Research in Higher Education: The Neverending Story

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Anyone who conducts research will attest to the fact that every answer revealed generates at least one more question. While this endless game of “whack-a-mole” might frustrate most people, I believe it is this pursuit of never-ending questions that most motivates academic scholars.

Why? Research, scholarship, creativity, and innovation are fueled by curiosity and the drive to improve the human condition. Whether it’s understanding the origins of the universe, the mechanistic workings of a subcellular organelle, the causes of human conflict through the course of history, or the most effective pedagogical techniques to inspire learning, research questions are pursued in generally the same way: ask the question, determine the answer(s), use the answers, discover new questions, and repeat. It’s a cycle powered by creativity, resourcefulness, collaboration, observation, and perseverance. We, the scholars of academia, are a key component of this successful cycle, but like any other cycle, we depend on many other factors to succeed.

The professoriate has a unique role and responsibility to pursue questions and problems that may broadly benefit society. This stands in contrast to research in business, government agencies, or the nonprofit sector, where research must specifically benefit a particular mission or purpose, and therefore, may be directed more by institutional interests than by individual creativity and curiosity. Academic scholars pursue knowledge without regard to immediate utility, bottom line, or accepted norms. In fact, I would argue that conducting research and scholarship that challenges existing paradigms is a role uniquely conferred to academic scholars. The challenge is that there are limited resources
available to conduct such research and scholarship. That’s why it’s essential that our society must continue to take every opportunity to champion investment in higher education research and scholarship – and see this as an investment in the betterment of society, whether realized immediately or, more likely, in the distant future.

“The greatest obstacle to discovery is not ignorance - it is the illusion of knowledge.” - Daniel J. Boorstin

All research begins with a question to be answered, a problem to be solved. It is vital to see the origination of questions and the identification of problems as a collective task, not an individual endeavor. When we, as academic scholars, see our students, our graduates, our colleagues, and our practitioners as partners in the quest for new information, we will not be bound by the illusion of knowledge.

I recall a situation many years ago when I was teaching a class of undergraduate pharmacy students. I was asked a question by a talented and inquisitive undergraduate student (Melissa Flagg, now Ph.D., Deputy Assistant Secretary of Defense, Research and Engineering, U.S. Department of Defense). I did not know the answer to the question, and I had learned by then to simply admit it when that was the case. Melissa apologized for asking, and I explained that, contrary to being unhappy about her question, I was very pleased, as it allowed me to explain why I encourage all students to ask difficult, thought-provoking questions. If I did not know the answer, there were only two possible explanations: (a) the answer is known, and I just don’t know it, or (b) the information is not known — nobody knows it. If the answer is known, then I (and my students) should look up the answer and learn something. If the answer is unknown, is it something that should be known? If so, it is a potential research question.

Assuming we could develop a testable hypothesis to answer the question, we could then devise a research plan, which, when executed, would provide new information and insights for the field, and eventually become part of what we teach our students and what our graduates use in their work.

While it is a cycle that takes some time to complete, it is the asking of the question that initiates the process. If you know the answer (or think you do), or if you have the solution (or think you do), there is no motivation to seek new information or to develop new solutions. Yet not many questions or problems have been optimally answered or solved; this is the need that motivates research and the never-ending story of academic scholarship.

The “illusion of knowledge” is the main reason I always encourage students to question everything. In my experience, some of the most thought-provoking questions are asked by those who are not so expert in a particular subject that they are constrained by the “illusion of knowledge.” It is also this very sort of experience that makes an education at a research university distinctive and valuable. With scholars in the classroom, students are learning from those who shape the field, are encouraged to think more deeply about what they’re learning and how to use it, and ask probing questions that challenge the existing body of knowledge and stimulate new thinking. Such experiences benefit both the students and the faculty.

Since most students will not pursue graduate education or become researchers themselves, their connection to faculty scholars is vital for identifying and communicating the challenges and problems they will face as professionals. After all, it is the educator who sees the shortcomings of existing pedagogies, the physician who is most aware of unmet therapeutic needs, the engineer who can see
where new technologies are most needed. Like
the student who asks a question that currently
has no answer, the practitioner observes
problems that need solutions — both should
inform new research areas. And faculty benefit
from having their views and ideas challenged,
which should lead to better research and
scholarship.

Good research — or more accurately the results
of good research — should drive sound public
policy, professional practices, consumer
behavior, and major technological advances in
the fields of education, healthcare, engineering,
technology and the environment. Good research
requires critical thinking, which makes for much
better problem solving and ethics because it
removes bias and ensures openness to other
interpretations of data. This is true whether the
research is primary or secondary — the value of
the research is only as good as the experimental
design and objective interpretation of the data.

For example, in primary research, where new
data is acquired firsthand through experiments, it
is vitally important to recognize the constraints
of the data acquired and resist the temptation to
disregard data that does not seem to ‘fit.’ Most
primary research begins with a hypothesis,
comparing a null hypothesis (there is no effect
of x on y) to an alternate hypothesis (x affects y)
(Siegfried, 2010). What would happen, for
example, if a researcher did not have a
hypothesis to test? He or she might observe
interesting patterns that may correlate, but that
are not linked in a meaningful way. For
example, you may find it alarming that the
number of murders by steam, hot vapors and hot
objects annually has an 87% correlation with age
of Miss America (Fletcher, 2014). Does this
mean the Miss America pageant must strive to
select ever-younger winners as a public health
safety measure? Of course not. This is an
extreme example designed to illustrate the
distinction between causality and correlation
and, more importantly, to underscore the
importance of knowing the constraints related to
data interpretation, especially when such
interpretations may become the basis for public
policy, professional practices, or curriculum
content.

Similarly, when primary research suffers from
inadequate experimental design, the result is
multiple conflicting studies that lack statistical
and predictive power. Since secondary research
is collation and summation of previously
published primary research data, it necessarily
relies on the ability to determine if the previous
work was sufficiently rigorous to be included in
analysis. Making sense of multiple primary
research studies is a science into itself. How do
we evaluate various sources and types of
information to draw sound conclusions and
make informed decisions? Is it enough to have a
leader in the field summarize the results in a
narrative review? While a summary may be
helpful to clarify concepts and provide a
historical perspective, narrative review may be
subjective and may not have concrete criteria for
including or excluding particular studies.
Consequently, two experts could review the
same subject and report different conclusions
(Koricheva and Gurevitch, 2013). Without a
critical mass of quality primary research,
secondary research cannot lead to sound
conclusions.

Both primary and secondary research provide
excellent training in critical thinking.
Understanding how to conduct primary research
— from developing sound hypotheses to proper
experimental design and data interpretation —
and having the tools to evaluate the existing
body of information through secondary research
should be part of our undergraduate and
graduate-level educational literacy. After all,
these undergraduates and graduate students
make up our future, and sound policy decisions
rest on the ability of policy makers, legislators,
journalists and the general public to understand societally-relevant academic research (Gormley, 2011), whether primary or secondary.

References


Alice M. Clark is the Interim Vice Chancellor for University Relations and an F.A.P. Barnard Distinguished Professor of Pharmacognosy at the University of Mississippi. In her role as vice chancellor, she assures strategic coordination of communications, development, federal relations, university events, and economic development. She previously served the university as Vice Chancellor for Research and Sponsored Programs, a role in which she was responsible for facilitating and coordinating the acquisition and administration of fiscal resources and developing the culture and infrastructure for excellence in research and scholarly activity. Prior to becoming Vice Chancellor, Clark was director of the National Center for Natural Products Research at the University of Mississippi. She has published extensively on the discovery of novel biologically active natural products and pharmaceuticals and was principal investigator on continuous peer-reviewed NIH funded grants from 1984 to 2014 to conduct research related to the discovery and development of new drugs for opportunistic infections. Clark is a fellow of the American Association for the Advancement of Science (AAAS) and the American Association of Pharmaceutical Scientists. In 1996, she was named the Rho Chi National Lecturer. She was the recipient of the 2010 Marcy Speer Outstanding Reviewer Award, NIH’s top award for excellence in service as a peer reviewer. Dr. Clark can be contacted at amclark@olemiss.edu.