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Mystic Inspiration or Effective Habits? Using Goal Setting and Behavioral Self-Management to Increase Research Productivity

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Abstract

Although numerous and diverse publications address professors' writing and research productivity, exceedingly few empirical studies report findings for interventions designed and implemented to increase professors' research productivity. This study used an innovative mixed methods design with a concurrent triangulation strategy and methods from two research traditions that investigators rarely integrate – quantitative single-case interventions and qualitative inquiry. Processes and findings from this study illustrate how researchers can combine these methods to illuminate the how and why of changes in performance in participant-interventionist studies. In this study, university professors used goal setting and behavioral self-management techniques to increase their daily research productivity and the number of manuscripts they submitted to professional journals. Based on findings and existing literature, we identify practical habits that increase research productivity. This study extends the literature base that includes numerous descriptive articles and opinion pieces on many topics about scholarly productivity, but few intervention studies that report quantitative findings.

Key words: behavioral self-management, case study, goal setting, mixed methods, productivity, professors, qualitative, quantitative, research design, single-case, writing

Mystic Inspiration of Effective Habits?

Using Goal Setting and Behavioral Self-Management to Increase Research Productivity

In a somewhat unconventional article for the
Journal of Applied Behavior Analysis, Irving Wallace, described how he and other famous novelists dating to the 19th century – independent of any formal knowledge, consultation, or training – used behavior modification techniques to write productively rather than waiting for periods of creative

inspiration (Wallace & Pear, 1977).

Once, long ago, deceived by the instructors, professors, by an old romantic tradition, I had believed that a writer writes only when he feels like it, only when he is touched by mystic inspiration. But then, after studying the work habits of novelists of the past, I realized that most successful writers invest their work with professionalism. From Balzac who worked six to twelve hours per day and… Hemingway, six hours a day, these authors were uniformly industrious, and when they were once launched upon a book they wrote regularly, day in and day out… In short, no matter how they effected their routines, the vast majority of published authors have kept, and do keep, some semblance of regular daily hours… Occasionally the hourkeepers were inspired when they went to their desks, but if they were not, they simply wrote as well as they could, as craftsmen, and hoped for the best. (p. 518)

In this article, we describe an intervention that increased research productivity of university professors. The intervention draws upon practices that productive writers have used for more than a century, as well as contemporary, empirically validated, behavior change procedures, including goal setting and behavioral self-management (BSM).

Research and Writing Productivity of University Professors

At many universities throughout the world, research productivity is the primary criterion used to evaluate professors' performance for purposes of job retention, promotion, and tenure. Publication in peer-reviewed journals is the hallmark of research productivity, although Savage (2003) posits that publication of books has become a standard measure of research productivity at some universities. Topics on research productivity are debated extensively, including: (a) quantity and quality of publications (Shea, 1997); (b) scholarship versus teaching (Oakley, 1997; Tierney, 2001); (c) consequences of using specific indicators, such as number of publications, to evaluate research productivity (Savage, 2003); (d) difficulties faced by scientists from third-world countries when attempting to publish in prestigious journals of first-world countries (Dietrich, 1998); and (e) effects, biases, and barriers in publishing, promotion, and tenure as a function of gender, race, age, and other factors (Creamer & McGuire, 1998; Toutkoishian & Bellas, 1999; Perna, 2001; Suitor, Mecom, & Feld, 2001; Dunn, 2005; Rothausen-Vange, Marler, & Wright, 2005). Debates notwithstanding, insufficient scholarly writing inhibits dissemination of knowledge, differentiates the credibility and professional standing of various disciplines (McCrory, 2002), and, in some instances, costs professors their jobs (Van Wyk, 1998).

Many authors have opined about research productivity and disseminated guidelines that describe how to write and publish. Moreover, numerous researchers have investigated professors' productivity via

descriptive and comparative studies, nearly of all of which are retrospective. However, very few researchers have implemented an intervention and collected quantitative data to evaluate whether professors' research productivity increased as a function of the intervention. Descriptive studies include Mallard (2002), who identified various stages in the development of scholars, as well as components for mentoring scholars. In addition, Polonsky, Juric, and Mankelow (2003) concluded that workload and associated stressors likely inhibit research productivity of some professors. Comparative studies include Endler (1997), as well as Mooney (1991) who reported that professors at research universities published at twice the rate of professors at other institutions of higher education.

Boice's body of work (1982; 1983, 1990; 1992) stands out among the exceedingly few intervention studies designed to increase scholarly writing productivity. Boice (1990) described reasons why professors fail to write productively, as well as research-validated strategies that increase productivity.

Many professors write in ways they know are less than optimal. They tend to save writing for times when they are tired, having spent fresher hours of the day on less valued tasks. Still, those who write most fluently and successfully provide clues about effective habits: these professors as writers follow fairly regular schedules of writing, avoid bingeing in writing, feel less anxiety about writing, and express little resentment toward the editorial process. Waiting to write until there is enough 'free time' usually means that writing gets put off. In other words, it gets procrastinated. Except, perhaps, when deadlines loom directly ahead, writing is an activity that can always be put off. (pp. 13, 73)

Boice (1992) also found that combined interventions were more effective than single interventions when treating writers' block in professional writers. Single interventions (i.e., automaticity, regimen, self-control, and social skills training) failed to maintain unblocking for the duration of an academic year, whereas combined interventions were associated with: (a) more stable productivity; (b) more manuscripts completed, submitted, and accepted for publication; and (c) better recovery from manuscript rejections.

More recently, Pololi, Knight, and Dunn (2004) reported that a collaborative mentoring program, which included monthly writing contracts, "facilitated the knowledge, skills, and support need to foster writing productivity" (p. 64) of 18 assistant professors at one medical school. The investigators analyzed qualitative data, such as participants' responses to open-ended questions about their experiences. However, the investigators did not report quantitative data to compare participants' writing productivity before, during, or after the intervention. Likewise, Morss and Murray's (2001) "Writing for Publication" program, conducted with academicians at a Scottish university, facilitated positive outcomes based on qualitative analyses of participants responses, but the investigators did not report quantitative data on changes in productivity.

BSM and Goal Setting

The BSM and goal setting components applied in our current study are derived from principles of cognitive-behavioral modification. BSM components emerged with systematic investigations of self-modification, which Watson and Tharp (1972) described as "an effort to link self-change strategies to a general theory of behavior" (p. viii). BSM capitalizes on reactive effects of cognitive factors, such as self-awareness and self-talk, and behavioral factors, such as antecedents, actions, and consequences (Kanfer & Karoly, 1972; Meichenbaum, 1977; Rachlin, 1974; Skinner, 1953). Literature reviews, meta-analytic reviews, and hundreds of individual studies have established the efficacy of BSM techniques,

such as self-monitoring and self-reinforcement (McDougall, 1998). Additionally, both classic and contemporary research findings support the efficacy of goal setting as a component of change models and interventions designed to improve systemic, group, and individual outcomes (Carter & Chatfield, 1986; Fullen, 1993; Goldenberg, 2004; Goldenberg, Saunders, & Gallimore, 2004; McDougall, 2002; McDougall, Smith, Black, & Rumrill, 2005; McDougall, 2005a; Peterson & Lezotte, 1991; Tyler, 1949). Numerous studies have demonstrated that participants who used goal setting and BSM components have improved their writing. Most participants in these studies were children or adolescents (cf., Kasper-Ferguson & Moxley, 2002; Seabaugh & Schumaker, 1994). However, McDougall et al. (2005) combined goal setting, self-planning, self-monitoring and self-graphing and improved a professor's research productivity, from a few minutes per day to three hours per day.

Lessons from Famous Novelists: Writing as Mystic Inspiration or as Behavioral Habit?

We believe that university professors who wish to establish a pattern of research productivity might benefit from the experiences of some renowned authors. In
Self-Control Techniques of Famous Novelists,
Irving Wallace (1971) described how he used charts and recorded his daily writing productivity.

With my fifth book, I started keeping a more detailed chart, which also showed how many

pages I had written at the end of every working day. I am not sure why I started keeping such records, I suspect that it was because, as a free-lance writer, entirely on my own,

without employer or deadline, I wanted to create disciplines for myself, ones that were guilt-making when ignored. A chart on the wall served as such a discipline, its figures

scolding me or encouraging me. I had never told anyone about these charts because I always feared that their existence would be considered eccentric or unliterary. But through the years, I have learned that their usage has not been uncommon among

well-known novelists of the past. (pp. 516-517)

More than a century ago, Trollope described in his autobiography how he maintained writing productivity. Trollope authored more than 50 novels and "was perhaps the greatest record-keeper [i.e., self-recorder of daily writing productivity] known to literature" (Wallace & Pear, 1977, p. 517). Many of the intervention elements and behavior change principles we applied in this current study are embedded [see brackets] within Trollope's description.

When I have commenced a new book, I have always prepared a diary, divided into weeks,

and carried on the period which I have allowed myself for the completion of the work.

[goal setting] In this I have entered, day by day, the number of pages that I have written,

[self-monitoring] so that if at any time I have slipped into idleness for a day or two, the

record of idleness has been there, staring me in the face, and demanding of me increased

labour, so that the deficiency might be supplied. [reactivity] According to the

circumstances of the time – whether my other business might then be heavy or light … I

have allotted myself so many pages a week. [short-term objectives] The average number

has been about 40 … as low as 20, and has risen to 112. [long-term productivity achieved

and behavioral momentum maintained via reasonable variation in daily productivity] There has ever been the record before me, and a week passed with an insufficient number of pages has been a blister to my eye and a month so disgraced would have been a sorrow to my heart. [reactivity] I have been told that such appliances are beneath the genius, but

had I been so, I think I might have subjected myself to these trammels. Nothing surely is

so potent as a law that may not be disobeyed [habit]. It has the force of the water-drop

that hollows the stone. A small daily task, if it be really daily, will beat the labours of a

spasmodic Hercules [Trollope, 1946, pp. 116-117]." (Wallace & Pear, 1977, p. 518)

Study Purpose, Research Question, and Research Hypothesis

In describing how to write productively, we – like novelists such as Trollope and Wallace, and researchers such as Boice (1990) – espouse behavioral principles and routines in favor of alternative explanations such as genius, inspiration, and heroic efforts. In this study, we extend the literature base on goal setting and BSM by targeting research productivity in the form of producing manuscripts for publication in peer-reviewed, professional journals – an essential task that challenges many university professors. Thus, we sought to replicate and extend findings from the McDougall et al. (2005) intervention, which increased the productivity of a professor during an off-duty period (summer vacation), when this sole participant had no teaching, supervision, or service tasks. Our primary research question was: To what extent does an intervention that combines goal setting and multiple BSM components, including self-planning, self-monitoring, and self-graphing, impact research productivity of three university professors? Through qualitative inquiry we also aimed to illuminate how and why, from participants' perspectives, their research productivity changed.

Method

Participants and Settings

The three participants in this study were professors in the College of Education at a public university in the Pacific Basin. Professor A was a White, male, tenured, associate professor in his 15th year in higher education. Professor B was a White, female, tenured, associate professor in her ninth year in higher education. Professor C was a White, male, non-tenured, assistant professor in his 11th year in higher education, but only in his 3rd year of a tenure-track position. We used purposive sampling (Patton, 1990) to identify participants who: (a) performed similar duties in the same department of the university; (b) demonstrated previously the capacity to publish journal articles; (c) experienced periods when their journal publications waned; (d) disseminated recently products other than journal articles (e.g., videos, monographs, and evaluation reports); (d) anticipated seeking promotion within one to two years of this study; and (e) desired to increase publications in peer-reviewed professional journals. The

settings for this study included the professors' offices and homes during a fall semester.

Materials

Intervention materials included timing devices (i.e., wristwatches, chronographs, clocks mounted on walls and embedded in computer monitors), data sheets, graph paper (8.50" x 11.75" with 4 squares per inch), and pencils and pens. Additional intervention materials included laptop and desktop computers, printers, word-processing programs, a statistical analysis program, floppy disks and CDs, printing paper, on-line and on-site library resources (e.g., electronic search systems), and manuscripts in various stages of development. We also used a 5-item questionnaire to collect social validity data from participants and their peers. Other materials included a notebook for field notes from conversations and e-mail messages between participants. We also used an interview protocol and the audio recording feature of a laptop computer to record, transcribe, and verify information from one focus group interview.

Research Design

This mixed methods research design applied a concurrent triangulation strategy (Creswell, 2003; Greene & Caricelli, 1997; Tashakkori & Teddlie, 1997, 2003) and drew upon two major traditions – single-case or small-N research, and qualitative inquiry. For the quantitative element of this research design, we used a multiple baseline design across participants with changing criteria embedded within intervention phases (Kazdin, 1982). For the qualitative element of this study, we used case studies (Miles & Huberman, 1994).

Variables of Interest and Data Collection

Dependent variable and measurement. The dependent variable or target behavior in this study was research productivity, which we operationally defined as activities that served the function of submitting manuscripts to professional journals. These activities included: drafting, editing, typing, and reading portions of manuscripts; inputting and analyzing numerical data with statistical analysis and graphing programs; analyzing and coding quantitative or qualitative data; searching the literature and retrieving articles on-line and at libraries; and corresponding with co-authors. We excluded from this operational definition tasks that served the function of creating and disseminating books, book chapters, monographs, videos, and newsletters.

Each participant used a watch, clock, or chronograph to measure duration, in minutes, of daily research activities. Procedures for measuring the dependent variable required each participant to note the times when research activities began and ended. Participants did not include in their daily totals any time during which their research activities were interrupted. Participants were instructed to write on a self-monitoring sheet, the number of minutes they spent on research activities each day, as well as their cumulative moving average. For example, a participant who produced 90, 30, and 60 minutes, respectively, on days 1, 2, and 3 of an intervention phase, was to record moving averages of: (a) 90 min/day on day 1 [90 min/1 day]; (b) 60 min/day on day 2 [(90 min + 30 min = 120 min)/2 days]; and (c) 60 min/day on day 3 [(90 min + 30 min + 60 min = 180 min)/3 days].

Maintenance and generalization of dependent variable. We measured short-term maintenance of daily research productivity immediately after the last intervention phase ended, as well as long-term

maintenance one year after the short-term maintenance phase ended. For generalization, we counted the number of manuscripts that each participant completed and submitted to journal editors for formal review during the first 122 sessions of this study.

Reliability of dependent variable measurement. The first author assessed reliability of dependent variable measurement, in the form of
intra-observer agreement, using the formula, shorter duration in minutes divided by longer duration in minutes, multiplied by 100% (Kazdin, 1982). Reliability was 100% for each of 11 sessions assessed.

Social validity of changes in dependent variable.
We used the social comparison and subjective evaluation methods to assess social validity of changes in the dependent variable (Kazdin, 1982). For social comparison, we collected quantitative data on two indices of research productivity and compared participants to their colleagues (i.e., the other, seven, tenure-track faculty members in the same department). These two indices included self-reported mean number of minutes expended daily on research activities and self-reported number of manuscripts submitted to journal editors. For subjective evaluation data, each participant described, in writing, their research productivity and writing habits before and during intervention phases.

Qualitative inquiry. We used case studies to illuminate participants' perspectives, individually and collectively, on the dynamics of change, that is, how and why research productivity changed. The lead author collected: (a) field notes based on informal conversations and e-mail messages with the other participants; (b) comments that participants wrote on self-recording documents (Merriam, 1998); and (c) subjective evaluation data via a social validity questionnaire. We also conducted a focus group interview at the same time we collected long-term maintenance data.

Independent Variable and Intervention Procedures

The independent variable in this study was goal setting combined with BSM components that included self-monitoring and self-graphing. The first author met with each participant, provided necessary materials, including self-recording forms and self-graphing paper, and explained the following intervention procedures.

Goal setting. Each participant identified one or more goals and developed a plan with target dates by which they intended to achieve the goals. Goals for professors A and B specified dates for mailing multiple manuscripts to journal editors for formal review. The single goal for professor C specified a date by which he would complete a data evaluation task that was needed to help complete a manuscript. Participants also established criteria for how many minutes, on average, they would devote to research activities over a series of days. See
Table 1. We used cumulative moving averages as criteria that participants could "aim for" during intervention phases. The first author instructed participants to try to match or exceed their moving averages. These moving averages provided more flexibility than traditional 'per day' criteria (e.g., 20 minutes each and every day). Thus, participants did not have to perform research activities each and every day for a fixed number of minutes. However, they did have to perform research activities relatively consistently in order to maintain their moving averages and meet goals.

Self-monitoring. Self-monitoring consisted of self-assessment plus self-recording (Glynn, Thomas, & Shee, 1973). Each day, participants asked themselves two questions (i.e., self-assessed). First, "How

many minutes did I spend on research tasks today?" Second, "How many minutes have I averaged per day on research tasks during this phase?" Then participants wrote the numerical answers to these two questions (i.e., self-recorded) on a self-monitoring form. Participants occasionally wrote notes on their self-recording forms.

Self-graphing. After participants recorded data on their self-monitoring forms, they were to mark on graph paper each day, the moving average (mean number of minutes) that they performed research tasks. Labels for the x-axis and y-axis of the graph were "day-date" and "moving average, in minutes," respectively. See
Figure 1. The first author instructed participants to draw a horizontal line (i.e., a productivity criterion) on their graphs to indicate how many minutes of research productivity they had to average. These criterion lines served as visual reminders and provided immediate visual feedback when participants graphed their productivity. Data points on or above the criterion lines meant that participants matched or exceeded the moving average established for particular intervention phases. Data points below the criterion lines meant that participants were 'falling short,' and, therefore, would need to 'make up' time. The first author instructed participants to post the graphs at locations where they would see the graph each day (e.g., on wall by office desk).

Procedural integrity of intervention. The first author conducted three randomly scheduled probes per participant and inspected participants' self-recording and self-graphing sheets to determine whether each participant self-recorded and self-graphed data punctually according to intervention protocol (i.e., each day). Professor A self-recorded and self-graphed according to protocol on three of three probes. Professor B self-recorded according to protocol on two of three probes and self-graphed according to protocol for one of three probes. Professor C self-recorded and self-graphed according to protocol on zero of three probes. However, he did self-record his productivity data each day in a personal appointment book rather than on self-recording sheets.

Data Analysis

Single-case quantitative data analysis. We used six classic visual inspection criteria to analyze graphed data and to evaluate experimental control (Kazdin, 1982). These criteria included: (a) changes in phase means, levels, trends, and variability or stability; (b) latency following phase changes; and (c) overlap between adjacent phases. We also analyzed the extent to which changes in the dependent variable corresponded with changes in criteria that required participants to increase the amount of time devoted to research activities. We calculated and reported descriptive statistics for each participant, for each baseline and intervention phase. We also calculated two indices to quantify effect sizes, including
d (Glass, McGaw, & Smith, 1981) and percentage of non-overlapping data or
PND (Scruggs, Mastropieri, & Castro, 1987).

Qualitative data analysis. We used the constant-comparative method (Lincoln & Guba, 1985) and identified themes common and unique to the three participants, with multiple modes of data collection, including subjective evaluation questionnaires, field notes, document analysis, and data transcribed from a focus group interview. The first author read, reviewed, and coded data, and identified emergent themes. This process produced 62 episodes that ranged from a single sentence to multiple paragraphs. Then a research assistant used a list of themes produced by the first author and matched each episode to its corresponding theme. Independent agreement between the first author and

research assistant was 84% (52 of 62 episodes). Next, the first author and research assistant resolved disagreements via consensus. Then we selected relevant examples (e.g., quotes) that illustrated common, unique, or important themes. To bolster credibility of our findings, we triangulated across data collection modes and sources (Denzin, 1978), conducted member checks (Lincoln & Guba, 1985), and verified the research assistant's transcription of the audio taped focus group interview. The fourth author, who did not participate in this intervention, served as a peer debriefer (Creswell, 2003). We also analyzed convergence between participants' descriptions of performance (qualitative data) and graphed data in
Figure 1 (quantitative data).

Results

Quantitative Changes in Research Productivity

As indicated in
Figure 1 and
Table 1, each professor increased research productivity from baseline to intervention phases.

Professor A.

Professor A's research productivity during baseline was nil (
M = 0.0 min;
n = 4 days). During the first phase of intervention, Professor A's research productivity increased (
M = 76.1 min;
n = 18 days) and always exceeded the within-phase criterion of 60 min. During the second phase, Professor A's research productivity increased further (
M = 80.8 min;
n = 13 days) and always exceeded the within-phase criterion of 77 min. During the third phase, Professor A's research productivity increased further (
M = 115.2 min;
n = 25 days) and always exceeded the within-phase criterion of 90 min. During the final phase, Professor A's research productivity increased again (
M = 121.6 min;
n = 40 days) and always exceeded the within-phase criterion of 120 min. The effect size for Professor A's daily research productivity, which we computed by subtracting the mean of baseline from the weighted mean (
M_I = 105.9 min) of the four intervention phases, then dividing by the pooled standard deviation of baseline and intervention phases (
SD = 100.5), equaled 1.05 The overall
PND between baseline and all intervention phases combined equaled 99% for daily research productivity. That is, whereas daily research productivity was 0 min per day for 4 of 4 sessions during baseline, daily research productivity was greater than 0 min per day for 95 of 96 sessions during intervention phases.

Professor B.

Professor B's research productivity during baseline was nil (
M = 0.0 min;

n = 19 days). During the first intervention phase, Professor B's research productivity increased (
M = 23.9 min;
n = 44 days), exceeded the within-phase criterion of 20 min during the last half of the phase, but fell slightly below criterion during the first half of the phase. During the second intervention phase, Professor B's research productivity increased again (
M = 31.1 min) and exceeded the within-phase criterion of 25 min for 51 of 55 days. The effect size for Professor B's daily research productivity, which we computed by subtracting the mean of baseline from the weighted mean (
M_I = 27.9 min) of two intervention phases, then dividing by the pooled standard deviation of the baseline and intervention phases (
SD = 28.6), equaled 0.97. The overall
PND between baseline and all intervention phases combined equaled 64% for daily minutes of research productivity. That is, whereas daily research productivity equaled 0 min for 19 of 19 baseline sessions, daily research productivity exceeded 0 min for 63 of 99 intervention sessions.

Professor C
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Professor C's research productivity during baseline was nil (
M = 0.0 min;
n = 43 days). During the first intervention phase, Professor C's research productivity increased (
M = 22.9 min;
n = 17 days) and always exceeded the within-phase criterion of 21.4 min. During the second intervention phase, Professor C's research productivity increased again (
M = 42.0 min;
n = 10 days), but fell slightly below the within-phase criterion of 42.9 minutes. The effect size for Professor C's daily productivity, which we computed by subtracting the mean of baseline from the weighted mean (
M_I = 30.0 min) of two intervention phases, then dividing by the pooled standard deviation of the baseline and intervention phases (
SD = 20.0), equaled 1.50. The overall
PND between baseline and all intervention phases combined equaled 74% for daily minutes of research productivity.

Maintenance and generalization. Research productivity during short-term maintenance averaged 132.7 min/day for Professor A (
n = 22 days). Long-term maintenance data collected one year after the short-term maintenance phase ended indicated that research productivity averaged 165.1 min/day for Professor A and 39.8 min/day for Professor B. We did not collect long-term maintenance data for Professor C or short-term maintenance data for Professors B and C. In contrast to Professor C, Professors A and B reported that they continued to record and graph their research productivity. Generalization data indicated that Professors A, B, and C completed 7, 1, and 1 manuscripts, respectively, during interventions phases, and 0 manuscripts during baseline.

Social validity. Social comparison data support the social validity of improvements in each professor's research productivity. Research productivity for each of the 3 professors averaged 0 min per day during baseline. During intervention phases, each professor increased overall daily research

productivity (
$M_{prof\ A}$ = 105.9 min per day,
n = 96 days;
$M_{prof\ B}$ = 27.9 min per day,
n = 99 days;
$M_{prof\ C}$ = 30.0 min per day,
n = 27 days). In comparison, tenure-track colleagues in the same department reported mean daily research productivity, during the fall semester, of 6.1 min per day (
range = means of 0 to 20 min per day,
n = 7 professors). Moreover, Professors A, B, and C completed 7, 1, and 1 manuscripts, respectively, while their 7 colleagues completed a total
of 2 journal manuscripts (
M = 0.3 manuscripts,
range = 0 to 1).

Subjective evaluation data indicated that each professor judged the intervention to be helpful in promoting research productivity. Professor A reported that setting explicit goals and graphing productivity each day help him to prioritize writing relative to other duties, and to make writing a part of his daily routine. Professor B reported that charting and a colleagues' occasional viewing of the chart, helped her achieve goals. Professor C reported that the intervention helped him establish the "discipline" necessary to write consistently.

Qualitative Inquiry: How and Why Professors Changed Research Productivity

We identified themes that illuminate how and why professors' increased their research productivity, as well as professors' perspectives on intervention goals, procedures, and outcomes.

Pre-intervention habits. Each professor reported that, before the intervention, they: (a) wrote journal manuscripts infrequently or rarely during normal work periods because other job duties consumed their time; (b) wrote during summer vacations, weekends, or off-duty periods; and (c) wanted to establish a pattern of research productivity during normal work periods, but had experienced long periods when they failed to produce journal manuscripts.

Professor C: So I felt really good about myself that summer and I saw myself produce

something that led to a publication … I took the job here and I think we all know that the

first few years, there's a lot of new things, and furthermore, I had gone for more than a

decade without really doing academic writing, so I think I had some fears about that too,

and not knowing where my voice would be, and where I would publish. These are things I

think you guys know. I've been struggling. So, if you don't really have the confidence

that your voice that will resonate in the professional literature, plus your taking on a job

where you want to get your classes well-established, and all the rest, it isn't hard to see how the years can start to flash by, and your publication record isn't, especially refereed journals, isn't going to be high.

Professor A: I recall call eight summers because that's the only time that I would write. Why? Well, teaching. Supervision. You know, one thing that I like about our department is that everybody supervises, everybody is in schools, and the reality is, that takes time. Reality is that if you are going to do courses well, teach well, it takes time – you've got committees, right, got service, internal, external, all that. Well, that was life, and so I never even envisioned writing as being part of my fall and spring semester (laughs). It couldn't happen.

Professor B: I've heard many people say that. It's like 'no I won't teach during the summer because that's the only time I write.'

Professor A: Exactly, and that was my mentality. And you know what? I didn't mind it because, you know, you have plenty of time, but in terms of continuity (shakes head).

Intervention goals focused efforts. Each professor reported that the goal-setting element of the intervention helped to prioritize tasks and change habits. Professor B stated that prior to the intervention, "I was spending an inordinate amount of time on other dissemination products … [the intervention] was planful with that in mind to increase scholarly refereed publications. So it really made me focus on where I was spending my time." Professor A reported that he set explicit goals to (a) mail manuscripts by specific dates, (b) have three manuscripts in review at all times, and (c) work concurrently on more than one manuscript at a time. Professor C reported that setting a goal date helped him to "establish discipline" and commit to the research task.

Connecting knowledge to action. Each professor possessed knowledge about writing productively, cited sources (e.g., books or journal articles) of this knowledge, and related this knowledge to the intervention and outcomes. Professor A reasoned, "The literature backs this up" when he described how he worked on more than one manuscript at a time in order to "stay fresh and avoid boredom." Professor C reported:

Years ago, I read an article about Hemmingway. I'd always mystified writing as kind of an artistic event, and spiritual and mystical. To see a great writer who would just quantify his behavior like that struck me as funny, kind of a surprise, and I admired it. So, it didn't bother me at all to think of setting some goals of counting things like minutes."

Professor B noted:

It's called
The Right to Write and she said that you needed to enjoy writing … to look

forward to it … even when at my very busiest, and I'm doing this, I saw writing as the

chance to steal kisses from a lover, and even if you have fifteen minutes, then steal it.

Patterns, habits, and individual differences. Writing topography, cognitive-behavioral reactivity, and professors' perspectives on how they changed habits shed light on how this intervention improved research productivity. Professor A reported that he used a strategy to:

… get ahead and stay ahead. I'm banking it. My mentality was 'OK I've put in, I'm ahead

of the game.' Now if I run into a busy stretch, I'm not going to back off to zero minutes

today, but I can afford to do ten or fifteen and it's not going to really hurt me.

Professor A's perspective on getting ahead and staying ahead is consistent with data in Figure 1. Each time he raised performance criteria, Professor A expended – disproportionately – much time on research tasks during the first few days of the new intervention phase. He expended fewer minutes on subsequent days of each intervention phase, but he maintained a moving average that always exceeded
a priori within-phase criteria.

The writing pattern for Professor B during the first intervention phase differed markedly from Professor A. Professor B tended to meet criteria toward the end of the first intervention phase after having produced at levels somewhat below criteria during initial and middle portions of the phase. See Figure 1. Professor B reported that writing, even for a few minutes per day, helped "push me and move along" the manuscript. In the past, Professor B wrote almost exclusively when she had large amounts of time. She reported habits such as "going over and over" the initial section of a manuscript, then feeling fatigued or bored, and not proceeding to subsequent sections. By working in shorter sections daily, she did not repeatedly review earlier portions. Instead, she worked on a different section each day – methods today, results tomorrow, discussion the next day. After one day on each of the other sections, she could return to the introduction. In this way, each section did not have to be a finished product. Professor B reported:

In the past – if I only had 15 minutes, I would surf the net, or something else, because

there really wasn't much time to accomplish something. With BSM, each 20 minutes

meant some progress on a section of the manuscript – no matter how small. And once

I started writing, it was easier to find another 10 minutes here and another 10 minutes

there.

Professors also reported that they
structured the environment to support task completion. For example, Professor C initiated research tasks each day, at approximately 6:00 a.m., with a cup of coffee in hand, seated with his laptop computer in his favorite rocking chair, with a large wall clock clearly visible. He refilled his coffee after reaching the halfway point of daily writing. After completing his writing routine, he rewarded himself with breakfast, more coffee, and a quick read of the newspaper. To his "surprise" he quickly established a routine. In addition, Professors C and A prioritized daily tasks by writing before they checked e-mail and phone messages. In the past, both of these professors responded "first thing" each day to these messages and, thereby, delayed or negated research tasks. Professors concurred that "something had to go" in order to change habits and increase productivity. Professor A noted that he reduced TV watching, Professor B stated that she "surfed the net" less, and Professor C indicated that he went to bed earlier in order to get up early and do his research task each weekday. Each professor reported that they selected settings for doing research tasks where disruptions and distractions could be minimized (e.g., away from the office or, if at the office, during quiet times).

Frequent activity promoted familiarity and productivity. Each professor reported that they performed research tasks nearly every day during the intervention. Frequent activity kept professors familiar with tasks and writing topics, reduced "start-up time and rehashing," and improved efficiency. Professors A and B reasoned that on "busy days" a few minutes per day was better than zero minutes. Professor A stated, "That's when I started experiencing, you know what, I can write on a dime. Right now [snaps fingers], you ask me to write something. I bet you I can do it. Because I'm conditioned to do it. Before I was not." Data from intervention phases in
Figure 1 indicate Professor A had just 1 of 96 days where he completed 0 minutes of research activities, and 7 of 96 days when he completed 1 to 10 minutes of research activities. Likewise, Professor B reported that frequent writing helped, even in short amounts each day.

I found that even fifteen minutes a day moved things forward. Because even when I

wasn't sitting down writing, it was still percolating a little bit. You are thinking, and so when you do sit down and write, you get more accomplished. So, in that fifteen minutes I probably got more accomplished than the first hour where I had two weeks in between. You know, because I wrote for fifteen minutes today . . . tomorrow, I'll pick up

here.' And then I'd wake up in the morning and going, 'OK, I'm going to be moving on

to this part, what is it I want to say?'

Professor C discovered he could "be productive within the constraints of a 1-hour interval. This too came as a bit of a surprise as [I] had rationalized prior to this study that [I] had needed larger time blocks to be productive." However, unlike Professors, A and B, Professor C reported:

Well, I cannot write for fifteen minutes or twenty. I can't do what you describe. I just

cannot do that. I either, because time is very funny for me, if I'm, if I start writing, I do, I

get into it, and then I lose track of time. But I don't get into it when it's just a few minutes

and I'm not good at that.

Notably, the research task that Professor C performed during the intervention phases of this study included coding data – not writing or typing a manuscript.

Reactivity, pressures, colleagues, motivation, and avoidance. Professors B and C explained that, during the intervention, they sometimes wrote to avoid personal feelings associated with failure to perform as expected. In the case of Professor C, he agreed to complete a research activity and to give the product to Professor A by a specific date.

Professor C: I realized when that started, is that I'm very social. If I give my word to

someone, I do try to keep my word or I feel really guilty afterwards. It's not like, it's not

necessarily that I will keep the word, but just know that I do feel badly and I can beat

myself up. And uh, so I made an obligation to you [i.e., to Professor A].

In the case of Professor B, avoiding embarrassment served as a powerful motivator to avoid 'zero-minute' days.

Professor B: I guess I'm very driven by embarrassment [laughs]. You know? Which is

really sad. It's like, high need for approval … you (Professor C) talked about keeping your word or the social aspect. He (Professor A) was coming in and looking at my chart. Currently we've started [putting our productivity charts] on the door, and I don't want

people to see that I couldn't find fifteen minutes in a day to write. That's embarrassing!

You know? [laughs]… we are all incredibly busy, but so busy that I couldn't find fifteen

minutes? I mean come on! It's embarrassing! [laughs]

Each professor indicated that becoming and staying aware of how much they produced each day – by recording or graphing productivity each day – helped maintain productivity. Professor A indicated that without daily self-graphing, research productivity was "out of sight, out of mind." Professor B stated:

My graph was next to my computer at work. At least once a week, [Professor A]

checked in with me. I knew I could never go very long without writing. When one or two

zero-minute days passed, I made the time to get some minutes in, so that I would have

something to show. The zeros were embarrassing. My mindset was that everyone can

make at least 10 to 20 minutes a day; there's no excuse. And if I couldn't make even 20

minutes a day, then I needed to readjust my priorities and get focused.

Discussion

Based on findings from this study and the extant literature we first, acknowledge limitations of our study and propose recommendations for future research. Second, we recommend research-validated strategies that increase professors' research productivity.

Limitations of this Study and Recommendations for Future Research

We acknowledge six limitations of this study. First, like other studies that use single-case research designs findings from the intervention apply directly to study participants only (Kazdin, 1982). Future studies could aim to replicate and extend these findings across other settings, conditions, and participants. Quantitative data suggest that the intervention was effective across each of 3 participants, or, in the ergot of single-case methodology, the intervention demonstrated strong experimental control over the target behavior. These findings are consistent with McDougall et al. (2005), who used the same intervention components to improve research productivity during a professor's off-duty period (i.e., summer vacation). Thus, the literature now includes two single-case intervention studies that combined goal setting with BSM to improve research productivity – one during professors' off-duty periods and one during professors' on-duty periods.

A second limitation is that we collected short-term maintenance data for only one of three professors, and long-term maintenance data for only two of three professors. Third, we collected reliability data for the dependent variable too infrequently, these data were based on intra-observer agreement instead of inter-observer agreement, and all reliability probes pertained to just one of the three participants (i.e., Professor A). Fourth, given a multi-component intervention and our single-case research design, we cannot ascertain the relative contributions of individual components of the intervention, such as goal setting, self-monitoring, and self-graphing. Moreover, procedural integrity checks indicated that Professor A consistently recorded and graphed daily research productivity, while Professors B and C tended to self-record but not self-graph. However, qualitative data do illuminate – from the perspective of the three participant-interventionists – the how and why of changes in research productivity, including attributions about specific intervention components. We recommend that researchers investigate BSM techniques that are more public than the relatively private formats we used, as well as self-managed or peer-mediated contracts. Anecdotally, after this study ended, Professors A and B started posting – on the outside panels of their office doors – self-graphing and self-recording forms that displayed their ongoing research productivity.

The fifth limitation of our study is that we applied some but not all elements of a research-validated model of change (Goldenberg, 2004). Model elements include: (a) explicit goals that are set and shared, (b) frequent indicators to measure ongoing progress toward achieving those goals, (c) assistance from both internal and external sources in achieving goals; (d) leadership that supports and pressures progress toward achieving goals (Fullan, 1992); and (e) the creation or modification of settings where the 'nuts and bolts' of daily activities adhere consistently to achieving goals (Goldenberg, 2004; Goldenberg, Saunders, & Gallimore, 2004; McDougall, 2002). We systematically incorporated goals and indicators in our intervention. The other elements – leadership, assistance, and settings – were not 'planful' but emerged. Thus, future investigators might incorporate each element more systematically than we did. Finally, the sixth limitation is that we did not conduct an external audit, although we did use a peer debriefer (Creswell, 2003).

Strategies to Increase Professors' Research Productivity – A Matter of Habits

We recommend that professors utilize research-validated strategies presented in Boice's (1990) self-help guide for professors, as well as strategies suggested by findings from our study and the McDougall et al. (2005) study. These strategies include: (a) write daily for at least 30 minutes; (b) write occasionally for multi-hour periods but don't binge as the primary strategy; (c) set explicit short- and long-term productivity goals; (d) keep daily charts or graphs that document writing productivity (e.g., amount of time); (e) place such charts or graphs in places that one sees routinely each day; (f) record daily results punctually, especially on days when productivity equals zero; (g) establish contingencies such as making a preferred activity contingent on completing daily writing time; (h) schedule stages of a manuscript over a period of weeks with specific, measurable goals; (i) limit the time devoted to generative stages, so that productivity moves beyond conceptual outlines to actual writing; (j) prevent "zero productivity" days by spending a few minutes on research tasks; (k) utilize peers to check frequently on each others' productivity; (l) collaborate on projects that require colleagues to meet mutually established goals for completing research tasks by specific dates; (m) readjust deadlines when initial deadlines are not met; (n) work concurrently on two or more research tasks to maintain interest and productivity through variety; and (o) work in settings conducive to writing, eliminate typical barriers, and prioritize tasks such that writing occurs first, early, and consistently, rather than last, late, and inconsistently.

We recommend that professors, particularly those who have not yet established a habit of writing, set explicit goals with short-term productivity criteria that they can achieve initially, even if that means only a few minutes per day. One key is to write each day – even briefly– to replace habits of infrequent writing. Then professors can gradually increase expectations and, in time, produce research more routinely as a professional habit – even during periods when creativity and inspiration wane. Our findings lend support to the habit of writing nearly every day – even if for only a few minutes – and echo findings from Boice (1990):

> The single most commonly listed reason for not writing by academicians is a lack of time.
>
> Most professors who don't write put the blame on busyness… Even professors with heavy teaching loads, have several 20-30 minute blocks of time available for writing in most work weeks. Because we tend to suppose that writing must be done in large blocks of time, we fail to see busy weeks during semesters as appropriate for writing productivity. In fact, though, professors who try doing writing in brief, daily sessions during busy weeks evidence two benefits. First, they typically produce far more writing than do colleagues who work in binges, and they do so at rates more than sufficient to meet the expectations of tenure/promotion committees on campus. Second, they find writing more enjoyable—in part because it no longer required substantial warm-up times

and in part because they no longer need to take it home to complete it. (pp. 13-14) .

For professors who cannot rearrange their duties to write each day, we recommend the following. Instead of setting a fixed daily performance criterion (e.g., 30 minutes of writing each and every day), set a weekly performance criterion (e.g., 210 minutes per week). Here, a professor self-monitors productivity in terms of: (a) a moving daily average ("I don't have to write for 30 minutes each day, but I must average 30 minutes per day this week."); or (b) a cumulative weekly total ("I have accumulated 180 minutes so far this week. I need at least 30 more minutes by Sunday."). This approach provides flexibility yet is consistent with research-validated behavioral principles used to establish productive habits. Professors should still limit the number of days that they do not write – even within one-week periods – because consecutive 'zero-minute' days can re-establish nonproductive habits associated with writing infrequently.

Findings from our study also suggest that productive researchers can differ somewhat in how they meet criteria. Recall topographies in Figure 1. Professor C, a self-proclaimed "creature of habit," tended to produce on the same days of the week for the same amount of time. He participated in the intervention for 27 days. Professors A and B participated in the intervention for approximately 100 days and wrote for varying amounts of time on various days. Initially, Professor B hovered slightly below her productivity criterion. Subsequently, she appeared to use the "get ahead and stay ahead" strategy that Professor A used consistently. This strategy is similar to writing habits that Plimpton (1965) observed in Ernest Hemingway:

He keeps track of his daily progress – 'so as not to kid myself' – on a large chart made

out on the side of a cardboard packing case and set up against the wall under the nose of

a mounted gazelle head. The numbers on the chart showing the daily output of words

differ …
the higher figures on days Hemingway puts in extra work so he won't feel guilty

spending the following day fishing on the gulf stream [italics added]
. (p. 219)

Although professors can use different strategies, our findings provide some support that the "get ahead and stay ahead" strategy is associated with greater productivity than other strategies. In our study, within-participant productivity was greatest for Professors B and C when they applied the "get ahead" strategy. In Figure 1, compare the pattern and magnitude of productivity during the second intervention phase to the first intervention phase for Professors B and C. Moreover, Professor A, whose productivity was substantially higher and more enduring than Professors B and C during intervention and maintenance, reported explicitly that he used the "get ahead and stay ahead" strategy throughout the intervention.

Our findings are also consistent with research that associates greater productivity with professors who work on multiple rather than singular writing tasks. Boice (1990) recommends that professors work concurrently on two or three writing projects because "alternatives reduce the tedium that can emerge when working on the same project too regularly. Often the alternative projects produce cross-

fertilization of ideas" (p. 78). In our study, Professor A, the most productive of the three professors, noted, "I got into the juggle mode … So that if I got tired of the big effort with that manuscript number one … I'd pull out the second or third project."

In conclusion, for writers who possess the prerequisite skills required to publish in peer-reviewed journals, increasing ones productivity appears, to us, largely a matter of changing old habits that promote writing infrequently to new habits that promote writing frequently. The BSM techniques used in this study did serve as effective tools in promoting that change.

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Table 1

Sample Form for Self-Recording Research Productivity Using Moving Averages

Date	Phase-	Productivity	# of min	Cumulative #	Actual

	day	criterion (moving average) this phase	produced this day	min produced this phase	productivity (moving average) this phase
9/3/05	I-1	60 min	90	90	90 min
9/4/05	I-2	60 min	30	120	60 min
9/5/05	I-3	60 min	60	180	60 min
9/6/05	I-4	60 min	120	300	75 min
9/7/05	I-5	60 min	120	420	84 min
9/8/05	I-6	60 min	30	450	75 min
9/9/05	I-7	60 min	75	525	75 min[1]
9/10/05	II-1	75 min	90	90	90 min
9/11/05	II-2	75 min	80	170	85 min
9/12/05	II-3	75 min	70	240	80 min
9/13/05	II-4	75 min	120	360	90 min
9/14/05	II-5	75 min	120	480	96 min
9/15/05	II-6	75 min	0	480	80 min
9/16/05	II-7	75 min	80	560	80 min
9/17/05	II-8	75 min	40	600	75 min
9/18/05	II-9	75 min	120	720	80 min[2]

Note: After setting a productivity criterion of a mean of 60 min for Phase I, and exceeding that criterion by producing a mean of 75 min over the course of 7 days[1], the individual increased the productivity criterion to a mean of 75 min for Phase II, and slightly exceeded the new criterion over the course of the next 9 days[2].

Table 2

Professors' Research Productivity Before and After Goal Setting and Behavioral Self-Management

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Phase (days) Productivity Actual
SD for Daily Range for Daily

Criteria Productivity Productivity Productivity

Professor A

Baseline (4) none 0.0 0.0 0.0

Intervention 1 (18) 60.0/day 76.1 90.4 0 – 285.0

Intervention 2 (13) 77.0/day 80.8 57.4 5.0 – 208.0

Intervention 3 (25) 90.0/day 115.2 106.6 12.0 – 443.0

Intervention 4 (40) 120.0/day 121.6 109.7 5.0 – 400.0

Maintenance (22) none 132.3 87.8 0 – 384.0

Professor B

Baseline (19) none 0.0 0.0 0.0

Intervention 1 (44) 20.0/day 23.9 23.3 0 – 80.0

Intervention 2 (55) 25.0/day 31.1 33.0 0 – 130.0

Professor C

Baseline (43) none 0.0 0.0 0.0

Intervention 1 (17) 21.4/day 22.9 13.1 0 – 30.0

Intervention 2 (10) 42.9/day 42.0 29.0 0 – 60.0

Note. All figures are minutes, except for number of days, which appear in parentheses. Productivity criteria and
actual productivity reported as mean number of minutes (moving averages). Measures of dispersion (SD for daily productivity and
range for
daily productivity) reported for daily minutes expended – not for moving averages.

Figure Caption

Figure 1. Moving averages for research productivity (mean number of minutes expended daily on research tasks) within baseline and intervention phases for professors A, B, and C. Horizontal dotted lines indicate within-phase productivity criteria (i.e., moving average in minutes) that professors set for selves.

VN:R_U [1.9.11_1134]