : (313) 274-7400
62. **Mcgregor Fund**
Tel : (313) 963-3495
63. **Michcon Foundation**
Tel : (313) 256-5472
64. **Skillman Foundation, The**
Tel : (313) 961-8850
65. **Slaughter (William E. Jr.) Foundation, Inc.**
Tel : (313) 666-9300
66. **Slavik (Joseph and Edna, The) Foundation Charitable Trust**
Tel : (617) 497-4251
67. **Slavik (Stephen F. and Mary E.) Foundation Charitable Trust**
Tel : (313) 855-5500
68. **Sparks (Jack D. and Fredda S.) Foundation, Inc**
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69. **St. Clair Foundation**
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70. **St. Denys Foundation**
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71. **Stonisch Foundation**
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72. **Stroh Foundation**
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73. **Stubnitz (Maurice and Dorothy)
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74. **Stulberg (David and Lois)
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75. **Summerfield (Miriam W.) Foundation**
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76. **Swanson Foundation**
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77. **Taubman Foundation, The**
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78. **Thomas Foundation, The**
Tel : (313) 855-3955
79. **Upjohn Company Foundation, The**
Tel : (616) 323-7017
80. **Vlasic Foundation**
Tel : (313) 642-3380
81. **Vos (Dan, The) Foundation**
Tel : (616) 676-9169
82. **Watling Foundation, Inc.**
Tel : (616) 869-5011
83. **Weisberg (Harvey and Lucille) Family
Foundation**
Tel : (313) 855-5516
84. **Wenger (Henry E. and Consuelo S.)
Foundation, Inc.**
Tel : (313) 567-1212
85. **Wetsman Foundation, The**
Tel : (313) 642-5100
86. **Williams (Jamison, The) Foundation**
Tel : (313) 642-0333

87. **Wilson (Lula C.) Trust**
Tel : (313) 645-7306
88. **Wilson (Matilda R.) Fund**
Tel : (313) 259-7777
89. **Wilson (Ralph C., The) Foundation**
Tel : (313) 259-9100
90. **Winkelman (Isadore and Beryl)
Foundation**
Tel : (313) 851-5225
91. **Wolverine Charitable Foundation**
Tel : (616) 866-5521
92. **Young Woman's Home Association
of Detroit, Michigan**
Tel : (313) 886-6970
93. **Zurschmiede (W. Tom Jr.) Foundation**
94. **Cadillac Products, Inc. Foundation**
Tel : (313) 583-1525
95. **Allied Signal Inc.**
Tel : (313) 827-6041
96. **Ameritech Publishing**
Tel : (313) 524-7300
97. **Barton-Malow Company Foundation**
Tel : (313) 351-4500
98. **Comerica Incorporated**
Tel : (313) 222-6987
99. **Consumers Powers Company**
Tel : (517) 788-0318
100. **Cross and Trecker Foundation**
Tel : (313) 644-4343
101. **Detroit Edison**
Tel : (313) 237-9271

102. **Diamond Crystal Foundation, The**
Tel : (313) 329-2244
103. **Domino's Foundation**
Tel : (313) 930-1855
104. **Federal-Mogul Corporation**
Tel : (313) 354-9934
105. **Federal-Mogul Corporation
Charitable Trust**
Tel : (313) 225-1243
106. **Ford Motor Company Fund**
Tel : (313) 845-8711
107. **GFV Communications Operation
Outreach Foundation**
Tel : (313) 591-3000
108. **K Mart Corporation**
Tel : (313) 643-5009
109. **Masco Corporation**
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110. **Masco Corporation Charitable Trust**
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- 122. Manoogian (Alex and Marie) Foundation**
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EIN : 386-089-952
- 123. McGregor Fund**
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EIN : 380-808-800
- 124. Mellon (Andrew W.) Foundation**
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FAX : (212) 223-2778
EIN : 131-879-954

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127. **New-Land Foundation**
Tel : (212) 841-6000
EIN : 136-086-562
128. **New World Foundation**
Tel : (212) 249-1023
EIN : 131-919-791
129. **Olin (F.W) Foundation**
Tel : (212) 832-0508
EIN : 131-820-176
130. **Sage Foundation**
EIN : 386-041-518
131. **Skillman Foundation**
Tel : (313) 961-8850
EIN : 381-675-780
132. **Sloan (Alfred P.) Foundation**
Tel : (212) 757-5117
EIN : 131-632-877
133. **Teagle Foundation**
Tel : (212) 247-1946
EIN : 131-773-645
134. **Towsley (Harry A. and Margaret D.)
Foundation**
Tel : (313) 662-6777
EIN : 386-091-798
135. **Upton (Frederick S.) Foundation**
Tel : (616) 982-0272
EIN : 366-013-317

- 136. Watson (Thomas J.) Foundation**
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EIN : 136-038-151
- 137. Wean (Raymond John) Foundation**
Tel : (216) 394-5600
EIN : 346-505-038
- 138. Wilson (Matilda R.) Fund**
Tel : (313) 259-7777
EIN : 386-087-665
- 139. PJM Charitable Foundation**
Tel : (212) 456-7906
EIN : 133-406-169
- 140. Dillard (Anna-Karin J. and David B.)
Foundation**
Tel : (212) 489-6600
EIN : 133-318-226
- 141. Templeton (John) Foundation**
Tel : (615) 598-0565
EIN : 621-322-826