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The Wisconsin Economy, University of Wisconsin and Wisconsin Technical College Graduates and the Jobs of the Future

By Dennis W. Redovich

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The Wisconsin Economy, University of Wisconsin and Wisconsin Technical College Graduates and the Jobs of the Future

Summary Statement

The Center for the Study of Jobs and Education in the State of Wisconsin has done an analysis of the graduates of the UW-Madison 1990 to 2000 and UW-Milwaukee 1989 to 1999 from data obtained from their web sites and from the UW-Madison Department of Student Tabulations. The analysis includes trends in numbers of graduates by School and College and by major. Special attention was given to majors related to high tech job related fields such as computers, science and math and biotechnology.

From 1992 to 2000 the Center has done an annual analysis of the statewide follow-up of graduates of the WTCS System which includes trends in numbers of graduates by major, employment and salaries of graduates. Dennis Redovich the author of this paper, retired Director of Research, Planning and Development from the Milwaukee Area Technical College, analyzed follow-ups of MATC graduates from 1968 to 1991. Special attention is given to the graduates of Technical programs in the WTCS System.

An analysis of the number of jobs in Wisconsin for about 700 job titles in 1996 and projections for these jobs in 2006 has been made. The data was taken from the, **Wisconsin Projections 1996-2006, Wisconsin Department of Workforce Development, July 1998**. The tables and analysis included in this paper were all done by the Center for the Study of Jobs and Education in Wisconsin. The final section of this paper is a summary of findings regarding the jobs of the future in Wisconsin and general recommendations for improving Wisconsin's economic future. This paper should be useful as background information for specific proposals for Wisconsin's economic future.

Graduates of the University of Wisconsin-Madison 1990 to 2000

As shown in Table 1, total graduates from the UW-Madison have declined (654) -7% from 9,150 in 1990 to 8,496 in 2000. Total bachelor's degrees have declined (7%), master's have declined (12%) and professional (1%) from 1990 to 2000. Total Ph.D. graduates increased 3%. Numbers of graduates by School/College and major follow.

Table 1 Change in Degrees Conferred 1990 & 2000

Type of Degree	1990	2000	Change 1990 to 2000	% Change 1990 to 2000
Total Bachelors	5,896	5,477	-419	-7%
Total Masters	2,047	1,793	-254	-12%
Total Ph.D.	706	730	24	3%
Total Professional	501	496	-5	-1%
Total All Degrees	9,150	8,496	-654	-7%

Source: UW-Madison Office of Registrar - Student Tabulations

As shown in Table 2, 7 of the 12 School/College groups declined in graduates from 1990 to 2000, Pharmacy -31%, Education -22%, Nursing -20% Agriculture -10%, Letters & Science -9%, Law -2% and Environmental Studies -2%. Five increased Medicine 22%, Human Ecology 7%, Business 4%, Veterinary Medicine 3% and Engineering 1%.

Table 2 Total Degrees, Bachelor's, Master's, Ph.D./Professional by School/College 1990 and 2000

School/College	Bachelor's		Master's		Ph.D./Prof.		Total Degrees		Change 90to00	% Change	% 2000 Grads
	1990	2000	1990	2000	1990	2000	1990	2000			
1. Letters & Science	3,184	2,892	861	758	326	324	4,371	3,974	-397	-9%	46.8%
2. Business	540	692	374	260	13	14	927	966	39	4%	11.4%
3. Engineering	627	591	215	232	81	107	923	930	7	1%	10.9%
4. Education	586	446	281	227	121	94	988	767	-221	-22%	9%
5. Agriculture/Life Sci.	430	412	151	98	130	132	711	640	-71	-10%	7.5%
6. Medicine	18	45	57	67	160	176	235	288	53	22%	3.4%
7. Law	0	0	8	41	276	237	284	278	-6	-2%	3.3%
8. Human Ecology	237	258	12	9	5	4	254	271	17	7%	3.2%
9. Nursing	144	95	34	46	1	3	179	144	-35	-20%	1.7%
10. Pharmacy	130	44	12	8	0	46	142	98	-44	-31%	1.2%
11. Veterinary Medicine	0	0	0	9	87	81	87	90	3	3%	1.1%
12. Environmental St.	0	0	42	40	7	8	49	48	-1	-2%	0.6%
Total	5,896	5,475	2,047	1,795	1,207	1,226	9,150	8,494	-656	-7%	100%

Bachelor's Master's Ph.D./Prof. Total Degrees

Source: UW-Madison Office of Budget, Planning and Analysis Report on web site and Office of the Registrar, Student Tabulations

Table 3 Graduates Top 4 School/College by Gender, Minority -Non-Minority 2000

School/ College	Total Grads	Male	Female	Total Minority	Afro- Amer	His- panic	Asian Amer	Native Amer	Cauc asian	*Intern- Ational	Un Known
1. Letters & Science	3,974	1,792	2,182	334	88	103	146	17	3,237	323	80
		45%	55%	8.4%	2.2%	2.6%	3.7%	0.4%	81.4%	8.1%	2%
2. Business	966	563	403	72	17	9	44	2	737	150	7
		58%	42%	7.4%	1.8%	0.9%	0.5%	0.2%	76.3%	15.5%	0.7%
3. Engineering	930	743	187	69	7	18	41	3	584	257	20
		80%	20%	7.4%	0.8%	1.9%	4.4%	0.3%	62.7%	27.6%	2.2%
4. Education	767	192	575	53	19	14	15	5	667	28	19
		25%	75%	6.9%	2.5%	1.8%	2%	0.6%	87%	3.6%	2.5%
Total Grads 12	8,496	4,031	4,465	722	161	194	322	45	6,709	924	141
School/College		47%	53%	8.5%	1.9%	2.3%	3.8%	5.3%	79%	10.9%	1.7%

* International students are foreign students who are of various ethnic backgrounds

Source: Office of the Registrar, Student Tabulations

International foreign student graduates, (924) 10.9%, exceed total minority graduates (722) 8.5%. African Americans make up only 1.9% (161) of 8,496 2000 graduates.

International students constitute 27.6% (227) of 930 year 2000 Engineering graduates and 33% (65) of 197 Computer Science graduates. Women outnumber men in eight of the twelve School/College group graduates. In total women constituted 53% (4,465) of 8,496 graduates in 2000.

Table 4 Top 25 UW-Madison Degree Majors With More Than 100 2000 Graduates

Degree Major	Bachelor's	Master's	Ph.D.	Professional	Total 2000 Degrees	% Total 2000 Degrees
1. Psychology	259	9	8	0	276	3.2%
2. Political Science	235	11	13	0	259	3.0%
3. Law	0	0	0	252	252	3.0%
4. History	186	24	35	0	245	2.9%
5. Mechanical Engineering	160	48	23	0	231	2.7%
6. Communication Arts	206	5	13	0	224	2.6%
7. English	181	24	16	0	221	2.6%
8. Electrical Engineering	131	52	33	0	206	2.4%
9. Journalism	186	19	0	0	205	2.4%
10. Banking/Finance	144	58	0	0	202	2.4%
11. Computer Science	116	65	16	0	197	2.3%
12. Accounting	130	57	0	0	187	2.2%
13. Marketing	157	27	0	0	184	2.2%
14. Zoology	166	2	10	0	178	2.1%
15. Economics	141	27	10	0	178	2.1%
16. Sociology	121	15	13	0	149	1.8%
17. Medicine	0	0	0	144	144	1.7%
18. Nursing	94	45	3	0	142	1.7%
19. Art	97	39	0	0	136	1.6%
20. Social Work	21	111	0	0	132	1.6%
21. Business Management	89	32	0	0	121	1.4%
22. Chemical Engineering	98	5	17	0	120	1.4%
23. Industrial Engineering	64	32	13	0	109	1.3%
24. Elementary Education	106	0	0	0	106	1.2%
25. Spanish	86	12	8	0	106	1.2%
Total Degrees Top 25	3,194	719	231	396	4,510	53.1%
11% of all majors						
Total Graduates 219 Majors	5,477	1,793	730	496	8,496	
% of All Degrees	64.5%	21.1%	8.6%	5.8%	100%	

The top 25 majors in terms of largest number of Bachelor's, Master's, Ph.D. and Professional graduates total 4,510 or 53.1% of the 8,496 total 2000 UW-Madison graduates from 219 majors. The Distribution of the 25 top majors by School/College in 1999 is as follows: Rank 1 to 25 in number of total bachelors, masters, Ph.D. or professional graduates

Letters & Science (11 majors) 1. Psychology 276 2. Political Science 259
4. History 245 6. Communication Arts 224 7. English 221 9. Journalism 205 14. Zoology 178 15. Economics 178 16. Sociology 149 19. Art 136 24. Spanish 106 L& S Total 2,177 (25.6% of all 2000 graduates)

Business (4 majors) 10. Finance & Banking 202 12. Accounting 187 13. Marketing 184

21. Business Management 121 Total 694 (8.2% of 2000 graduates)

Engineering/Applied Science (5 majors) 5. Mechanical Engr. 231 8. Electrical Engr. 206 11. Computer Science 197 22. Chemical Engr. 120 23. Industrial Engr. 109
Total 863 (10.1% of 2000 graduates)

Others (5 majors) 3. Law 252 18. Nursing 144 17. Medicine 133 20. Social Work 132
23. Elementary Education 106 Total 767 (9% of 2000 graduates)

Graduates of 16 majors in Computers, Mathematics and Physical or Biological Sciences
Total 878 2000 graduates (9.6% of 2000 grads). Only number 11. Computer Science (197
grads) ranked in the top 25 of majors with 100 or more graduates. Paradoxically there
were more Journalism graduates, 205 in 2000, than any of the so called high tech majors.

Table 5 Degrees in Computer, Biological or Physical Science & Mathematics

	Bachelor's	Master's	Ph.D.	Total 2000 Degrees	% Total 2000 Degrees
1. Computer Science	116	65	16	197	2.3%
2. Chemical Engineering	98	5	17	120	1.4%
3. Biochemistry	69	1	23	93	1.1%
4.. Bacteriology	58	20	9	87	1%
5. Chemistry	31	21	33	85	1%
6. Mathematics	42	26	11	79	0.9%
7. Genetics	42	7	7	56	0.6%
8. Molecular Biology	54	0	0	54	0.6%
9. Physics	6	10	22	38	0.4%
10. Cellular/Molecular Biology	0	5	21	26	0.3%
11. Statistics	1	12	6	19	0.3%
12. Medical Physics	0	6	3	9	0.1%
13. Biology	4	0	0	4	0
14. Bimolecular Chemistry	0	0	4	4	0
15. Biomedical Engineering	0	4	0	4	0
16. Applied Engr. Physics	3	0	0	3	0
Total All Majors	524	182	179	878	10.3%

Graduates of the University of Wisconsin-Milwaukee 1989 & 1999

Bachelor's, master's and doctoral degrees conferred by UWM School/College and major were obtained from the UWM Institutional Fact Book posted on the UWM web site as of July 1999. All of tables in this report, 1988-89 to 1998-99 were compiled from this data. When 1999-2000 data becomes available the tables and report will be updated.

The number of UWM Bachelor's degrees conferred declined -13% (-389) from 2,950 in 1988-89 to 2, 561 in 1998-99. The number of UWM Master's degrees increased by 108 (11%) from 1988-89 to 1998-99. Doctoral degrees increased by 44 (68%) from 65 in 1988-89 to 109 in 1998-99. Total degrees for all majors decreased 227 (-6%) from 4,015 in 1988-89 to 3,788 in 1998-99. (See Table 1)

Table 1 Change in UWM Degrees Conferred 1989 to 1999

Type of Degree	1989	1999	Change 1989 to 1999	% Change 1989 to 1999
Total Bachelors	2,950	2,561	-389	-13%
Total Masters	1,000	1,108	108	11%
Total Ph.D.	65	109	44	68%
Total All Degrees	4,015	3,778	-237	-6%

Table 2 UWM Degrees Conferred 1989 & 1999 by School or College

School/College Rank Order 1999 Total Grads	Bachelor's		Master's		Ph.D.		Total Degrees		Change 89 to 99	% 1999 Grads
	1989	1999	1989	1999	1989	1999	1989	1999		
1. Letters & Science	907	781	188	174	43	74	1,138	1,029	-109	27.2%
2. Business Adm.	885	600	151	227	4	4	1,040	831	-209	-22%
3. Education	256	237	264	216	10	15	530	468	-62	12.4%
4. Social Welfare	163	179	130	165	0	0	293	344	51	9.1%
5. Engr. & Appl. Sci.	227	169	64	47	1	7	292	223	-69	5.9%
6. The Arts	144	196	31	20	0	0	175	216	41	5.7%
7. Allied Health	141	158	18	36	0	0	159	194	35	5.1%
8. Nursing	117	128	24	53	5	8	146	189	43	5%
9. Arch. & Urban Plan.	110	112	61	67	2	1	173	180	7	4.8%
10. Library/Info. Sci.			69	113	0	0	69	113	56	3%
University Total	2,950	2,561	1,000	1,108	65	109	4,015	3,778	-237	100%

As shown in table 2 the number of Bachelor's degrees conferred declined -13% (-389) from 2,950 in 1988-89 to 2,561 in 1988-99. Business Administration Bachelor's degrees declined by 285 (-32%) and Engineering & Applied Science declined by -58 (-25%). The Arts gain of 52 graduates (+36%) was the largest increase.

The number of UWM Master's degrees increased by 108 (11%) from 1989 to 1999. The largest increases were in Business Administration 76 (50%), Library and Information Science 44 (64%), Nursing 29 (120%) and Allied Health 18 (100%). Master's degrees conferred declined in Education -48 (-18%) Engineering & Applied Science -17 (-26%), L & S -14 (-7%), The Arts -11 (-35%) and Architecture & Urban Planning -4 (-6%)

Increase of 31 Doctoral degrees in L & S represents 70% of 44 (68%) total Doctoral increase from 1988-89 to 1988-99.

Table 3 Top Ten UWM Bachelor Degree Majors 1989, 1994 and 1999**Rank Order by 1999 Graduates**

Major	88/89	93/94	98/99	% 1999	Change 1989-1999	% Change 1989-1999
1. Education	142	142	152	5.9%	10	7%
2. Finance	287	81	143	5.6%	-144	-50%
3. Marketing	255	154	138	5.4%	-107	-45%
4. Nursing	117	167	128	5.0%	11	9%

5. Man. Information Systems	87	49	124	4.8%	37	42%
6. Accounting	153	159	117	4.6%	-36	-24%
7. Criminal Justice	93	103	116	4.5%	23	25%
8. Architectural Studies	110	90	112	4.4%	-2	-2%
9. Art	62	85	111	4.3%	49	79%
10. Psychology	95	132	102	4.0%	7	7%
Total Top 10 Bachelor's	1,401	1,162	1,243	48.5%	-158	-11%
University Total Bachelor's	2,950	2,783	2,561	100%	-389	-13%
From 83 Program Majors						

Table 4 UWM Bachelor's Degrees by Major, Science, Mathematics & Computer

Major	1989	1994	1999	%1999 Grads	Change 89 to 99	% Change 89 to 99
1. Biological Science	65	73	57	2.2%	-8	-12%
2. Computer Science	37	33	28	1.1%	-9	-24%
3. Chemistry	13	9	17	0.7%	4	31%
4. Mathematics	26	14	5	0.2%	-21	-81%
5. Physics	6	4	2	0.01%	-4	-67%
6. Applied Math & Physics	4	3	1	0.0%	-3	-75%
Total Science, Math & Computer	151	136	110	4.2%	-41	-27%

Bachelors in science, math and computer science declined from 151 to 110 (-27%)

**Table 5 Top Ten UWM Master's Degrees by Major 1989, 1994 and 1999
Rank Order by 1999 Graduates**

Major	88/89	93/94	98/99	% 1999 Master's Grads	Change 89 to 99	% Change 89 to 99
1. M.S. Management	52	83	104	9.4%	52	100%
2. Educational Psychology	69	107	88	7.9%	19	28%
3. MBA	73	92	81	7.3%	8	11%
4. Curriculum & Instruction	75	73	61	5.5%	-14	-19%
5. Adm. Leadership Education	80	77	42	3.8%	-38	-48%
6. Executive MBA	26	24	42	3.8%	16	62%
7. Architecture	49	53	41	3.7%	-8	-16%
8. Engineering	47	55	34	3.1%	-13	-28%
9. Com Sci & Dis	19	16	24	2.2%	5	26%
10. History	19	16	20	1.8%	1	5%
Total Top 10 Program Majors	509	596	537	48.5%	26	5%
University Total Master's from 51 Program Majors	1,000	1,142	1,108	100%	108	11%

Table 6 UWM Master's Degrees by Major-Science, Math & Computer

	1989	1994	98/99	% 1999	Change	% Change
				Master's Grads	89 to 99	89 to 99
1. Computer Science	17	22	13	1.2%	-4	-24%
2. Biological Sciences	7	9	9	0.8%	2	28%
3. Mathematics	18	6	6	0.5%	-12	67%
4. Chemistry	7	4	2	0.2%	-5	71%
5. Physics	3	7	1	0.1%	-2	-67%
Total Science, Math & Computer Majors	52	48	31	2.8%	-21	-40%

Master's degrees in science, math and computer science declined from 52 to 31 (-40%) 1989 to 1999.

Table 7 Top Ten UWM Doctoral Degrees by Major 1989, 1994 and 1999 Rank Order by 1999 Graduates

Major	88/89	93/94	98/99	% 1999	Change
				Doctoral Grads	89 to 99
1. Urban Education	10	12	15	13.8%	3
2. Chemistry	6	14	13	11.9%	7
3. English	7	12	12	11%	5
4. Economics	3	14	11	10.1%	8
5. Psychology	7	8	9	8.3%	2
6. Nursing	5	3	8	7.3%	3
7. Mathematics	2	4	7	6.4%	5
8. Engr. & Applied Sci.	1	8	7	6.4%	6
9. Biological Sciences	4	7	5	4.6%	1
10. Geography	2	2	5	4.60%	3
Total Top 10 Program Majors	47	84	92	84.4%	45
University Total Doctoral From 19 Program Majors	65	93	109	100%	44

Table 8 UWM Doctoral Graduates by Major Science & Mathematics

	88/89	93/94	98/99	% 1999	Change
				Doctoral Grads	89 to 99
1. Chemistry	6	14	13	11.9%	7
2. Mathematics	2	4	7	6.4%	5
3. Biological Sciences	4	7	5	4.6%	1
4. Physics	2	5	2	1.8%	0
Total Science & Math Majors	14	37	27	24.8%	13

Science and math doctoral degrees increased from 14 to 27 in 1999. There were no doctoral graduates in computer science.

The need for higher education to provide bachelors, masters and doctoral graduates in math and technology is declining as indicated by the decline in UWM graduates in math and technology.

1999 Graduates Wisconsin Technical College System

The annual WTCS Graduate Follow-up prepared by WTCS Board staff is one of the finest in the U.S and is the source of all data for this report. **The “Graduate Follow-up 1998-99 “April 2000, WTCS Board,** reflects only those students who graduate. Most Wisconsin Technical College students do not graduate but receive an excellent education in courses, which allows them to be employed successfully without graduating.

*Health occupations 6,603 (40%) and Business 2,620 (17%) graduates constitute 57% of 1999 WTCS graduates statewide. Technical 950 (6%) and Industrial 1,952 (13%) total 18% of 15,365 graduates statewide from all programs.

* Nursing Assistant graduates (2,577) in 1999 represent 17% of all graduates. This total is 2.7 times the 950 Technical Division graduates from 44 programs statewide. Nursing Assistant graduates have been about double Technical graduates for 10 years..

* Annual median salaries for all WTCS graduates increased 72% from \$14,448 in 1988 to \$24,951 in 1999. The increase from 1998 to 1999 was 8.5% from \$22,982 to \$24,951.

* Health Occupations Associate Degree graduates annual median salary (\$30,553) with 1,431 graduates in 1999 exceeds Technical median salaries of \$28,080 with 950 graduates. Statements and graphs that indicate Technical, Service and Industrial graduates secure the highest paying jobs are very misleading. Graduates from these areas include the salaries of numerous graduates who were employed prior to graduation with years of experience in their field. Fire Fighter, Police Officer and technicians would be examples. (48% of all graduates were 25 or older) Health Occupations graduates include 3,957 Short Term graduates (2,577 Nursing Assistants) with median salaries of \$18,822 that are not comparable to graduates of two year Technical and Service programs.

Women in 1999 with 9,325 graduates (61%) far outnumber men 5,980 (39%) of all graduates. Women dominate in programs with the highest starting salaries after graduation, such as number one Dental Hygienist (\$43,677) and AD Nursing \$32,566. Women constitute 83% of Health Occupations programs and 75% of Business graduates that include high paying computer programs with large numbers of graduates. There is no justification for non-traditional programs for women based only on higher salaries.

Table V Annual Median Salary by Program With 100 or More Graduates

Instructional Program Rank Order	1999 Median Salary	Number of Graduates	1998 Median Salary	Number of Graduates
1. 10 Dental Hygienist	\$43, 677	133	\$39,232	148
2. 10 Supervisory Mgt.*	\$36,688	216	\$32,498	214
3. CIS Prog/Analyst	\$34,007	383	\$32,496	342
4. 30 EMT Intermed.*	\$33,067*	119	\$26,946*	116
5. 10 AD Nursing	\$32,556	774	\$31,176	818
6. 30 Truck Driving	\$31,198	139	\$26,004	131

7. 30 Police Rec. Sch.*	\$31,031*	214	\$30,926*	295
8. 20 College Parallel*	\$31,019*	196	\$21,533*	180
9. 10 CIS Computer Sp.	\$30,000	268	\$30,000	242
10. 30 Farm Bus & Pr*	\$28,000	251	\$25,000	169
11. 10 Electronics	\$27,977	110	\$27,501	117
12. 10 Police Science*	\$27,038	433	\$24,742	486
13. 10 Mech. Design Te	\$26,500	165	\$26,748	189
14. 10 Bus. Mid Mgt.*	\$25,988*	124	\$24,000*	128
15. 32 Mach Tool Tech	\$25,584	138	\$25,000	122
16. 31 Mach Tool Oper	\$24,948	154	\$24,744	112
17. 31 Welding	\$24,568	164	\$24,564	183
18. 31 Practical Nurse	\$24,483	229	\$23,600	242
19. 10 Marketing	\$24,007	354	\$21,321	373
20. 30 EMT Basic	\$23,814	980	\$22,878	978
21. 10 Occup. Therapy	\$21,838	113	\$23,502	132
22. 10 Accounting	\$21,600	598	\$20,798	685
23. 32 Automotive Tech	\$21,319	128	\$21,059	124
24. 10 Adm. Assistant	\$20,728	181	\$19,528	216
25. 31 Auto Body	\$19,761	100	\$20,278	90
26. 31 Dental Assistant	\$18,641	109	\$17,580	109
27. 31 Office Assistant	\$17,769	156	\$16,119	162
28. 30 Nursing Assist.	\$17,676	2,578	\$16,644	2,510
29. 10 Child Care &Dev	\$16,838	156	\$15,444	137
30. 31 Barber/Cosmet	\$14,975	161	\$13,981	134
		9,824		9,884

*High percentage of graduates working in their field prior to graduation

The 30 programs with 100 or more graduates total 9,824 and represent 64% of graduates statewide. The 2,578 Nursing Assistant graduates represent 17% of all graduates from about 300 programs with graduates statewide.

Summary and Conclusions WTCS Graduates and Salaries

The WTCS Follow-up is one of the finest in the U.S. and the world. However it reflects only those students who graduate. Most students in Wisconsin technical colleges do not graduate but receive an excellent education in courses which allows them to be employed without graduating. The WTCS gets a lot of hype from the politicians but modest financial support as compared to the billion dollars UW-System and Wisconsin Department of Corrections receive.

Trends in number of graduates 1990 to 1999 are as follows:

Rank Order 1999 Graduates Number of Graduates peaked in 1984 16,622

Instructional Division	1990	1999	% Change
Health Occupations	4,295	6,103	+42%
Business	3,099	2,620	-15%
Industrial	2,157	1,952	-14%

Service Occupations	768	1,135	+48%
Marketing	864	1,079	+25%
Technical	1,209	950	-21%
Home Economics	879	654	-26%
Agri-Business	514	520	+1%
Graphics and Applied Arts	276	260	-6%
General Education	100	201	+101%
Total	14,265	15,365	+8%

Health Occupations 1,808 (42%) increase in graduates far exceeds 367 (48%) the increase for Service Occupations. However, most commonly the misleading statement, “Service Occupations are the fastest growing in terms of jobs” is stated. Health Occupations of course are service occupations.

Because many Health Occupations require certification or licensing prior to obtaining employment, most health graduates are not employed in their field prior to graduation. The high paying jobs in the Service, Trade & Industry and Business Divisions are often those in which graduates have prior experience or are employed in the field prior to graduation. Programs such as Fire Science, Basic Police Recruit, Supervisory Management, Materials Management would be examples. Other examples would be a number of Technical and Industrial programs with less than 25 graduates.

Business and Marketing programs with graduates with prior experience and higher than average salaries have in most cases more women graduates than men, 75% of Business and 64% of marketing graduates were women in 1999. Sixty one percent of all graduates are women.

Dental Hygiene (\$43,677 and 133 graduates) has had the highest entry-level salary for years. The following misleading statement is often made, “Women must be recruited into the many higher paying technical jobs in order to earn a living wage”. The AD Nursing (\$32,556 and 744 graduates) and CIS Programmer Analyst (\$34,007 and 383 graduates) programs have a large majority of women graduates. Minority men and all men might be recruited into occupations dominated by women for money reasons.

What is the Reality of the High Tech Jobs of the Future?

I have analyzed the number of jobs in Wisconsin for about 700 job titles in 1996 and projections for these jobs in 2006. The data was taken from the, **Wisconsin Projections 1996-2006, Wisconsin Department of Workforce Development, July 1998.**

Summary of Findings

The jobs of the future are essentially the same jobs in existence in 1996. The great majority of jobs in 2006 require short term on the job training or experience or moderate length on the job training, experience or education. Tables I shows the following:

* The top six jobs in employment in Wisconsin are all short term training or experience

and they represent a projected 391,180 jobs or 12.2% of total 2006 employment in Wisconsin. *Short-term training jobs represent 30 of the 57 job titles (Of a total of about 700 job titles) with at least 10,000 jobs projected in 2006. These 30 job titles are projected to employ 907,208 or 28.5% of total employment in 2006. *Jobs that require College Graduation represent 8 of the top 57 jobs projected for 2006 and are projected to employ 174,680 or 5.5% of total employment in 2006. *Short-term training jobs in total will increase in number and percent more than jobs that require college graduation.

The following table shows in rank order by number of projected 2006 jobs the 57 job titles in the State of Wisconsin projected to have 10,000 or more workers in 2006.

Table I -Employment in Wisconsin 1996 and Projected 2006 Employment in 57 Job Titles* with Projected Employment of 10,000 or more in 2006

Wisconsin 1996-2006	1996	Training/Experience	2006
Rank Order by Job Title 2006	Employment	Education	Employment
1.Salesperson Retail	73,550	Short Term	82,230
2. Cashiers	68,290	Short Term	79,050
3. General Office Clerks	62,750	Short Term	66,700
4. Janitors & Cleaners	49,810	Short Term	58,190
5. Truck Driver Heavy	48,380	Short Term	54,700
6. Waiters/Waitresses	44,360	Short Term	50,310
7. Secretary Not Medical/Legal	51,870	Moderate	49,450
8. Registered Nurses	40,450	Associate Degree	46,540
9. Market/Sales Supervision	37,610	Experience Related	41,980
10.Nurse Aides/Orderlies	36,720	Short Term	41,960
11. Bookkeeping Clerks	42,570	Moderate	41,040
12. Teachers Elementary.	36,070	Bachelor's Degree	40,840
13. Teachers Secondary.	30,940	Bachelor's Degree	36,630
14. Food Prep Workers	30,778	Short Term	35,890
15. Maintenance /Repair General	29,350	Short Term	34,420
16.Hand Packers	26,040	Short Term	31,880
17.Truck Driver Light	22,370	Short Term	26,220
18.Traffic/Ship/Rec Clerk	23,220	Short Term	25,860
19.Carpenters	23,870	Moderate	25,850
20.Stock Clerk/Sales Floor	23,780	Short Term	25,740
21.Receptionist/Information Clerk	20,940	Short Term	25,230
22.Child Care Workers	18,960	Short Term	24,750
23.Maids/Cleaners	20,670	Short Term	24,680
24.Clerical Supervision.	20,880	Experience Related	24,580
25.Bartenders	21,570	Short Term	22,450
26.Accountant/Auditor	19,230	Bachelor's Degree	21,930
27.Cooks Restaurant	16,860	Short Term	20,310
28.Pack/Filling Machine Operator	14,650	Short Term	19,600
29.Financial Managers	16,280	Bachelor's Degree	19,080
30.Auto Mechanics	16,230	Moderate	18,750
31.Home Health Care Aids	11,880	Short Term	18,540
32.First Line Supervision Production	11,470	Experience Related	18,260
33.Ind. Truck/Tractor Operator	16,140	Short Term	17,710

34.Cook Fast Food	13,860	Short Term	17,420
35.Hairdressor/Stylist	15,820	Moderate	17,280
36.Food Service/Lodging Manager	13,500	Experience Related	17,210
37.Comb. Food Prep/Service	13,860	Short Term	15,550
38.Machine Setup/Operator	16,930	Short Term	15,560
39.Systems Analyst	8,020	Bachelor's/Experience	15,420
40.Bank Tellers	13,980	Short Term	15,050
41.Special Education Teacher	9,190	Bachelor's	14,170
42.Licensed Practical Nurse	12,490	Moderate	14,030
43.Marketing PR Manager	10,980	Bachelor's/Experience	13,680
44.Electrician	12,340	Moderate	13,630
45.Machinist	12,370	Moderate	12,930
46.Order Clerks	12,000	Short Term	12,570
47.Sales Representative Science	11,100	Experience Related	12,520
48.Teachers-Pre/4-5 Kindergarten	10,860	Bachelor's Degree	12,440
49.Teacher Aides	9,490	Moderate	12,240
50.Welders/Cutters	10,490	Moderate	11,810
51.Adjustment Clerks	8,280	Short Term	11,760
52.Typists (Word Processing)	14,370	Short Term	11,460
53.Driver Sales Workers	9,830	Experience Related	11,370
54.Bus Drivers School	8,240	Short Term	11,070
55.Physicians	9,810	Professional Degree	10,720
56.Lawyers	8,760	Professional Degree	10,690
57.Data Entry	9,130	Short Term	10,420
Totals 1996 and Projected 2006			
For 57 Job Titles	1,304,238		1,492,350
Percentage of Employment	47%		47%
Total All Job Titles (700) 1996 and	2,797,400		3,185,500
Projected 2006			

*Does not include General Managers & Top Executives category or NEC groupings.

Table II Computer Systems and Computer Math/Science Research

Computer Job Titles*	1996	2006	Growth/Yr.
In Wisconsin- 7 Job Titles	Employment	Projection	1996-2006
Computer Systems			
1. Systems Analysts	8,020	15,420	741
2. Computer Programmers	7,390	8,700	132
3. Computer Support Specialists	2,410	3,950	154
4. Computer Program Aides	1,420	1,390	-3
5. Database Administrators	690	1,160	47
6. Computer Scientists NEC	640	1,340	69
7. Programmers Numerical Tool	300	310	1
Totals	20,870	32,270	1,141
Percent Total Workers 1996-2006	0.7%	1%	

*A college degree is not required for all of these jobs. *Short term or moderate length training and/or experience are often used for entry-level positions. Systems Analyst is the only job title listed in the top 57 jobs with more than 10,000 workers projected in 2006.

Summary and Conclusions

Wisconsin has an exemplary education system of K-12 School Districts, including the Milwaukee Public Schools, the Wisconsin Technical College System and the University of Wisconsin System. These systems consistently produce a highly educated and productive workforce that is competitive with any state or country in the world. There is not a crisis in education in Wisconsin. Outrageously the public schools in Wisconsin, particularly MPS, are often used as scapegoats for the social and economic problems of the State of Wisconsin. There is always room for improvement of our K-12 schools, but there are absolutely no simple solutions to the problems of poverty in some areas of the state including the central City of Milwaukee. Certainly the Economic Summit will not provide any significant suggestions for school improvements that are not already known. There are no secrets in education and educational research is largely useless rhetoric.

Is the rationale for extreme school reforms in Wisconsin that all students must be prepared for the so-called high skill jobs of the future? If it is, then it is a big con. If preparation for jobs is not the rationale for all students being prepared for college, high stakes testing and the elimination of social promotion, then what are the reasons?

The trends in graduates from the University of Wisconsin System and the WTCS System indicate that graduates from so-called high tech areas such as computer science are not increasing and in fact in some cases are declining. Associate Degree Technical Division graduates statewide have been declining slowly for the last 10 years and in 1999 for the first time the number of graduates statewide was below 1,000 at 950. This is happening at the same time that political, business and educational leaders and the media are claiming an extreme shortage of highly trained high tech workers. Meanwhile elementary school students in the year 2000 are becoming computer proficient.

At the UW-Madison, international foreign student graduates, (924) 10.9%, exceed total minority graduates (722) 8.5%. African Americans make up only 1.9% (161) of 8,496 2000 graduates. International students constitute 27.6% (227) of 930 year 2000 Engineering graduates and 33% (65) of 197 Computer Science graduates. Women outnumber men in eight of the twelve School/College group graduates. In total women constituted 53% (4,465) of 8,496 graduates in 2000. (See Table 3 page 2)

The number of so-called high tech and high pay jobs is relatively small in number. The jobs of the future are essentially the same jobs in existence in 1996. The great majority of jobs projected for 2006 require short term on the job training or experience or moderate length on the job training, experience or education. * The top six jobs in employment in Wisconsin are all short term training or experience and they represent a projected 391,180 jobs or 12.2% of total 2006 employment in Wisconsin. *Short-term training jobs represent 30 of the 57 job titles (Of a total of about 700 job titles) with at least 10,000 jobs projected in 2006. These 30 job titles are projected to employ 907,208 or 28.5% of total employment in 2006. *Jobs that require College Graduation represent 8 of the top 57 jobs projected for 2006 and are projected to employ 174,680 or 5.5% of total employment in 2006. *Short-term jobs in total will increase in number and percent

more than jobs that require college graduation. * Systems Analyst is the only high-tech job title listed in the top 57 jobs with more than 10,000 workers projected in 2006. Even this job does not require a college degree. (See Tables I and II Pages 11-12)

Technology and computer related equipment make jobs easier not more difficult. Technology increases the productivity of workers and decreases the number of workers required for a given amount of production. Elementary school kids may use computers, including Milwaukee Public School students, as well or better than many highly paid CEO's, State and Local Superintendent's and education bureaucrats I have known.

Table III Occupational Areas That May Require Higher Math or Science

Occupational Areas	WI 1996 Employment	WI 2006 Employment	Number of Job Titles
Engineers	23,950	31,550	18
Engineering Technicians	21,310	22,690	11
Physical Scientists	2,740	3,450	6
Life Scientists	3,230	3,860	5
Physical & Life Science Tech.	5,780	6,530	5
Computer Systems	20,860	32,270	7
Math/Science Research	1,500	1,180	6
Math/Science Instruction	6,800	7,680	9*
Totals	85,170**	109,840**	67

Percent of Total Employment 3.0% * * 3.5% **

*Includes Life & Physical Science, Math, Computer & Health Specialty Teachers

As shown in table III, 67 job titles related to math and science are projected to employ 109,840 in Wisconsin in 2006. Two occupational titles, Salespersons Retail (82,230) and Cashiers (79,050) are projected to employ 161,280 in Wisconsin in 2006.

Nationwide there were 153,000 jobs in the so-called Biotechnology Industry according to an "Annual Biotechnology Industry Reports", 1993-1999 cited in the Journal/Sentinel article July 5, 2000. It is not clear as to how many of these jobs are scientific or technical and how many are business services or other non-scientific or non-technical jobs. In any case the number of potential jobs created in Wisconsin in the Biotechnology Industry is not large as compared to other industries. It is also not clear how many of the jobs created would be above average in salary.

The following data was taken from the, **Wisconsin Projections 1996-2006, Wisconsin Department of Workforce Development, July 1998.** There is no specific classification for biotechnology jobs. The job titles are from the more than 700 specific job titles.

Table V Job Titles That "May" be Biotechnology Related

Biotechnology Job Titles	1996 Employment	2006 Employment	Growth/Yr. 1996-2006
Physical & Life Scientists			
1. Chemistry	1,520	1,800	28
2. Biological Scientists	970	1,290	32

3. Life Scientists NEC	350	370	2
4. Agricultural Food Scientists	660	730	7
5. Medical Scientists	110	130	2
Totals	3,610	4,320	71
Physical/Life Science Technicians			
1. Biological, Agricultural/Food Techs	2,140	2,430	29
2. Science Technicians NEC	2,030	2,310	28
3. Chemical Technicians exc. Health	1,620	1,790	17
Totals	5,790	6,530	74
Total Biotechnology Job Titles	9,400	10,580	118
Percentage of Total Employment	0.3%	0.3%	

My experience since the 1960's in "vocational" education is that the market works and that demand for workers stimulates the development of a pool of workers prepared for the jobs in demand. Creating a trained pool of workers in advance to create new high tech high pay jobs is most often futile. Technology makes jobs simpler, not more complex, and increases the productivity of individual workers. Computer and technology literacy is now the norm for high school graduates. My experience is that workers who have learned on the job, after informal training or short-term training, are doing many so-called high tech jobs. Employers primary concern is whether they can do the job.

To preserve Wisconsin's strong economy and preserve high paying jobs already in existence, Wisconsin should modernize its core industries and the excellent educational programs preparing workers for jobs. Job projections by the Wisconsin DWD to 2006 indicate little change in overall employment patterns. There will be larger than average percentage increases in high-tech job titles and industries like Biotechnology and efforts should be made to increase employment in these areas. However these increases are small in numbers as compared to our existing workforce in our core industries like manufacturing.

The economic problems of the world are on the demand side not the supply side. Supply side education and training does not create good paying jobs anymore than failed supply side economics. The problem for Wisconsin is to create family living wage jobs. Workers with sufficient incomes to purchase goods and services are essential for creating jobs.

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