Salient practices of award winning undergraduate research mentors – excellence, freedom and control. (0272)

Helen Walkington[1], Eric Hall[2], Kearsley Stewart[3], Jennifer Shanahan[4], Elizabeth Ackley-Holbrook[5]
[1]Oxford Brookes University, UK,
[2]Elon University, USA,
[3]Duke University, USA,
[4]Bridgwater State University, USA,
[5]Roanoke College, USA

The identification of undergraduate research as a high-impact practice (Kuh, 2008) has added to its growth as an international movement. Data suggesting that undergraduate research offers particular gains for students from under-served populations (e.g. Brownell & Swaner, 2010), along with funding commitments to diversity in research (e.g., McNair Scholarships, National Science Foundation grants), have also stimulated broader participation.

The growth of undergraduate research has seen three significant changes in its practice in the last decade. First, the expansion of undergraduate research beyond the laboratory sciences, to mathematics, social sciences, arts and humanities, and professional disciplines (Shanahan et al., 2015) and an associated use of the term "Undergraduate Research, Scholarship, and Creative Activity," (Crawford & Shanahan, 2014). Secondly, the availability of undergraduate research opportunities in an array of institution types has expanded including community colleges in the U.S. (Hensel & Cejda, 2014) and further-education colleges in the U.K. (Healey, Jenkins & Lea, 2014). Finally, broader undergraduate research experiences that include not only the US style apprenticeship model with an individual professor, but also more democratic, course-based experiences that involve diverse groups of students in scholarly work (Brush, Cox, Harris, & Torda, 2010; Corwin, Graham, & Dolan, 2015).

Research shows the need for, and the benefits of, personally-supportive undergraduate research mentoring across a variety of contexts, including different demographic groups (e.g., non-traditional undergraduates, first-generation students), academic disciplines, and under-represented groups (e.g., women in STEM fields, minority students) (e.g. Osborn &

Karukstis, 2009). Despite the need for effective undergraduate research mentors, overarching guidelines on what makes for "good" mentoring do not exist.

This paper will discuss the salient practices of undergraduate research mentors as currently described in the literature, then present results from over thirty in-depth interviews with award-winning undergraduate research mentors from around the world about their practice, exploring the themes of freedom and control within the data and showcasing exemplars from a range of contexts.

The literature review identified from nearly 100 peer-reviewed articles the practices associated with effective undergraduate research mentoring. Following this a five-person, multidisciplinary research team conducted over 30 in depth (c 1 hour) key informant interviews about undergraduate research mentoring practices with international faculty from a broad range of disciplines who had won an institutional or national award for excellence in this area. The interview guide explored pathways into undergraduate research mentoring, the nature of the mentor-mentee relationship, effective research mentoring practices, challenges to successful mentoring and the perceived future of undergraduate research mentoring. In addition, we conducted 30-minute qualitative interviews with recent former mentees of our award winning faculty informants. Interviews were transcribed and coded by two members of the team, followed by cross checking by the remaining three members for inter-rater reliability all using the online qualitative software program Dedoose. Using grounded theory, analysis has focussed on describing salient practices described by these successful undergraduate research mentors.

The ten salient practices from the literature review include communicating high expectations, tailoring research to individuals, building a community of practice, providing emotional support and developing a personal interest in students, having the time and availability to scaffold the research process and allowing students to gain a sense of ownership over the research and engage in professional development activities related to dissemination and the building of future networks.

The research with award winning mentors echoes many practices from the literature but develops this by furnishing us with examples of how each practice is achieved in particular personal, disciplinary, institutional and national contexts. The data reveals the impact of

undergraduate research mentoring on academic career trajectories. In terms of the freedom – control dialectical there are several important themes where this is revealed.

First, the balance achieved between allowing students autonomy in the research process which can mean they decide their own research topic and feel the authenticity of possible failure versus the safety net, scaffolding and faculty / academic staff control of topics that will yield publishable research.

Second, in recruitment to the mentoring relationship, ensuring a good 'fit' between mentor and mentee relates to the freedom and control dialectical in several ways through the desire for inclusivity but the need for selection to ensure a high quality experience; and the freedom exercised in student selection (such as positively choosing students from underrepresented groups or with lower gradepoint averages because of a perceived ability to add more value).

Third, the juxtaposition of a highly controlled time frame, with regular meetings and sometimes a learning contract vs the free / unbounded use of time such as going for coffee, dinner, the blending of research discussions into social time, and ongoing developmental mentoring long after the research had ended.

Fourth, is the community of practice element which reveals a contrast between allowing students the freedom to work with each other, to engage in peer mentoring, and participate in external activities such as publication, dissemination and networking outside the institution, but at the same time mentors exercise strong control in terms of control of the size and make-up of research groups and scaffolding / preparation for wider engagement activity.

There are clear implications for practice as a result of this research. There are huge opportunities to share practice across disciplines, and institutions. There is a clear mandate to focus on particular practices when working with students from under-represented groups, as the research has revealed the importance of creating a 'bridge' to home life and showing an interest in the whole student (rather than just the research project). A pedagogy for the future needs to acknowledge and adapt to the way in which the context of research-based learning in universities is evolving. There are implications for being able to scale up research teams while maintaining a quality experience where students feel supported emotionally as well as academically. Furthermore the importance of reward and recognition for undergraduate research mentors and support for this activity within and outside of the curriculum in administrative and resource management systems is clearly apparent.

References

Brownell, J. E., & Swaner, L. E. (2010). Five high-impact practices: Research on learning outcomes, completion, and quality. Association of American Colleges and Universities.

Brush, E., Cox, M., Harris, A., & Torda, L. (2010). Undergraduate research as faculty development. *CUR Quarterly, 31*(1), 11-16.

Corwin, L. A., Graham, M. J., & Dolan, E. L. (2015). Modeling course-based undergraduate research experiences: An agenda for future research and evaluation. *CBE – Life Sciences Education, 14*, 1-13.

Crawford, I., & Shanahan, J. O. (2014). Undergraduate research in the arts and humanities: Challenges, opportunities, and rewards. In I. Crawford, S. Orel, & J. O. Shanahan (Eds.), *How to get started in arts and humanities research with undergraduates*. (pp. 1-11). Washington, DC: Council on Undergraduate Research.

Healey, M., Jenkins, A., & Lea, J. (2014). *Developing research-based curricula in college-based higher education*. York, UK: Higher Education Academy.

Hensel, N. H., & Cejda, B. D. (Eds.), (2014). *Tapping the potential of all: Undergraduate research in community colleges.* Washington, DC: Council on Undergraduate Research.

Kuh, G.D. 2008. High impact educational practices: what are they, who are they, who has access to them and why they matter, Washington, DC: Association of American Colleges and Universities. Available at: http://www.neasc.org/downloads/aacu_high_impact_2008_final.pdf

Osborn, J., & Karukstis, K. (2009). The benefits of undergraduate research, scholarship, and creative activity. In M. K. Boyd & J. L. Wesemann (Eds.), *Broadening participation in undergraduate research: Fostering excellence and enhancing the impact*. (pp. 41-53). Washington, DC: Council on Undergraduate Research.

Shanahan, J. O., Liu, X., Manak, J., Miller, S. M., Tan, J., & Yu, C. W. (2015). Research-informed practice, practice-informed research: The integral role of undergraduate research in professional disciplines. *CUR Quarterly, 35*(4), 6-16.