

Research, Publishing, and Tenure Among Texas Biologists

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This study examined opinions toward research among biology faculty in Texas institutions of higher learning. The objectives of the study were to determine what the viewpoints of Texas biology faculty were toward research according to faculty rank and institutional type. Mailed questionnaire approach was used in this study to collect data. Instrument was developed to assess perspectives toward research. Seven hundred-and-forty-two individuals participated in the study. Major findings of this study were: a) more than half of the participants (59%) showed positive opinions toward research, b) approximately 40% of the biology faculty of all ranks in Texas reported that publications used for tenure and promotion at their institutions are just counted, not qualitatively evaluated, c) more than 56% of the biology faculty of all ranks in Texas institutions believed that it is difficult in their department to achieve tenure if one does not publish, d) almost one-third (31%) of the biology faculty in Texas indicated that the pressure to publish reduces the quality of teaching in their department, and e) sixteen percent of the biology faculty from all institutions of higher learning in Texas revealed that research is frowned upon by administrators on their campus.

Boyer (1990), Buzza (1990), and Weaver (1986), to name a few, report that college and university faculty are vocalizing their frustrations with efforts to be good teachers, carry on research, publish, and provide services to students and communities, all at the same time. These researchers report that faculties in American institutions of higher learning recognize the conflict caused by a system that provides recognition and monetary compensation for limited tasks such as research and publication, while academic responsibilities to serve on college committees and to serve in the community that go beyond requirements are largely unrewarded. For years education theorists such as Bressler believed that research is necessary to improving professors' classroom teaching skills. However, more recent research studies by Friedrich and Michalak and Boyer do not support this notion. Madsen has written: "Faculty members of small universities should be judged by their teaching ability, not by their publication".

Caplow and McGee reported that many educators believe that pressure in the academic arena comes from being paid to teach, while being valued for research productivity and publications. Crimmel wrote: "Hired to teach, but paid to publish. It is a conflict that is both unfortunate and unnecessary." The significance of this study lies in the potential insight gained from a better understanding of biology teachers' perspectives toward research and publishing. Faculty scholarship is essential for maintaining the high quality learning, teaching, and they should be encouraged to produce scholarly products but not be threatened to the point of publishing or perishing (Bowyer, 1992). The findings of the study may also provide useful information to be useful to administrators or directors of faculty development programs.

Elements and Techniques

Mailed questionnaire approach was best for the study for the following reasons. They can reach many subjects all over a large state like Texas at a relatively low cost. Subjects have more time and privacy to formulate well thought out answers on the questionnaires than over the telephone or in person.

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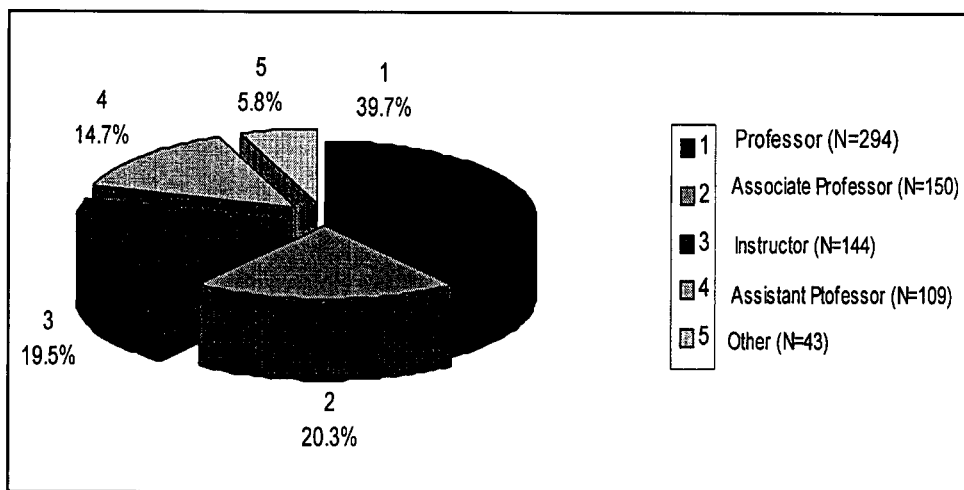
Finally, interviewer bias and recording errors do not prejudice the information (Clover and Balsley, 1984, p. 125). The developed instrument was validated by a panel of experts in the fields of biological sciences and higher education. The resulting instrument was used to gather information from the population. Responses used a five-point Likert-type scale. One key to success for any survey is a high rate of response. Alreck (1985) reported that the "cosmetic appearance[s] of the mail survey are very important." The procedure for administration of the questionnaire used in this study was designed to insure the highest possible response rate (58%). Permission for use of subjects was obtained from the Institutional Review Board. All 1,277 members of biology faculty within the population in Texas were mailed a cover letter, a survey instrument, and a return self-addressed, postage paid envelope. Faculty members were given two months to return the questionnaire. Official mailing lists of Texas biology faculty were obtained from the College Marketing Group Information Services in Wilmington, Massachusetts at a modest cost, a major advantage for this study. Survey instruments were color-coded for category identification purposes. In this study, the Cronbach's correlation coefficient alpha for items were

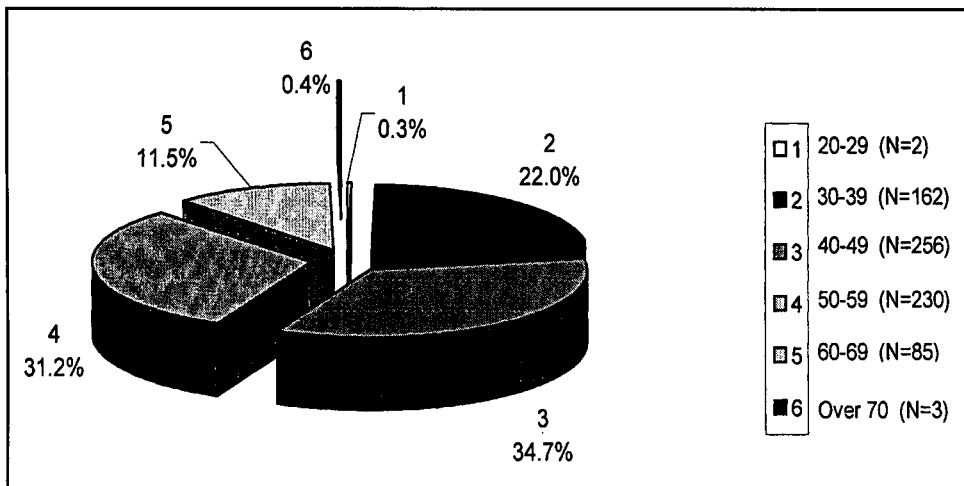
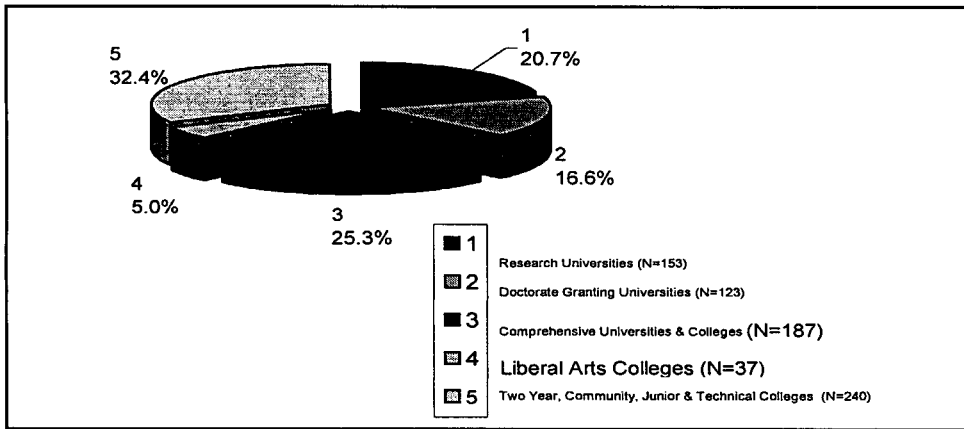
calculated to test for reliability.

Results and Discussions

The analysis revealed how Texas biology educators perceive the importance of various factors associated with research. Seven hundred-fifty-two instruments were returned from all participating schools, except for the specialized institutions. After reviewing and coding, only 740 questionnaires were acceptable for data analysis purposes. Data were analyzed in relationship to each individual research question in the study. Items of the instrument were positively correlated ($r = 0.76$). Non-parametric statistics (Chi-square) were used and all tests of significance were conducted at the 0.05 level of significance. Demographic data for biology faculty in Texas institutions of higher learning are presented in Figures 1 - 3.

An examination of Figure 1 reveals that approximately 40% of the biology faculty who participated in the study were full professors. Associate professors accounted for 20%, assistant professors 15%, instructors for 20%, and all others (adjunct, lecturers, no ranks, and those who did not specify) for 6%. According to the data presented in Figure 2, about 21% of returned responses were from faculty at research universities. Faculty from doctorate-granting colleges





and universities made up about 17% of the surveyed population, while 25% were from comprehensive colleges and universities, 5% were from liberal arts colleges and two-year community, junior, and technical colleges in Texas, accounted for about 32% of all responses. As shown in Figure 3, over one-third of all faculty (34.7%) in the study were between the ages of 40 and 49. The faculty in the 50 and 59 age group made up 31% of surveyed population. The remaining age groups indicated by the faculty were 22% between 30 and 39, 12% between 60 and 69, 0.3% between 20 and 29, and 0.4% were over 70 years of age. Over three-fourth (76.1%) of all faculty in Texas institutions of higher education who participated in the

study were males and females accounted for less than 25%.

According to the data in Table 1, there was a significant association between faculty rank and responses to the statement: Research is frowned upon by faculty on my campus. This table reveals that 69% of the faculty of all ranks disagreed with the statement either completely or somewhat, while 15% agreed (completely or somewhat) and 15% neither agreed nor disagreed. In Table 1, the chi-square value of 95.63 (16 d.f.) was significant at the 0.05 level. Among all faculty ranks, associate professors accounted for the highest percentage (89%) of those who disagreed with the above statement and instructors accounted for the lowest percentage (47%) of those who

disagreed. In table 2, data reveal that 69% of the faculty members from all institutions disagreed with the statement. Only 15% of the faculty agreed. The chi-square value of 249.80 (16 d.f.) was significant at the 0.05 level. Among faculty members from all institutions, research universities accounted for the highest percentage (98%) of responses who disagreed with the statement. This may confirm that such institutions are largely dependent upon grant money for support and continuous research.

According to the data in Table 3, there was a significant association between faculty rank and responses to the statement: Research is frowned upon by administrators on my campus. This table reveals that 70% of the

faculty of all ranks disagreed (completely or somewhat) with the statement, while 15% agreed (completely or somewhat) and about 15% neither agreed nor disagreed. In Table 3, the chi-square value of 107.81 (16 d.f.) was significant at the 0.05 level. Among all faculty ranks, associate professors accounted for the highest percentage (87%) of those who disagreed with the statement. This may illustrate that associate professors are engaged in research simply for tenure and promotion to full professorship. Instructors accounted for the lowest percentage (44%) of those who disagreed. An examination of Table 4 reveals that 70% of the faculty members from all institutions disagreed with the above statement. Only 16% of the faculty agreed.

Table 1
Statement 1: Research Is Frowned upon by Faculty on My Campus (N=738).

Faculty Rank	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Professor	52.74	20.21	12.33	11.64	2.74	292
Associate Professor	72.00	16.67	3.33	8.67	3.33	150
Assistant Professor	55.04	16.51	9.17	15.60	2.75	109
Instructor	28.47	18.06	35.42	12.50	4.17	144
Others	46.51	9.30	25.58	13.95	2.37	43
Total	51.90	17.07	15.31	11.92	3.12	738

$X^2 = 95.63$ with 16 d.f.; significant at $p = 0.05$

Table 2
Statement 1: Research Is Frowned upon by Faculty on My Campus (N=739).

Carnegie Classification System	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Research Universities	89.54	7.19	1.31	1.96	0.00	153
Doctorate Granting Universities	67.48	21.14	4.07	7.32	0.00	123
Comprehensive Universities and Colleges	48.66	24.60	7.49	17.65	1.60	187
Liberal Arts Colleges	40.54	18.92	18.92	16.22	5.41	37
Two-Year, Community, Junior and Technical Colleges	24.27	15.48	35.15	15.48	7.53	239
Total	51.96	17.19	15.16	11.91	3.11	739

$X^2 = 249.80$ with 16 d.f.; significant at $p = 0.05$

Table 3

Statement 2: Research Is Frowned upon by Administrators on My Campus (N=739).

Faculty Rank	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Professor	59.93	15.41	10.27	11.30	2.74	292
Associate Professor	71.52	15.89	3.97	5.96	2.63	151
Assistant Professor	54.13	15.60	10.09	14.68	4.59	109
Instructor	25.00	18.75	34.03	12.50	7.64	144
Others	37.21	18.60	25.38	9.30	6.98	43
Total	53.32	16.37	14.48	10.83	4.19	739

 $X^2 = 107.81$ with 16 d.f.; significant at $p = 0.05$

Table 4

Statement 2: Research Is Frowned upon by Administrators on My Campus (N=740).

Carnegie Classification System	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Research Universities	90.20	5.88	1.96	1.96	0.00	153
Doctorate Granting Universities	78.05	9.76	2.44	8.94	0.81	123
Comprehensive Universities and Colleges	53.48	24.06	8.02	11.23	3.21	187
Liberal Arts Colleges	29.73	16.22	24.32	24.32	5.41	37
Two-Year, Community, Junior and Technical Colleges	20.83	20.42	32.08	15.00	9.17	240
Total	53.38	16.35	14.46	10.81	4.19	740

 $X^2 = 262.35$ with 16 d.f.; significant at $p = 0.05$

In Table 4 the chi-square value of 262.35 (16 d.f.) was significant at the 0.05 level. Among faculty members from all institutions, research universities accounted for the highest percentage (97%) of responses who disagreed with the statement. This may also confirm that the primary sources of funding for these institutions are based on continuous research. The faculty from two-year, community, junior, and technical colleges accounted for the lowest percentage (40%) of those who disagreed.

According to the data in Table 5, there was not a significant association between faculty rank and responses to the statement: Research is vitally necessary for the welfare of the country. Almost all of the faculty (92%) of all ranks agreed (completely or somewhat)

with the statement, while only 5% disagreed (completely or somewhat). Among all, assistant professors accounted for the highest percentage (94%) of those who agreed with the statement. This may indicate that the assistant professors are expected to conduct research. Instructors accounted for the lowest percentage (89%). In Table 6, almost all the faculty members (92%) from all institutions agreed with the above statement. Only 5% disagreed. The chi-square value of 55.30 (16 d.f.) was significant at the 0.05 level. Among faculty members from all institutions, research universities accounted for the highest percentage (98%). The faculty from liberal arts colleges accounted for the lowest percentage (86%) of those agreed. This may represent that liberal arts colleges' primary

Table 5

Statement 3: Research is Vitally Necessary for the Welfare of the Country (N=740).

Faculty Rank	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Professor	1.37	1.03	4.45	17.47	21.84	292
Associate Professor	3.29	5.26	1.97	17.76	25.83	152
Assistant Professor	0.92	0.92	3.67	74.31	21.10	109
Instructor	2.78	4.86	4.17	65.28	20.14	144
Others	0.00	6.98	0.00	69.77	20.93	43
Total	1.89	2.97	3.51	72.30	22.16	740

 $X^2 = 23.01$ with 16 d.f.; significant at $p = 0.05$

Table 6

Statement 3: Research is Vitally Necessary for the Welfare of the Country (N=740).

Carnegie Classification System	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Research Universities	0.00	0.65	1.31	9.15	88.89	153
Doctorate Granting Universities	4.07	1.63	1.63	17.07	75.61	123
Comprehensive Universities and Colleges	2.67	3.74	2.67	22.99	67.91	187
Liberal Arts Colleges	0.00	0.00	13.51	32.43	54.05	37
Two-Year, Community, Junior and Technical Colleges	1.67	5.00	5.00	22.50	65.83	240
Total	1.89	2.97	3.51	19.46	72.16	740

 $X^2 = 55.30$ with 16 d.f.; significant at $p = 0.05$

mission is teaching.

Data in Table 7 reveal no statistically significant relationship was found between faculty ranks and the statement: Research can advance civilization to higher levels. This table shows that 87% of the faculty of all ranks agreed (completely or somewhat) with the above statement, while only 4% disagreed (completely or somewhat). However, associate professors accounted for the highest percentage (89%) of those who agreed with the statement. This may also exemplify that associate professors engaged in research are looking forward to tenure and full professorship. According to the data presented in Table 8, about 87% of the faculty from all institutions agreed with the above statement. Only 4% disagreed. The chi-square value

of 43.69 (16 d.f.) was significant at the 0.05 level. Among faculty members from all institutions, doctorate granting universities accounted for the highest percentage (92%) of those respondents who agreed with the statement. This may explain that doctorate granting institutions are competing with research institutions for grant contracts. The faculty from liberal arts colleges accounted for the lowest percentage (72%) of those who agreed.

According to the data in Table 9, there was a significant association between faculty rank and responses to the statement: At my institution publications used for tenure and promotion are just counted, not qualitatively measured. This table reveals that about 40% of the faculty of all ranks agreed with the

Table 7
Statement 4: Research Can Advance Civilization to Higher Levels (N=737).

Faculty Rank	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Professor	1.37	3.07	7.17	19.45	68.94	293
Associate Professor	1.99	2.65	6.62	22.52	66.23	151
Assistant Professor	1.85	1.85	14.81	25.00	56.48	108
Instructor	0.70	3.52	8.45	34.51	52.82	142
Others	0.00	2.33	11.63	23.26	62.79	43
Total	1.36	2.85	8.68	24.02	63.09	737

$X^2 = 23.2$ with 16 d.f.; significant at $p = 0.05$

Table 8
Statement 4: Research Can Advance Civilization to Higher Levels (N=738).

Carnegie Classification System	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Research Universities	1.31	0.65	8.50	15.69	73.86	153
Doctorate Granting Universities	3.25	1.63	3.25	18.70	73.17	123
Comprehensive Universities and Colleges	0.54	3.76	9.14	29.57	56.99	186
Liberal Arts Colleges	5.56	5.56	16.67	36.11	36.11	36
Two-Year, Community, Junior and Technical Colleges	1.25	3.75	10.00	28.75	56.25	240
Total	1.63	2.85	8.67	24.93	61.92	738

$X^2 = 43.69$ with 16 d.f.; significant at $p = 0.05$

Table 9
Statement 5: At My Institution Publications Used for Tenure and Promotion Are Just Counted Not Qualitatively Measured (N=734).

Faculty Rank	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Professor	15.40	14.04	23.63	29.79	15.75	292
Associate Professor	10.53	17.76	22.37	28.93	20.39	152
Assistant Professor	7.41	12.96	30.56	31.48	16.67	108
Instructor	9.29	2.86	67.14	10.71	3.57	140
Others	2.38	16.67	47.62	21.43	4.76	42
Total	11.31	12.67	34.06	25.75	13.90	734

$X^2 = 125.66$ with 16 d.f.; significant at $p = 0.05$

statement (completely or somewhat), while 24% disagreed (completely or somewhat). Over one-third (34%) neither agreed nor disagreed. This is consistent with the 1989 Carnegie Foundation findings. The Carnegie study showed that 38% of all faculty members from several different departments agreed with the same statement. The chi-square value of 125.66 (16 d.f.) was significant at the 0.05 level. Associate professors accounted for the highest percentage (49%) of those who agreed with the above statement and instructors accounted for the lowest percentage (14%) of those who agreed. Table 10 contains data showing that there was a significant association between type of institution and responses to the above

statement. This table reveals that about 40% of the faculty from all institutions agreed with the statement, while 24% disagreed, and over one-third (34%) neither agreed nor disagreed. The chi-square value of 212.25 (16 d.f.) was significant at the 0.05 level. In this study, faculty members from comprehensive colleges and universities accounted for the highest percentage (57%) of respondents who agreed with the above statement. This is slightly higher than those findings of the 1989 Carnegie Foundation report, which indicated that 54% of all faculty members from several different departments agreed with the same statement. The faculty from two-year, community, junior, and technical colleges accounted for the lowest percentage

Table 10
Statement 5: At My Institution Publications Used for Tenure and Promotion Are Just Counted Not Qualitatively Measured (N=731).

Carnegie Classification System	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Research Universities	11.84	19.74	15.13	30.26	23.03	152
Doctorate Granting Universities	12.40	23.14	16.53	37.19	10.74	121
Comprehensive Universities and Colleges	10.81	8.63	23.24	37.30	20.00	185
Liberal Arts Colleges	24.32	13.51	29.73	18.92	10.81	37
Two-Year, Community, Junior and Technical Colleges	8.90	4.24	65.25	9.52	5.51	236
Total	11.35	12.18	34.34	25.85	13.95	731

$X^2 = 212.25$ with 16 d.f.; significant at $p = 0.05$

Table 11
Statement 6: The Pressure to Publish Reduces the Quality of Teaching in My Department (N=736).

Faculty Rank	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Professor	36.64	13.36	15.75	22.60	9.93	292
Associate Professor	28.47	11.25	15.23	27.15	17.88	151
Assistant Professor	27.52	18.35	16.51	24.77	11.93	109
Instructor	35.21	9.86	34.51	11.27	3.52	142
Others	33.33	7.14	38.10	4.76	9.52	42
Total	33.15	12.64	20.65	20.65	10.60	736

$X^2 = 65.26$ with 16 d.f.; significant at $p = 0.05$

(15%) of those who agreed.

According to the data in Table 11, there was a significant association between faculty rank and responses to the statement: The pressure to publish reduces the quality of teaching in my department. This table reveals that 46% of the faculty of all ranks disagreed (completely or somewhat) with the statement, while 31% agreed (completely or somewhat) and 21% neither agreed nor disagreed. The chi-square value of 65.26 (16 d.f.) was significant at the 0.05 level. Among all faculty ranks, full professors accounted for the highest percentage (50%) of those who disagreed with the statement. This may suggest that full professors are most committed to the idea of publishing. In Table 12 are data indicating that 46% of the faculty from all institutions disagreed with the above statement. Almost one-third (31%) of the faculty agreed, while 21% neither agreed nor disagreed. The chi-square value of 180.05 (16 d.f.) was significant at the 0.05 level. Among faculty members from all institutions, research universities accounted for the highest percentage (61%) of respondents who agreed with the above statement. In the Carnegie Foundation report 52% of all faculty members from research universities of several different departments agreed with the Carnegie's statement. The faculty from liberal arts colleges in this study accounted for the lowest percentage (11%) of those who agreed.

According to the data in Table 13, there was a significant association between faculty rank and responses to the statement: In my opinion it is difficult for a person in my department to achieve tenure if he or she does not publish. This table shows that most faculty members (56%) of all ranks agreed (completely or somewhat) with the statement, while 28% disagreed (completely or somewhat), and 13% neither agreed nor disagreed. The chi-square value of 141.58 (16 d.f.) was significant at the 0.05 level. Among all faculty ranks, full professors accounted

for the highest percentage (68%) of those who agreed with the statement. This may illustrate that full professors have experienced the most pressure to publish in order to gain tenure and promotions. An examination of Table 14 reveals that most of the faculty members (56%) from all institutions agreed with the above statement. Only 28% of the faculty disagreed and 13% neither agreed nor disagreed. The chi-square value of 473.62 (16 d.f.) was significant at the 0.05 level. Among faculty members from all institutions, research universities accounted for the highest percentage (98%) of respondents who agreed with the above statement. This is much higher than those findings of the 1989 Carnegie Foundation study that reported that 94% of all faculty members from research universities of several different departments agreed with the same statement. The faculty from two-year, community, junior, and technical college accounted for the lowest percentage (10%) of those who agreed.

Conclusions and Recommendations

This study revealed that approximately 40% of all biology faculty in Texas report that publications used for tenure and promotion at their institutions are just counted, not qualitatively evaluated (Table 9). Huer (1991) wrote: "Academic tenure for American professors is an extraordinarily self-contradictory phenomenon Tenure is a privilege, and all privileges eventually corrupt The tenure privilege in American universities is an aberration This privilege is gained neither by merit nor by heredity. It is acquired chiefly by luck (being in the right place at the right time), by convenience (expanding one's vita, not one's scholarship), or by demonstrating an infinite capacity for humility (sometimes called collegiality). These qualities may be necessary and valuable for survival in a highly competitive economic society". Finally, over 56% of the biology faculty of all ranks in Texas institutions of higher learning believed that it is difficult in their departments

Table 12

Statement 6: The Pressure to Publish Reduces the Quality of Teaching in My Department (N=737).

Carnegie Classification System	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Research Universities	17.65	12.42	9.15	33.99	26.80	153
Doctorate Granting Universities	24.39	14.63	15.45	34.15	11.38	123
Comprehensive Universities and Colleges	42.47	19.35	12.90	18.28	6.45	186
Liberal Arts Colleges	56.76	10.81	21.62	10.81	0.00	37
Two-Year, Community, Junior and Technical Colleges	36.55	6.72	36.53	8.40	5.04	238
Total	33.11	12.62	20.62	20.62	10.72	737

$X^2 = 180.05$ with 16 d.f.; significant at $p = 0.05$

Table 13

Statement 7: In My Opinion It Is Difficult for a Person in My Department to Achieve Tenure If He or She Does Not Publish (N=734).

Faculty Rank	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Professor	20.62	5.84	4.81	9.28	58.42	291
Associate Professor	20.53	3.97	9.93	11.26	54.30	151
Assistant Professor	13.76	11.01	8.26	10.09	55.96	109
Instructor	30.00	7.14	35.71	2.86	18.57	140
Others	30.23	0.00	25.58	2.32	34.88	43
Total	21.93	6.13	13.49	8.17	48.23	734

$X^2 = 141.58$ with 16 d.f.; significant at $p = 0.05$

Table 14

Statement 7: In My Opinion It Is Difficult for a Person in My Department to Achieve Tenure If He or She Does Not Publish (N=735).

Carnegie Classification System	Disagree Completely %	Disagree Somewhat %	Neither Agree Nor Disagree %	Agree Somewhat %	Agree Completely %	Total N
Research Universities	0.65	1.31	0.00	4.58	93.46	153
Doctorate Granting Universities	4.07	3.25	4.07	8.13	80.49	123
Comprehensive Universities and Colleges	12.90	11.83	6.99	17.20	51.08	186
Liberal Arts Colleges	54.05	8.11	18.92	10.81	5.41	37
Two-Year, Community, Junior and Technical Colleges	47.03	5.93	31.36	2.97	6.78	236
Total	21.90	6.12	13.47	8.16	48.30	735

$X^2 = 473.62$ with 16 d.f.; significant at $p = 0.05$

to achieve tenure if one does not publish (Table 9). Smith (1990) mentioned: "the vast majority of what passes for research/publication in the major universities of America is mediocre, expensive, and unnecessary, does not push back the frontiers of knowledge in any appreciable degree, and serves only to get professors promotions, it may be appropriate to give some consideration to teaching". Based on the findings and conclusions of this study, the following recommendations are made; (1) to re-evaluate the existing pressure in the academic arena, which comes from being hired to teach, while being valued for research productivity and publications. Crimmel (1984) wrote: "A conflict that is both unfortunate and unnecessary", (2) since scholarship is of vital importance to the academic enterprise, it is recommended that research productivity should be measured qualitatively, not quantitatively, and (3) a great diversity of opinions seems to exist for what it means to be a scholar. It is recommended that an investigation be made of the various difficult situations now as an opportunity to rethink what it means to be an educator today. It is also recommended that institutions of higher education examine the current state of biology research and understanding of faculty and staff within their departments. The faculty of such departments can then develop appropriate programs for adequate faculty tenure and promotion evaluation. Deutsch (1975) suggested modification of criteria for appointment, promotion, and tenure. Wachtel (1980) said, limit the number of works submitted for hiring, tenure, and promotion evaluation to an applicant's three best works.

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