Tests of Marsh’s Model:

There is no support at all for the complementary nature of teaching and research constructs.

There is some support for their antagonistic nature in relation to time spent on the two activities. This apparent antagonism, however, does not explain why the relation between teaching and research outcomes is not more positive.

The results fail to support the fundamental assumption that the ability to be a good teacher and the ability to be a good researcher are positively related. Indeed, because self-ratings are likely to be positively biased by potential method effects (e.g., halo effects), it is quite surprising that these self-rating variables are not positively correlated.

In summary, the nonsignificant relation between self-ratings of teaching ability and research ability provide strong
support for the construct validity of interpretations of the near-zero relation between teaching effectiveness and research productivity.
Teaching/Research Relation
Other Mediating Variables

Research Outcomes
Research publications are consistently correlated with other research variables (self-ratings of ability, personal goals, proportion of time spent on research, and research nexus – belief that research facilitates teaching).

Self-ratings of research ability are even more highly correlated with these research variables, but are also negatively correlated with some of the teaching variables (personal goals and proportion of time).

Teaching Outcomes
Students’ evaluations of teaching are uncorrelated with all mediating variables
(except self-ratings of teaching ability). Research goals and research satisfaction are negatively related to teaching outcomes.

Self-ratings of teaching ability are significantly related to teaching goals and external rewards for teaching (the claim that teaching effectiveness would be enhanced if teaching was externally rewarded).
Other Mediating Variables

For all potential mediating variables, we also evaluated correlations between matching teaching and research variables.

The majority of these relations are nonsignificant – including relations between objective outcomes (.03) and self-ratings of teaching and research abilities (.10).

Three are significantly positive:
• External rewards (.80, the claim that teaching or research would improve if there were greater external rewards);
• Constraints (.48, the belief that teaching or research are limited by external constraints);
• Nexus (.47, the belief that research contributes to teaching or that teaching contributes to research).
The only significantly negative relations are for the time variables (-.24 for actual time and -.48 for proportion of time). The negative relation between teaching and research goals (-.20, p = .08) approaches statistical significance.
Teaching/Research Relation
Moderating Variables

Here we evaluate moderating variables that can distinguish between subgroups where the teaching/research relation is more positive.

The nexus variables are particularly relevant. We posited that the teaching-research relation would be more positive for academics who believe that teaching contributes to research and vice-versa.

We evaluated this moderation hypothesis for a set of 20 variables (including the two nexus variables). The critical interaction, however, was nonsignificant for all 20 variables.

For the nexus variables, not even the direction of nonsignificant results were consistent with predictions. The teaching/research relation is more
negative – not more positive – for academics who believe that teaching contributes to research and vice versa.

The results support earlier conclusions that the near-zero correlation between teaching and research is very robust in our study.
### Potential Mediating Variables: Correlations With Measures of Teaching (T) and Research (R).

**Mediating Correlations**

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<tr>
<th>Matching T &amp; Variables</th>
<th>Objective</th>
<th>Self-Ratings</th>
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Note. All measures are paired, one referring to teaching (T) and one referring to research (R). For each measure, correlations are presented between it and: objective measures of teaching and research (overall teacher rating and total publication measures considered earlier), teacher self-ratings of their ability as a teacher and a researcher, and the matching measure (e.g., the research goals measure is correlated with the teaching goals measure)

* p < .05
Academics believe, many with passion, that there is a nexus between research and teaching. Support for this claim is fundamental to the basis of research universities that combine the two activities.

In contrast to the myth that research and teaching are complementary constructs, the teaching-research relation is near-zero. This finding is very robust in our studies.

Our measures of research publications were based on performances over three years, were externally audited, and were the basis of research allocations. Hence, they are more accurate than typical self-report data.

Although we had multiple indicators of research publications and multiple indicators of teaching effectiveness, the
nonsignificant teaching-research relation was consistent.

We hypothesised that the teaching-research relation would differ systematically from department to department, but found no support for this prediction.
Importantly, we also considered quite different measures of teaching and research; academics’ self-ratings of their abilities as teachers and researchers.

Although we would certainly not defend these measures as being more valid than our more objective measures, they are fundamentally different constructs.

Because of the well-known self-report biases (e.g., halo effects) that are likely to positively bias relations between these self-rating variables, we would expect that these self-rating variables would be modestly or even substantially (positively) related. In contrast, we found that even these measures of teaching and research were uncorrelated.

Hence, these results based on self-ratings provide strong support for the near-zero
relation between measures of teaching effectiveness and research publications.
Teaching/Research Nexus

We constructed scales to measure teaching and research nexus; beliefs that good teaching facilitates research and that good research facilitates teaching.

Academics supported this nexus. Items “having to teach something helps me clarify my ideas in my research work on it” and “having to research something helps me clarify my ideas in my teaching of similar topics” received mean responses of about “4 = very much” on a 1-to-5 response scale. The two scales were moderately correlated (.47).

We posited that the teaching-research relation would be stronger for academics who had stronger beliefs that the two activities were complementary. However, our nexus variables were not significantly related to the teaching-
research relation (the nonsignificant relations were not even in the right direction).
Marsh’s Theoretical Model

Marsh posited that the near-zero teaching/research relation represented the juxtaposition between:

- The positive relation between abilities to be a good researcher and a good teacher; and
- The negative relation between the time and, perhaps, the motivation required to be a good teacher and a good researcher.

Our results were the strongest test of this model and provided some interesting results. However, the main predictions of the model were not supported. In particular, the fundamental premise of the model was that the ability to be a good teacher and the ability to be a good researcher are positively related, but the self-rating variables used to represent these variables were not significantly correlated.
Teaching/Research Antagonism

There was support for a potential antagonism between teaching and research constructs posited in Marsh’s model:

- Self-ratings of research were negatively related to teaching motivation and time devoted to teaching;
- Self-ratings of teaching were negatively related to research motivation;
- Research time and teaching time were negatively correlated for both the proportion (-.49) and absolute (-.24) estimates of time;
- Although the negative correlation between personal goals to pursue research and teaching (-.20) was nearly significant;
- research publications and self-ratings of research ability were both negatively correlated with time devoted to teaching;
- Self-rated research ability was negatively related to the goal of being a good teacher;
• Objective measures of teaching effectiveness were negatively related to satisfaction from research and the personal goal to be a good researcher.
Teaching/Research Asymmetry

Teaching effectiveness and even self-ratings teaching ability are mostly *not* significantly related to other teaching constructs (e.g., satisfaction, personal goals, time, activities).

Research productivity and self-ratings of research ability are positively related to most of the corresponding research constructs.

Why should there be this asymmetry in the pattern of results?

Academics receive considerable training in research and are constantly exposed to research role models. Because academics know how to be productive researchers, it follows that greater motivation, time, effort, and appropriate activities should result in increased research productivity.
Most academics receive little training to be good teachers. Marsh and Roche (1993) found that even teachers who were motivated to improve their teaching and had systematic feedback from their students identifying their strengths and weaknesses did not know how to improve their teaching effectiveness.

In contrast, randomly assigned groups of teachers who met with external consultants to discuss specific strategies to improve their teaching effectiveness in areas selected by the teachers did significantly improve their teaching effectiveness.

If teachers do not know how to improve their teaching effectiveness, it follows, perhaps, that devoting more time and effort to teaching may not improve teaching effectiveness. If universities
want their academic staff to be better teachers, then they need to invest in teaching improvement interventions like those proposed by Marsh and Roche.
Implications

We encourage research into different conceptions of teaching and research. We are not, however, optimistic that this will lead to finding the Holy Grail of a high and positive relation.

This search appears to assume that the relation between research and teaching is high and positive and that we have been looking for the Grail under a lamplight that is broken and defective. Research consistently shows that there is no such relation. So, instead of looking for even more mediators and moderators, instead of arguing about the nature of knowledge and how the process of constructing knowledge may have close parallels in teaching and research, we maybe should accept the conclusion that teaching and research (however conceived) are unrelated and move on to ask how we should enhance this relation.
Implications

Good researchers are neither more nor less likely to be effective teachers than are poor researchers. Good teachers are neither more nor less likely to be productive researchers than are good teachers.

There are roughly equal numbers of academics who are relatively:
• Good at both teaching and research;
• Poor at both teaching and research;
• Good at teaching but poor at research; and
• Poor at teaching but good at research.

These results clearly demonstrate that personnel selection and promotion decisions must be based on separate measures of teaching and research.

If universities want to improve either their teaching or research, they need to not select, retain, promote, or reward academics who are poor at both teaching
and research. If universities want to improve both teaching and research, then they need to select, retain, promote, and support academics who are good at both teaching and research.
Appendix: Description of Items and Scales

**Teaching ability**
1. Under ideal conditions (i.e., no limits on time, resources etc.) compared with others in your discipline, how would you rate your ability as a teacher

**Research ability**
1. Under ideal conditions (i.e., no limits on time, resources etc.) compared with others in your discipline, how would you rate your ability as a researcher

**Teaching satisfaction**
1. Teaching undergraduates students is an activity that gives me a great deal of satisfaction

**Research satisfaction (alpha = .96)**
1. Being involved in research gives me a great deal of satisfaction
2. Conducting research is an activity that gives me a great deal of satisfaction

**Personal Teaching goal**
1. My personal goal primarily is to be a good teacher

**Personal Research goal**
1. My personal goal primarily is to engage in research

**University Teaching goal**
1. Perceived university goal is primarily to be a good teacher

**University Research goal**
1. Perceived university goal is primarily to engage in research

**Extrinsic rewards for teaching (alpha = .85)**
1. Having more public recognition to quality teaching would inspire me to become a better teacher
2. Having a salary increase related to my teaching performance would inspire me to become a better teacher

**Extrinsic rewards for research (alpha = .72)**
1. Having more public recognition to quality research would inspire me to become a better researcher
2. Having a salary increase related to my research performance would inspire me to become a better researcher

**Constraints of research on teaching (alpha = .64)**
1. Research interferes with my teaching capabilities and productivity
2. Time is a major constraint to improving my teaching productivity
3. Does your time and commitment to research interfere with your teaching capabilities

**Constraints of teaching on research (alpha = .74)**

1. Teaching interferes with my research capabilities and productivity
2. Time is a major constraint to improving my research productivity
3. Does your time and commitment to teaching interfere with your research capabilities

**Time Spent on Teaching (reliability = .70)**

1. How many hours during a typical week do you spend on preparation for Teaching
2. How many hours during a typical week do you spend on teaching
3. How many hours during a typical week do you spend on follow-up from teaching (e.g., marking, talking to students)

**Time Spent on Research**

1. How many hours during a typical week do you spend on research

**Research activity (alpha = .65)**

1. Had informal discussions with departmental colleagues about common research interests
2. Participated in one or more joint research projects with colleagues
3. Maintained professional contact with colleagues overseas
4. Reviewed one or more proposals for a funding agency

**Teaching activity (alpha = .79)**

1. I make use of assessment material to diagnose what my students understand and do not understand
2. I use the results of examinations and student assignments to amend my subsequent teaching of a topic
3. When I revise a course, I always examine teaching and assessment methods to see if they are appropriate
4. I go out of my way to help students with their study problems
5. I regularly consult books and articles on teaching methods
6. I try hard to understand the difficulties students may be experiencing with their work
7. I make time to discuss my students’ progress with them regularly
8. When I revise a course, I do library research to make the content up to date

**Nexus of teaching on research (alpha = .79)**

1. Becoming a good teacher enhances an academic’s research
2. Having to teach something helps me clarify my ideas in my research work on it
3. I feel I have something to learn from my undergraduate students in my subject area
4. My research is enhanced by my undergraduate teaching
5. Students’ questions can help me elucidate issues in my research

**Nexus of research on teaching (alpha = .70)**

1. Conducting good research enhances an academic’s teaching
2. Having to research something helps me clarify my ideas in my teaching of similar topics
3. I share ideas from my research with my undergraduate classes
4. I use the results of my research to amend my subsequent teaching of a topic

\( ^{a}\) based on a five-point response scale; \(^{b}\) based on actual number of hours reported; \(^{c}\) based on dichotomous response scale.