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A Proposal for Thinking Strategically About Ethics Education: Applying the Principles of Andragogy to Enhance Teaching and Learning About Responsible Conduct of Research (RCR)

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Abstract

Training in the responsible conduct of research (RCR) is mandated for select trainees supported by federal funds. RCR Instructors typically address standards and accepted practices for the planning, conduct and reporting of academic research. While this focus may be relevant to future academic scientists, the majority of science graduate students pursue careers in non-academic employment sectors (e.g., government, non-profit, industry). The ethical and regulatory conventions, norms and expectations of the academic setting may not always transfer to other work environments. As such, educators should focus less on answering specific questions about standards and practices in academia, and instead design ethics education to actively engage students in a learning process that prepares them with the skills to identify and navigate ethical dimensions in a wide range of possible science professions. This paper introduces the principles of andragogy and provides recommendations for educators to consider when designing research ethics education for graduate students seeking cross-sector science careers. By applying principles that resonate with adult learning and integrating strategies that promote self-directed and life-long learning (e.g., reflective practice and collaborative projects), professional and research ethics instructional effectiveness may be enhanced.

Introduction

Responsible Conduct of Research (RCR) training is provided to students and post-doctoral trainees at academic institutions throughout the United States, primarily in response to federal funding requirements (NIH 1992; NIH 2009; NSF 2009). Core areas of instruction associated with RCR training (e.g., data management, conflict of interest, authorship, research subject protections) were initially identified by the National Institutes of Health (NIH 1992) and, later by the Public Health Service (PHS 2000). While subject matter areas were identified, the NIH did not present a prescriptive plan or establish standards for training; leaving the scope of RCR training open to the discretion of each institution. As a result, RCR educational initiatives have emerged over the past quarter century with diverse goals, content and instructional approaches (Kalichman & Plemmons 2007; DuBois et al. 2010; Mastroianni & Kahn 1999).

One aspect of RCR training that remains fairly constant is the application of concepts to practices within the academic biomedical research environment. While a biomedical focus may be relevant and meaningful to future academic scientists, particularly biomedical researchers, college graduates increasingly seek careers in non-academic employment sectors (e.g., government, non-profit, industry) (NIH 2012). In fact, a report by the NIH Biomedical Workforce Working Group acknowledged that despite the decrease in tenure track academic positions "graduate training continues to be aimed almost exclusively at preparing people for academic research positions" and recommended that graduate programs "accommodate a greater range of anticipated careers for students" (NIH 2012, 8).

With regard to RCR instruction, the ethical and regulatory conventions, norms and expectations of the academic setting may not be directly applicable to cross sector research environments. As such, educators should focus less on answering specific questions about standards and practices in the academic environment, and instead design ethics education to actively engage students in a learning process that fosters development of the skills needed to identify and navigate ethical dimensions in a wide range of possible science professions. This paper provides a framework for designing RCR instruction using the principles of andragogy as a method of engaging students in learning about whether and how commonly accepted core content in research ethics present in the cross-sector workplace setting.

Status of RCR Education

Much has been written on research ethics education over the past 25 years. Nearly a decade after the initial training mandate was published, Mastrionni and Kahn conducted a study to learn how academic research institutions complied with the RCR training requirements and found responses were quite diverse regarding who was trained (e.g., trainees covered by mandates or all trainees), who was responsible for teaching (e.g., principal investigator, ethics faculty), what content was covered (e.g., conflict of interest, data management), what instructional methods were used (e.g., lecture, seminars, discussion forums) and whether instruction was discipline specific or general (Mastroianni & Kahn 1999). While progress has been made on clarifying goals and instructional content, the objectives of RCR remain complex and difficult to define and evaluate. Kalichman (2007) summed up the challenges of defining the scope of RCR stating that "RCR has come to include a wide-ranging mix of knowing and following rules, being a moral person, having good character, exhibiting good ethical judgment, and acting with integrity and responsibility" (Kalichman 2007, 870). Because of this broad scope, most agree that no one educational strategy will meet the needs of all and, as such, we will likely continue to see a variety of approaches used in RCR education (Dubois & Dueker 2009; Kalichman 2007). Regardless of the diversity in RCR training, there is a consistent focus on contextualizing RCR practice to the academic research setting. Given many graduates will seek professional careers in non-academic settings, a goal of this project was to design RCR instruction that fostered student engaged learning about cross-sector research ethics.

Approaches to RCR Education

As in any discipline, teaching RCR requires consideration of the learning outcomes and pedagogical objectives with respect to the training goals (Prichard 2005; Schrag 2005). Over the past few years, the literature has included descriptions of RCR teaching that engage students/trainees in interactive, inquiry-based and problem-oriented activities (Atkinson 2008; Berry et al. 2013; Brummel et al. 2010; DeBruin et al. 2007); however, RCR outcome studies reveal the traditional format of lecture, discussion and case-analysis are reported most frequently (Antes et al. 2009; Plemmons et al. 2006; Powell et al. 2007). Occasionally, the principles or learning theories undergirding the selected teaching strategy are described in the RCR literature (Keefer 2012; McGee et al. 2008); although, this detail is fairly uncommon and, perhaps, may be implied.

Outcomes associated with RCR training have been less than impressive ranging from no changes to modest improvement (Anderson et al. 2007; Antes 2009; Heitman et al. 2001; Powell et al. 2007). Research ethics educators attribute these outcomes to inconsistent goals (Kalichman & Plemmons 2007), uncoordinated initiatives (Steneck & Bulger 2007) and low levels of institutional support (Kalichman 2007). Several argue that RCR educators need to carefully consider instructional design (Antes 2009; McGee et al. 2008; Anderson et al. 2007) and apply theory-based learning principles to determine appropriate teaching strategies (Keefer 2012; McGee et al. 2008; Nebeker 2013). For example, the research on human learning states that preconceptions can interfere with learning new information (Bransford et al. 2000). Instruction designed to identify learner preconceptions would be consistent with applying theory-based learning principles and may contribute to better RCR training outcomes (McGee et al. 2008; Nebeker 2013).

Likewise, teaching strategies that engage the learner with opportunities to practice new skills, experience mistakes and reflect on these experiences will help the trainee increase understanding and improve transfer of concepts to practice (Bransford et al. 2000; Aguinas & Kraiger 2009). This paper presents a framework for teaching RCR that incorporates principles of andragogy. While the application of andragogical principles are not uncommon in adult and post-secondary education, they proved particularly useful when considering RCR instruction for science master's students preparing for cross-sector science professions and can easily be adapted by those involved with RCR instructional design. Specifically, applying principles of adult learning in teaching about RCR promotes the development of skills needed to identify and navigate ethical dimensions of the workplace, albeit in an academic setting or in a corporate or government environment.

RCR Applied to Cross Sector Science Careers

In 2009, the National Science Foundation (NSF) developed a plan to implement Section 7009 of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act. Specifically, the NSF required that institutional officials certify, at the time of proposal submission, that a plan was in place to provide RCR training to undergraduate students, graduate students and post-doctoral trainees who would be supported by NSF to conduct research (NSF 2009).

This requirement extended RCR training beyond the traditional biomedical research disciplines to science and engineering fields including, for example, computational sciences, climate studies, financial mathematics and remote sensing. This training requirement challenged RCR educators to consider the application of research ethics across a variety of non-biomedical disciplines and develop training appropriate to the student's career stage, including undergraduate and master's level trainees.

Concurrent with the NSF implementation plan, the NSF Ethics Education in Science and Engineering (EESE) program agreed to support an educational initiative to develop RCR instruction for master's level science students enrolled in a relatively new degree program called the Professional Science Master's (PSM) program (Science Masters 2013). The impetus to examine the literature on adult learning was prompted by the challenges of developing relevant RCR instruction for students enrolled in PSM degree programs. Lessons learned from exploring and applying the theories of adult learning, in particular the principles of andragogy to RCR instructional design, are relevant to educators interested in improving the scholarship of teaching and learning about research ethics.

Professional Science Master's Degree Programs

A brief history of the PSM degree program is provided to contextualize the unique challenges for designing research ethics instruction for students preparing for careers in non-academic employment sectors.

The PSM degree program was first introduced in the late 1990s when educators and employers recognized that, in addition to subject matter expertise, professional skills were necessary to prepare students to perform and be competitive in the global economy (Musante 2009; Teitelbaum & Lynch 2010; Wendler et al. 2010). PSM degree programs were designed to combine graduate coursework in a science or engineering field with industry relevant education in business management, communications, regulatory affairs, law and ethics that are referred to as *Plus* courses (Science Masters 2013). In addition to augmenting a science master's degree program with *Plus* course options, the PSM programs typically require that students complete an internship in lieu of a research thesis to gain hands on experience in the field where they may eventually be employed (Teitelbaum & Lynch 2010). Since 1997, the number of PSM programs has grown to over 300 offerings at 139 universities in the United States and abroad (Science Masters 2013). The majority of PSM programs are in biology/biotechnology (29%) and environmental sciences (23%) followed by mathematics and statistics, computational molecular biology, computational sciences, physics and geological sciences (Ibid). Medically related sciences (e.g. medical physics), chemistry, and forensic sciences make up about 10% of all PSM programs (Ibid).

Challenges in Designing RCR Instruction for the PSM

When identifying an appropriate RCR instructional design for PSM programs, there were a number of unique challenges that prompted a focus on learning theories and principles. For example, we needed to consider: 1- what knowledge or expertise in cross-sector research ethics would be needed for teaching, 2- whether topics commonly

associated with RCR (conflict of interest, data management, authorship practices, etc.) were relevant in the non-academic employment sectors (e.g., medical physics, biotechnology) and, 3- whether it was feasible for training to involve participation of employers who supervised interns. A project aim was to develop RCR instruction for PSM programs that was meaningful to the graduate student and relevant to the employment sector where a student may participate as an intern and/or become employed.

To address these challenges and move toward the desired outcome, a learning process was needed that would empower students to be autonomous and self-directed in learning about the ethical dimensions of their discipline and profession. The process of developing instruction to foster self-directed and lifelong learning skills involved an extensive review of the literature on human learning and, in particular, adult learning in post-secondary education. This literature supported adoption of a learner-centered approach to instruction that relies on self-directed learning strategies (e.g., self-assessment, reflective writing, problem-based activities, discussion forums, and qualitative inquiry).

Research on Learning

Understanding what is known about human learning, particularly adult learning, can assist RCR educators to make informed decisions about how they engage students in the learning process. The literature on the science of human learning increased dramatically over the latter half of the 20th century as a result of extensive research and scholarship within the social, behavioral, developmental and cognitive sciences. Notable scholars contributing to this literature include, for example, John Dewey, Paulo Freire, Malcolm Knowles, Jean Lave, Jack Mezirow, Jean Piaget, Carl Rogers, Lev Vygotsky and Eitenne Wenger. Developments in educational research led to more focused discussions on how to transfer or apply the science of learning to educational practice, for example: 1- learning is a social process that requires interaction and collaboration (Vygotsky 1978); 2- learners create understanding through reflective practice (Mezirow 1991); 3- learners are most motivated and interested when the subject matter is connected to personal and professional experiences (Knowles et al. 2005); 4- learning is enhanced when combined with opportunities to connect content to authentic practice (Lave & Wenger 1991); and, 5- metacognitive skill development enhances self-responsibility for learning (Flavell 1979). In 2000, Bransford, Brown and Cockering published a model for designing the optimal learning environment, which was based on nearly 40 years of research on human learning. While the Bransford et al. (2000) framework was written for primary school educators, a recent article describes how principles of an optimal learning environment can be adapted to guide RCR instructional design for post-secondary education (Nebeker 2013). This paper considers what is known about adult learning and proposes strategies to apply the principles of andragogy to foster self-directed learning about the ethical dimensions of research.

Andragogy Applied to RCR for Science Master's Trainees

The term andragogy or "man-learning" was first introduced in the 1800s by Alexander Kapp, a German scholar (Boyer 1984; Knowles et al. 2005; Rachal 2002). Andragogy

is a set of assumptions or principles thought to motivate adult learning and is a perspective advanced within the United States by Malcolm Knowles over 50 years ago. Knowles' principles of andragogy assumed that adults are self-directed, problem centered, motivated, knowledgeable and willing to learn, provided they understand the purpose and relevance for learning a particular subject (Knowles et al. 2005). These principles present an approach to learning that encourages interactive and collaborative instruction. Each principle is presented below with considerations for teaching and learning about responsible conduct of research. In addition, examples are provided to demonstrate how these principles align with the RCR curriculum developed for and tested with students in several Professional Science Master's programs. One aim of our field-testing process was to identify the facilitators and barriers to engaging employers and internship supervisors in the learning process. As such, many of the examples include reference to employer involvement.

Limitations

The purpose of this paper is to introduce the principles of andragogy as a teaching tool for research ethics educators who are involved in RCR instructional design and assessment. In this paper, I share examples of how research ethics instruction designed for Professional Science Master's (PSM) students incorporate the principles of andragogy. Data collected during the PSM project field-testing informed iterations of the draft curriculum. The resulting instructional guide entitled, "Teaching Responsible Conduct of Research: A Resource Guide for Professional Science Master's Degree Programs" is available to PSM faculty via the National Professional Science Master's Association (NPSMA). Several of the instructional techniques used in the Guide were field-tested with students, faculty and employers affiliated with PSM programs. A limitation of this paper is that we have not collected sufficient data to assess whether the teaching strategies used in the Guide proved effective in developing self-directed learning skills. Additional quantitative and qualitative data are now being collected to assess the extent to which the teaching strategies used in the curriculum influence the desired learning outcomes.

Andragogy Principles

Each principle is presented below with a few strategies for educators to consider when designing instruction. In addition, each principle includes an "In Practice" segment with examples of the instructional techniques that reflect the principle in practice.

Principle 1: Adults *need to know* reasons for learning.

Learners are more receptive to learning when they understand why they need to know the information being taught. Recognizing what is being taught, why it is being taught, and the expected competencies are cited as critical elements for optimal learning (Bransford et al. 2000) Knowles believed that when adults understand the purpose of acquiring new knowledge, they are more likely to be self-directed and motivated to learn as opposed to experiencing resistance to learning when expectations for knowing about a subject is imposed by others (Knowles et al. 2005).

The federal RCR training requirements create a critical challenge for both students and educators since mandates to learn can be construed as an imposition by students and,

subsequently, may prompt barriers to one's willingness to learn. Educators may experience resistance or resentment from students who attend a course, workshop or seminar in response to an RCR training mandate as opposed to seeking information about research ethics out of professional interest. To mitigate these challenges, instructors can promote discussion to connect the relevance of RCR training with valued professional competencies. When applying the principles of andragogy, the role of the educator is to guide students to develop skills for self-directed learning and to encourage the student to take responsibility for their learning. Techniques that educators can use to increase self-directed and motivated learning include:

1. Involve students in establishing course goals and determining priorities for relevant RCR content to be covered.
2. Discuss with students what RCR means and what competencies are expected at different stages of training as well as the role of all stakeholders (e.g., mentors, colleagues, organizations and the public) in fostering research integrity.
3. Encourage students to explore why learning about acceptable RCR standards of practices will contribute to their professional development.

In practice: To engage students in identifying course goals and priorities, students are asked to identify three to five aspects of planning, conducting and reporting of research they consider most critical to their professional success. Since the student may not know this information, they are instructed to ask both a faculty member in their department and a relevant cross-sector practitioner (e.g., employer or internship mentor). For example, a computational sciences graduate student discussed RCR priorities with his faculty mentor and with his internship supervisor who worked at a local pharmaceutical company.

To learn about what competencies are expected, faculty and employer representatives are invited to participate in either in person or virtual discussions. During this session, guest speakers contribute their thoughts and experience about what fosters or undermines research integrity. Additional discussion includes relevant training opportunities, expectations of students and/or employees and stakeholder influence within and outside of the organizational culture that can foster or impeded responsible and ethical research.

To engage students in understanding why knowing about RCR is beneficial, we begin with an overview of the course purpose, format and objectives. Since a novel aspect of the course is learning about standards and practices to increase research integrity in cross-sector research settings, students have an instrumental role in acquiring information and sharing what they have learned with fellow students. An objective of this approach is to foster development of self-directed learning skills to empower students to continue learning about the ethical dimensions of their research environment.

<u>Principle 2: Adults have *experiences* that contribute to a foundation for learning.</u>
Adults have life experiences derived from a number of sources (e.g., work, family, school) that contribute to what they know and what they need to learn. Moreover adults like to draw upon this foundation of experience both as a resource and to transfer

learning to practice (Knowles et al. 2005). By nature, humans are interested in learning when the subject matter is relevant to their interests. While this principle focuses on life experience as enhancing individual interest in a subject, researchers have recognized that understanding the learner's prior experience is critical for acknowledging both correct and inaccurate perceptions (Bransford et al. 2000). When applied to RCR instruction, educators can:

1. Recognize that students will have some prior research experience and those experiences will influence their learning about responsible and ethical research practices.
2. Use formative assessment techniques to gauge student understanding of concepts so that both the instructor and the student have a sense of what they know and what remains unclear. This type of formative assessment provides the instructor with an understanding of student competencies and creates an opportunity to address misconceptions.
3. Encourage opportunities for students to reflect upon and talk about their experiences to explore similarities and differences across disciplines and work environments (e.g., academic lab, industry, non-profit, etc.).

In practice: We administered an assessment that includes both qualitative and quantitative items to gauge existing knowledge about topics associated with RCR broadly. In addition, students are asked to reflect on and write about their experiences in the research setting and to think about questions they have about the ethical dimensions of their work. Students who are actively involved in, or who have completed an internship experience, are asked to consider and write about similarities and differences observed between the academic and corporate cultures with regard to RCR. This formative assessment and reflective writing process contribute to class conversations intended to promote awareness of differences in standards, conventions and regulations influencing accepted research practices in various settings. The assessment results and discussions are also useful in identifying misconceptions and clarifying accepted standards of practice.

Principle 3: Adults have a *self-concept* of being responsible.

Knowles considered adults to be responsible, autonomous and self-directed in their learning and capable of taking control of their learning through self-study. Andragogy assumes adult learners are autonomous with the ability to set goals for learning and monitor progress toward achieving those goals. When applied to RCR instruction, educators can:

1. Engage students in planning and evaluating a personal RCR goal. This may occur through a self-assessment of competencies and subsequent consideration of what improvements would be beneficial to their professional competencies.
2. Provide realistic and relevant learning experiences that directly link content to the professional setting where concepts will be applied (e.g., role-play, case study analysis and discussion).
3. Foster participant reflection of ethical dimensions of a profession through activities that promote active engagement in the learning process (e.g., problem solving practice, qualitative inquiry, debate, etc.).

In Practice: Planning a personal goal for learning is initiated during the first session by asking students to describe what they hope to gain from attending the course specific to competencies in planning, conducting and reporting of research. Often, the goals focus on knowing what is important, where to get accurate information and a desire to feel more capable and confident when addressing an ethical dilemma. For example, a graduate student in computational biology stated: "I hope to feel confident in confronting ethical situations as they arise in my research career." To build this confidence, students have opportunities to practice identifying and responding to situations that may arise in the workplace. RCR courses often use case studies to depict ethical dimensions in the academic research settings. Since this course is designed to learn about RCR in cross sector research and other professional settings, students are actively involved in gathering data about how or whether professional and research ethics topics present in the workplace. To gather this data, students can search for current events and/or conduct an informational interview with an employer or internship supervisor. As a final project, students synthesize what they have learned during the data collection phase and work in teams to develop an annotated instructional case that depicts a plausible ethical dilemma in a cross-sector science setting. In addition to project-based learning strategies, periodic formative assessment is used to support ongoing evaluation of individual goals. For example, halfway through the course, students are asked to: 1- reflect on what they've learned, 2- assess whether they feel more comfortable talking about the ethical dimensions of their research, and 3- identify whether they are having more frequent conversations about RCR with their peers and mentors.

Principle 4: Relevance to professional goals increases *readiness to learn.*
The principle of readiness to learn is based on the student's desire to perform well when managing a situation that is directly relevant to their personal or professional life. Andragogy assumes that adults learn best when information is presented in a real life context in a manner that requires problem-solving skills. When applied to RCR instruction, educators can:

1. Encourage students to determine what areas of RCR are most relevant to their discipline and profession. Gathering accurate information about RCR relevance may involve inquiry-based activities that involve, for example, an interview with a professor or practitioner about the conventions and standards of ethical practices within the discipline and/or profession.
2. Ask students to reflect on an actual ethical dilemma they have experienced and consider how they managed the situation. With that problem in mind, ask students to reflect upon their decision and consider what worked well and what could be improved. Responses can guide what strategies may be useful in identifying and navigating ethical challenges in the future.

In practice: For the science master's students, engaging in conversation with employers or practitioners was essential in applying the principle of "relevance" or readiness to learn. The employers who have participated in the course, via interviews or on panels, provide valuable insights on the professional standards and accepted practices in cross-sector research professions.

Principle 5: *Orientation* to learning must apply to life and work.

Andragogy proposes that learners be engaged in the process of learning using task or problem-centered approaches that directly relate to an important life issue. Connecting learning to the actual work environment is a critical aspect of successful transfer of a concept to practice and is well documented in the literature (Aguinas & Kraiger 2009). When applied to RCR instruction, educators can:

1. Engage students in examining the relevance of the subject matter (e.g., conflict of interest, peer review) to the context of the workplace and how one learns about expectations and standards of practice through role-play, simulations and/or debate.
2. Encourage students to raise questions and discuss perspectives that reflect their discipline or profession. Provide opportunities to practice talking about ethical issues that reflect reality in the workplace via real or hypothetical case studies that pertain to the actual discipline or professional field.
3. Allow time to practice evaluating discipline and profession-relevant case studies using a framework to guide analyses.

In practice: A teaching strategy used to explore 'orientation' involves a panel presentation where faculty, employers, and student interns talk about the practice of responsible and ethical research (e.g., human subject protections, authorship, publication, data management) and how responsible practices are demonstrated within their respective organizations. These conversations contribute, for example, to discussions of core topics typically discussed in RCR and whether/how the topic or domain transfer to a non-academic professional setting. For example, authorship and publications was strongly valued in the academic setting where as patents were valued in lieu of publications within a biotechnology business setting.

Principle 6: *Motivation* to learn increases with maturity.

Knowles' sixth principle of andragogy is based on the assumption that internal motivation to learn increases with maturity. What motivates individuals may be driven by external controls like a better position or higher salary or internal controls like increased personal competence and quality of life. Motivation to learn about professional and research ethics may be driven by the desire to either avoid making mistakes or gain respect within a profession for adopting and advancing practices that promote research integrity. When applied to RCR instruction, educators can:

1. Reinforce student awareness of her/his role within their respective discipline and profession for contributing to an organizational climate which values ethical and responsible research practices.
2. Explore rationale that supports knowledge, awareness and practices that foster professional and research ethics and, ideally, avoid behaviors that would compromise their reputation.

In practice: The principle of 'motivation' for the science master's student is to be as prepared as possible when joining a new organization as an employee or intern. Several of our employer partners were unfamiliar with the training that academic scientists receive in RCR and were interested in participating to assist students to

become aware of corporate expectations and values. Qualitative formative assessments are incorporated in the curriculum to prompt students to periodically reflect on their role and responsibilities with respect to promoting research integrity within the organizational culture.

Next Steps

Data obtained in collaboration with PSM partners during curricular field-testing and input from PSM affiliates attending regional and national meetings contributed to the development of a research ethics instructional guidance document entitled, "Teaching Responsible Conduct of Research: A Resource Guide for Professional Science Master's Degree Programs." The author has presented the research-based principles and strategies at several NPSMA regional and national meetings. In addition, several "Train-the-Trainer" workshops have been conducted with faculty who are interested in integrating cross-sector RCR instruction within their PSM *Plus* courses. Additional educational research is planned to better understand the extent to which the RCR instructional design that incorporates research-based principles influences self-directed learning about RCR.

Conclusions

Andragogy is a learning process that can be used to empower students to take responsibility for their ongoing learning about responsible and ethical research practices regardless of the employment sector in which they pursue a career. Educators can promote development of self-directed and lifelong learning skills among RCR students by applying the principles of andragogy in their teaching. Using a combination of instructional strategies that actively engage students in the learning process is the most effective method of fostering the transfer of learning to practice. Techniques that promote opportunities for students to practice collaborative problem-solving, qualitative inquiry and discussion of relevant and realistic ethical dimensions of the work environment align with principles of andragogy. These techniques may include, for example, a combination of discussion, debate, simulation, case-analysis and role-play. Regardless of the specific strategy used, an objective of a learner-centered approach to RCR training is to prepare students with the resources and skills needed to navigate the ethical dimensions of a research environment, whether that is in, for example, quantitative forecasting for private industry, laser sintering in an academic laboratory, or geospatial intelligence for a government agency.

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For nearly 20 years, Dr. Nebeker has contributed to advancing ethical and responsible research practices in biomedical, social and behavioral sciences through national and international venues. Since 2002, Camille has received federal support from the National Institutes of Health, National Science Foundation and the Office of Research Integrity to foster research ethics education and to study factors that influence research integrity. Dr. Nebeker is an assistant professor and research ethicist with the UC San Diego Department of Family and Preventive Medicine and an affiliated investigator with the UCSD Research Ethics Program.

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