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The Use Of Multiple Linear Regression In Predicting Scholarly Productivity Among Counselor Educators

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Abstract

The present study was designed to find a regression equation that would help predict research productivity among counselor educators. Seven variables were found to contribute significantly to the equation, yielding an R^2 of .455. The authors present several ways in which this information can be utilized.

Research activity is very important for college and university faculty members. In addition to teaching, advising students, and other related duties, faculty are expected to engage in research activity within their particular disciplines. The "publish or perish" phenomenon is well known in academic circles, even though it may be argued that a college educator's worth cannot be measured simply by research productivity. Nevertheless, the importance of publishing is likely to become increasingly crucial as the academic climate reflects lower enrollment, fewer economic resources, and faculty retrenchment. Bishkin (1984) noted that as grants and other resources become increasingly scarce, only creative researchers will be able to obtain funding. At the same time, productivity is still required.

Numerous researchers have attempted to measure scholarly productivity, despite the nebulous issue of quality versus quantity. Studies within the physical sciences (Bayer & Dutton, 1977; Bayer & Fogler, 1966; Crane, 1965) and within psychology (Dennis, 1954; Guyer & Fidell, 1973; Platz & Blakelock, 1960) have measured productivity by counting

journal articles and books, looking at the number of citations, and analyzing the content of journal articles.

Little research, however, has been done in the field of counselor education. Walton (1982) looked at differences between high and low producers on numerous variables using chi-square analyses. He found several significant differences between the two groups, and suggested several ways those differences could be used by counselor educators.

The present study is an extension of Walton's (1982) research, and employs multiple linear regression to predict productivity among counselor educators. Institutions which intend to hire employees who are likely to engage in research may be able to use the equation generated in the present study to predict whether the prospective faculty member will be a high or low producer in terms of the publication record. Individuals can also use the equation to determine whether or not a given academic environment is conducive to research activity.

Methods and Procedures

A total of 520 questionnaires was mailed to members of the Counselor Education and Supervision (ACES) division of the American Personnel and Guidance Association (APGA), which is now called the American Association for Counseling and Development (AACD). From these randomly selected individuals,

56.1 percent returned completed questionnaires. For the purposes of this analysis, only those respondents who listed their primary occupation as counselor educator were included. Questionnaires with a substantial amount of missing data were not retained for the analysis. Hence, a total of 158 subjects was used for the regression procedure. It should be noted that educators who are low publishers may be underrepresented in the sample. Some caution is necessary when interpreting the results.

The questionnaire was divided into two major parts. The first dealt with demographic information, as well as preferences within the field of counseling, while the second part concerned productivity information. In the final analysis, the number of journal articles, books, and monographs each participant reported having published was used as the dependent variable.

All variables which were nominal in form were dummy-coded in order to perform the multiple regression analysis. The authors employed several regression procedures with pairwise deletion of missing data. Pairwise deletion allows for the inclusion of a questionnaire with a minimal amount of missing information. The default on most software packages is to delete a questionnaire if even one item is missing.

It was hypothesized that some combination of the variables would yield an R^2 value significantly different from zero, such that Ho: $R^2y.x_1x_2...x_p = 0$. Because of the exploratory nature of the study, the authors did not predict which variables would significantly contribute to the regression equation.

Results

Before regression procedures were employed, an analysis checking for outliers was conducted. Using Cook's Distance, Mahalanobis' Distance, and Weisberg's Test, it was determined that no outliers were present.

Five regression procedures were used in an attempt to reach a concensus on the variables included in the equation. A graph of the R^2 and Adjusted R^2 values yielded similar results. Other graphical methods were not employed, although it can be noted that the Adjusted R^2 values give almost identical results to an analysis of the residual mean squares, as Hocking (1976) noted.

Both R^2 and Adjusted R^2 indicated that seven variables probably determined the most useful equation. Forward, backward, and stepwise procedures concurred with this conclusion, with all five methods suggesting the same regression equation.

When the questionnaire was developed it was assumed that the percentage of completed questionnaires returned would be

maximized by allowing the respondent to answer in categories rather than requiring exact information. It was reasoned that counselors would be more likely to respond if given various ranges to choose from, rather than having to give exact figures

Although such procedures may have had desirable results in terms of the rate of return, there was a disadvantage in using such information without assigning rank values. Thus, the data analysis may have lost some of its potency because of the use of categorical data rather than interval data. Table 1 gives the appropriate values, after dummy-coding, for the seven variables used in the equation.

Table 1.

Values Assigned to Categorical Data

Years of Work	0-4 = 1	5-10 = 2	11-25 = 3	>25 = 4
Research Hrs/Week	0-4 = 1	5-12 = 2	13-20 = 3	>20 = 4
University Size	<10,000 = 1	10,000-19,999 = 2	20,000-29,999 = 3	
	30,000-39,999 = 4	40,000-49,999 = 5	>50,000 = 6	
Number of Journal Subscriptions	0-2 = 1	3-4 = 2	5-10 = 3	>10 = 4
Rank	Professor = 1	Associate Professor = 2	Assistant	
	Professor = 3	Instructor = 4	Other = 5	
Preferred Activity = Administration	No = 0	Yes = 1		
First Publication	Before Doctorate = 0	After Doctorate = 1		

The seven variables meeting the criterion for entry into the model resulted in an R^2 of .455. The resulting *F* value was 17.88, $p < .0001$. Table 2 gives the regression equation, and indicates that all seven variables meet the .05 criterion for inclusion in the model. When reduced models from this restricted model were considered, the *F* value remained significant, giving further evidence that all seven variables contribute to predicting productivity among counselor educators.

Table 2

Variables in Restricted Model, as Determined by All Five Methods

Variable	B	Error	R^2	F	Significance
Years of Work	.56	.16	.182	12.67	.0005
Research hrs/Week	.64	.18	.301	12.70	.0005
University Size	.36	.08	.356	19.13	.0001
First Publication	-.70	.20	.391	11.67	.0008
Journal Subscriptions	.37	.15	.420	5.65	.0187
Rank	-.31	444	.440	4.47	.0362
Administration	-1.25	.62	.455	4.04	.0463
Constant	-1.18	.77			

Discussion

The present study suggests that it is possible to predict counselor educator productivity with a reasonable amount of accuracy based on seven variables. These are: years of work in the field, number of hours per week spent on research activities, size of university, whether the first publication was before or after receipt of the doctoral degree, the number of journals subscribed to, academic rank, and whether or not the preferred professional activity is in administration. Of these, several seem intuitive. First, the number of hours spent doing research would seem to be an obvious indicator of how many publications that researcher is likely to produce, although it is recognized that one could spend many hours on research, and still not be highly productive in terms of tangible end products. Second, the number of years of work experience has a substantial correlation with productivity. The longer a researcher has been in the field, generally speaking, the more the likelihood that he or she has publish professional articles. Associated with this is Walton's (1982) finding that as an individual improves his or her academic rank, scholarly productivity is likely to increas It should be noted that academic rank increases with nu[illegible] years of work experience.

University size is also a predictive factor of productivity. Walton (1982) noted that 50% of high producers were affiliated with institutions whose total student population was more than 20,000, while 43.3% of low producers worked at colleges or universities with less than 10,000 students. The present authors suggest that larger universities generally tend to facilitate research activities more than their smaller counterparts.

The number of journals to which the individual subscribes was another of the predictive factors in the present study. Walton (1982) found that counselor educators who subscribed to more journals were more likely to publish. This does not mean that those who do not publish do not keep current in the field, as over 62% of low producers subscribed to at least five journals, and over 95% received at least three journals. Alternately, it may indicate that high producers are likely to receive a large number of journals. The reasons for this are unclear, but may be related to their search for relevant research topics and issues.

Another predictive variable is whether the individual's first publication was before or after receipt of the doctoral degree. Highly productive researchers were more likely to have published their first work before they received their doctorate (Walton, 1982). This seems to indicate that those

expressing an interest in research before beginning work as counselor educators are likely to maintain the interest after obtaining employment in the field.

The question of academic rank has been previously addressed. In terms of whether or not one prefers administrative tasks, it would seem to follow naturally that less time spent on administrative work leaves more time available for research and publication. Although Walton (1982) reported few differences in high versus low producers on this variable, the current finding could be an artifact of the question, since preferred activity was requested rather than the activity in which the most time was actually spent.

The prospective counselor educator may be able to use the information contained in the present study, along with that provided by Walton (1982), to determine if the institutional environment of a potential employer is conducive to research productivity. Specifically, does the institution allow adequate time for research? Also, is the size of the institution sufficient for adequate support of research activity? These factors must be combined with factors the potential employee controls in order to reach an adequate level of prediction. Conversely, the institution can use the equation to help choose faculty members who are likely to participate in research activities. A substantial part of the

variance is not accounted for in the equation; therefore the equation should not be used as the only selection device.

It should be remembered that the present study probably underestimates the variance accounted for by the independent variables, since the present study used categorical data rather than exact responses. This factor is especially relevant when one considers the dependent variable, which was the number of journal articles, as well as the number of books and monographs published. Dividing responses into several categories rather than looking at the exact number of publications may have yielded a conservative estimate of the effect of variables predicting counselor educator productivity. As mentioned previously, however, ordinal responses were used to obtain a higher rate of return.

The authors suggest that more research is needed in this area. A replication would help ensure the validity of the prediction equation, and would substantiate the present authors' claim that it is possible to predict research productivity among counselor educators on the basis of the seven prediction variables listed herein.

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