

Review of Instructional Approaches in Ethics Education

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Abstract Increased investment in ethics education has prompted a variety of instructional objectives and frameworks. Yet, no systematic procedure to classify these varying instructional approaches has been attempted. In the present study, a quantitative clustering procedure was conducted to derive a typology of instruction in ethics education. In total, 330 ethics training programs were included in the cluster analysis. The training programs were appraised with respect to four instructional categories including instructional content, processes, delivery methods, and activities. Eight instructional approaches were identified through this clustering procedure, and these instructional approaches showed different levels of effectiveness. Instructional effectiveness was assessed based on one of nine commonly used ethics criteria. With respect to specific training types, Professional Decision Processes Training ($d = 0.50$) and Field-Specific Compliance Training ($d = 0.46$) appear to be viable approaches to ethics training based on Cohen's d effect size estimates. By contrast, two commonly used approaches, General Discussion

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Training ($d = 0.31$) and Norm Adherence Training ($d = 0.37$), were found to be considerably less effective. The implications for instruction in ethics training are discussed.

Keywords Ethics · Education · Training · Instruction · Cluster analysis · Responsible conduct of research (RCR)

Introduction

For many years, research integrity was a concern for a select few bad apples committing major transgressions. Thus, it was assumed federal oversight with respect to research integrity should focus on punishment rather than preventive action (Steneck 2006). However, an increased number of research misconduct cases, coupled with the prevalence and consequences of questionable research practices (John et al. 2012), triggered the need for an increased focus on research integrity among the broader scientific community. One approach for fostering research integrity is formal ethics education. Mandates by the National Institutes of Health (NIH) and the National Science Foundation (NSF) stipulated instruction in responsible conduct of research (RCR) for all scientists applying for federally-funded grants (Steneck and Bulger 2007). These mandates, in addition to efforts by other government agencies (Mumford et al. 2015), have led to a proliferation of ethics education programs in the last two decades.

Of particular note, these federal mandates did not specify the nature of and content required for RCR training. This allowed institutions to exercise autonomy in developing RCR programs (Steneck and Bulger 2007). As a result, considerable variability in instructional objectives and content is now evident in the current state of ethics education (DuBois and Dueker 2009; Kalichman 2014). For example, some programs employ self-directed, online instruction (e.g., Braunschweiger and Goodman 2007). Other programs utilize face-to-face, case-based instruction emphasizing strategies for solving ethical programs (Mumford et al. 2008). Still other programs focus on reducing research misconduct (e.g., Brkic et al. 2012).

Along with the recent increase in ethics education in the scientific community, business schools have also increased ethics instruction offerings (Christensen et al. 2007). Indeed, recent scandals involving Volkswagen and the International Federation of Association Football (FIFA) point to the need for continued emphasis on ethics education in organizations and business schools. Furthermore, the Association to Advance Collegiate Schools of Business includes ethics as a standard for business school accreditation (AACSB 2013). Thus, although RCR education is the primary focus of the present study, business studies bearing on ethics education were included as well.

Given the increased number of ethics education programs emerging in recent years (Watts et al. 2016), a systematic identification of the common types of ethics instruction is both timely and warranted. As such, the present effort has two primary aims. The first aim is to identify the common instructional approaches to ethics education. The second is to assess the effectiveness of the identified instructional approaches vis-à-vis meta-analytic results.

Ethics Training

In a review of RCR objectives, Kalichman and Plemmons (2007) interviewed RCR instructors regarding instructional goals of their programs. Combined, these trainers mentioned over 50 distinct goals, further reinforcing the variability evident in current ethics education with respect to objectives. Other authors have also noted considerable diversity in instructional objectives for ethics education (Mumford et al. 2015; Steneck and Bulger 2007). A certain degree of variety is expected and even desirable given that instructional objectives should be based on the needs and aptitude of trainees (Antes 2014; Goldstein and Ford 2002). This variety in instructional objectives has contributed to considerable diversity with respect to instructional content and delivery methods in ethics education programs. Accordingly, four categories of instructional characteristics seem relevant for distinguishing between the various types of ethics training programs (Goldstein and Ford 2002). These four categories include (1) instructional content, (2) processes, (3) delivery methods, and (4) activities.

Not surprisingly, ethics education programs can vary considerably in terms of instructional content. For example, Steneck (2006) drew a distinction between research ethics and research integrity. Specifically, research ethics refers to research behavior being guided by moral principles while research integrity involves professional standards of an institution guiding research behavior (Steneck 2006). Thus, one approach (i.e. research ethics) raises *questions* about the appropriate behavior of researchers while the other approach (i.e. research integrity) presents *clear statements* for how to behave in a given context. This distinction notwithstanding, a multitude of other examples of instructional content variables exist in ethics education. For example, programs may emphasize a specific aspect of research misconduct in an attempt to reduce such behavior (e.g., Brkic et al. 2012). Alternatively, the substantive ethical issues applying in a specific field may be covered (e.g., Cho and Shin 2014). Furthermore, the historical development of moral or ethical theories may be featured prominently in an ethics training course (e.g., Cummings et al. 2010). While diverse, the presented examples certainly do not provide exhaustive coverage of content in ethics education.

With a myriad of extant instructional content variables, instructors in ethics education may be left asking: Is there a common framework of content variables from which to draw? One proposed framework was developed by the Office of Research Integrity (ORI). ORI presented nine guidelines critical to RCR education, including (1) research misconduct, (2) protection of human subjects, (3) welfare of laboratory animals, (4) conflicts of interest, (5) data management practices, (6) mentor and trainee responsibilities, (7) collaborative research, (8) authorship and publication, and (9) peer review (Steneck 2007). Although these nine guidelines present a useful framework for educating young scientists, it is important to bear in mind that instructional content should be chosen based on the needs of trainees (Antes 2014; Goldstein and Ford 2002). Thus, one would not expect a single overarching curriculum to apply to all institutions attempting to promote greater research integrity (DuBois and Dueker 2009; Mumford et al. 2015).

In addition to specific content, ethics training programs may also vary in the extent to which they underscore process variables. Whereas content variables concern factors bearing on ethical situations generally, processes help individuals work through a complex, ill-defined ethical problem (Mumford et al. 2008). For example, trainees may be asked to forecast, or predict, the outcomes of a given ethical situation (MacDougall et al. 2014). A specific desirable outcome may not be clear for many ethical situations. However, forecasting can provide a richer understanding of the ethical situation by considering alternative courses of action and the associated consequences for oneself and others (Harkrider et al. 2012). Alternatively, trainees may be provided with a case-analysis framework in which relevant stakeholders, facts, and norms must be identified in an ethical case (DuBois et al. 2008). It is important to note, despite ample evidence for the efficacy of processes in ethics education (Mumford et al. 2008), some programs forego covering processes altogether.

A third potential differentiation among ethics education programs is the use of delivery methods. Instructors are presented with a variety of options in delivering the content of the training (Goldstein and Ford 2002). For example, instructors may employ a traditional delivery method such as lecture or a more novel approach such as web-based instruction or simulations. One consideration in this respect is that instructors are not limited to a single instructional technique and often use multiple delivery methods within a single course (Goldstein and Ford 2002). An instructor may choose to supplement lectures with web-based instructional features, for example. In one RCR course, Resnik (2005) asked students to participate in class as well as submit case studies to an electronic discussion board. An additional delivery method that may be used is team-based learning. In a series of studies by McCormack and Garvan (2014) and McCormack et al. (2015), students were asked to complete cases in teams of 5–7 members. The answers provided by teams, in turn, stimulated further discussion of the case by the rest of the class. The two preceding examples point to another commonly used delivery method in ethics education—cases. Case-based knowledge can be developed through experiences or direct instruction (Kolodner et al. 2003). In the context of ethics instruction, cases can help individuals evaluate an ethical situation as well as provide analogous principles to guide future decision making (Mumford et al. 2008). One unique feature of cases is that they allow the instructor to embed certain instructional features into the case itself. For example, emotional content (Thiel et al. 2013) or forecasted outcomes (Harkrider et al. 2012) may be embedded to emphasize critical components or the overall salience of the case.

Instructional programs also differ with respect to the activities employed. Activities, or practice exercises, can further reinforce a concept by asking trainees to actively engage with the material. The training literature suggests that trainees are more likely to transfer knowledge and skills when they are asked to produce the desired response in training (Goldstein and Ford 2002). For example, in role play scenarios, trainees act out characters in an ethical scenario in which they provide a solution to the ethical problem (e.g., Brummel et al. 2010). Thus, when conducted appropriately, role plays can provide a realistic preview of a situation an individual may encounter in the future (Goldstein and Ford 2002). Alternatively, discussion, in

large or small groups, may be used to elicit responses, or greater levels of interaction, from trainees. One illustration of discussion in small groups is provided by Lin et al. (2010). In this study, students worked in small groups deliberating a specific ethical problem. By contrast, Evans and Bendel (2004) offer one example of discussion in large groups. In this study, nursing students were asked to share personal experiences involving patients to further elaborate on a broader course theme. Activities could also involve individualized exercises offering little to no interaction with other trainees. Self-reflection and essays are two examples of activities featuring minimal social interaction. In a study by Van Hise and Massey (2010), following each class session, students were asked to answer multiple questions by reflecting on various aspects of the course.

Meta-Analyses

It should be clear at this juncture that a variety of instructional approaches are available in ethics education. However, before turning to the effectiveness of specific instructional approaches, the effectiveness of ethics education programs in general should first be examined. Instructional effectiveness can be defined as the acquisition of knowledge, skills, or attitudes in a training program or course (Goldstein and Ford 2002). In a recent study, Antes et al. (2009) used meta-analytic procedures to quantitatively review the literature on ethics education and determine the overall effectiveness of 26 programs. In this meta-analysis, instructional effectiveness was assessed based on Cohen's d , an effect size estimate assessing the difference between two independent means (Cohen 1992). Cohen's d effect sizes demonstrate the effectiveness of a treatment (i.e. training) condition by comparing a post-test score to a pre-test score or control (i.e. no training) condition score (Shadish et al. 2002). Common reporting standards for Cohen's d effect size suggest effect sizes of .20 indicate a small effect, .50 indicate a medium-sized effect, and .80 or greater indicate a large effect. In the Antes et al. (2009) meta-analysis, the overall effectiveness of 26 ethics education programs in the sciences was found to be modest (Cohen's $d = .37$). Moreover, a meta-analysis on 38 programs in business ethics education conducted by Waples et al. (2009) did not yield any more promising results ($d = .29$). Although these meta-analytic results were relatively moderate, it is important to bear in mind that certain instructional features were found to be more effective than others. For example, a greater emphasis on cognitive components of ethical issues, in contrast to social-interactional components, was found to be associated with more effective programs (Antes et al. 2009; Waples et al. 2009). Furthermore, case-based instruction was found to be more effective than traditional classroom-based instruction (Antes et al. 2009; Waples et al. 2009). This series of findings suggests that ethics education can indeed be effective, though certain approaches may be more effective than others.

The encouraging findings obtained by Antes et al. (2009) and Waples et al. (2009), coupled with increased government investment in ethics education, led Mumford and colleagues to conduct two recent meta-analyses of ethics instruction programs in RCR and business (Watts et al. 2016; Medeiros et al. 2016). Given the

increased attention in ethics education in recent years (Kalichman 2014), it stands to reason that there has been a substantial increase in ethics education studies conducted. Indeed, Watts et al. (2016) identified 150 unique effect sizes in RCR education meeting the inclusion criteria. Meanwhile, 90 unique effect sizes meeting the inclusion criteria were identified by Medeiros et al. (2016) in business ethics education.

The findings obtained by Watts et al. (2016) suggest that ethics education programs in the sciences have improved considerably since 2007. Specifically, these authors found that studies published since 2007 ($d = .56$) showed a substantially larger effect than studies published prior to 2007 ($d = .36$). Thus, these findings would suggest that ethics education in the sciences is not only effective, but also has improved markedly in recent years. In addition to evidence pointing to the general effectiveness of ethics education programs, once again, certain instructional features were found to be more effective (Watts et al. 2016). For example, courses covering content specific to a field or general to all fields were found to be more effective than programs attempting to strike a balance of specificity and generality. In addition, coverage of professional guidelines as well as field-general guidelines also proved beneficial. Moreover, emphasis on processes demonstrated substantial value. Regarding delivery methods and activities, cases comprising minimal realism or emotional content offered large benefits for trainees as well. Interestingly, no single activity by itself was particularly effective; rather, a mixture of multiple activities appears to be a fruitful instructional approach.

Although Watts et al. (2016) meta-analysis offers noteworthy conclusions regarding instruction in ethics education, two key issues were not addressed in that study. First, training generally operates as a system where components of the system interact with one another to impact training effectiveness (Goldstein and Ford 2002). The Watts et al. (2016) meta-analysis presents results with respect to single variables rather than an interaction of multiple variables. Second, the frequency with which combinations of instructional variables co-occur was not assessed. Given the substantial increase in ethics education programs witnessed in recent years, an identification of the most and least common approaches may prove of interest for educators in the field of ethics. Therefore, the present study attempts to address these two issues by identifying the common instructional approaches in ethics through a quantitative clustering procedure. In addition to identifying common approaches, the present effort aims to determine the frequency and effectiveness of each approach. Thus, the research questions guiding the present effort are as follows:

Research Question 1 What are some common instructional approaches to ethics education based on combinations of instructional content, processes, delivery, and course activities?

Research Question 2 What is the relative effectiveness of these instructional approaches in this typology of ethics instruction?

Methods

Sample

The study sample used in the present effort was derived from two meta-analyses on ethics education in RCR and business conducted by Mumford and his colleagues (Medeiros et al. 2016; Watts et al. 2016). Although the primary focus was ethics education in science and engineering, studies from the business sample (Medeiros et al. 2016) were included to add stability to the cluster procedure employed here. The literature search for both studies began with an inspection of review articles bearing on ethics education (Antes et al. 2009; Craft 2013; O'Fallon and Butterfield 2005; Waples et al. 2009). Next, 32 major databases (e.g., ERIC, Chronicle of Higher Education, Google Scholar) were examined using keywords including "ethics training," "ethics education," "responsible conduct of research," "moral development training," "ethics instruction," and "professional ethics training." After searching these databases, 14 key journals (e.g., *Accountability in Research, Ethics and Behavior, Science and Engineering Ethics*) relevant to ethics education were identified and examined further.

To reduce the potential for the "file drawer problem" (Rosenthal 1979), several steps were taken. First, the *ProQuest Dissertation Abstracts* database was searched in an attempt to identify unpublished dissertations. Second, listings for professional conferences (e.g., American Psychological Association, World Conference in Research Ethics) were examined further. Third, principal investigators of grants relevant to ethics instruction funded by the National Institutes of Health (NIH) and the National Science Foundation (NSF) were contacted to retrieve any unpublished data. Fourth, doctoral-granting Carnegie research institutions were identified, and RCR Program Directors and Research Vice Presidents were subsequently contacted to request unpublished data. This initial search for published and unpublished manuscripts relevant to ethics instruction yielded 5023 studies to be potentially included in the meta-analyses. After the inclusion criteria were applied, a final sample of 330 training programs were identified as relevant to the present effort. A subset of this sample included studies which described course characteristics but did not include evaluation data. Studies of this nature were included in the cluster analysis to add stability to the clustering procedure but were not included in later analyses assessing effectiveness of instructional approaches.

Coding Procedures

Three judges, doctoral students in Industrial/Organizational Psychology familiar with the ethics education literature, coded study content with respect to instructional characteristics. The judges first reviewed the ethics education literature. Following this literature review, the judges developed operational definitions and rating scales for each instructional variable. Next, six experts in the field of ethics education provided detailed feedback. The judges then implemented the changes noted by these experts. Subsequently, the judges received 40 h of rater training to familiarize

themselves with operational definitions and rating scales. Following initial rater training, judges coded a sample of five studies and met to resolve any discrepancies. After sufficient consensus was reached on these five studies, the judges continued with the remainder of the coding process. The final interrater agreement coefficient (89 %) suggests that agreement among raters was sufficient.

Training Program Description

The judges read through program descriptions and coded programs with respect to: (1) instructional content, (2) processes, (3) delivery methods, and (4) activities. Most variables were coded on a 5-point scale where 1 indicates a variable was rarely used in a training program and 5 indicates a variable was used extensively. Variables omitted in program descriptions were coded as missing data.

Judges rated instructional content and process variables on a five-point scale according to the degree of emphasis in training programs. The content and process variables were identified through a review of the ethics education literature (e.g., Antes et al. 2009; Craft 2013; O'Fallon and Butterfield 2005; Waples et al. 2009). In total, over 70 instructional content variables (e.g., guidelines, professionalism, moral philosophy) were assessed. In addition to the instructional content variables, judges also coded program descriptions based on the extent to which programs emphasized processes. The processes examined in the present effort included focus on self or others, ethical awareness, consequences, constraints, forecasting, motives, strategies, emotions, cognitive analysis, error analysis, stakeholder analysis, moral imagination, meta-ethical, virtue analysis and value analysis.

Additionally, judges appraised the extent to which programs utilized various delivery methods and activities. The delivery methods and activities were identified based on a review of the training literature (e.g., Goldstein and Ford 2002). The delivery methods and activities were appraised on a 5-point scale, except where noted. The delivery methods included: online, online interactive, online pausing (0–1 scale), timed online modules, whole learning, question-based, lecture, self-directed (1–3 scale), group-based (1–3 scale), repeat exposure (0–1 scale), linear versus branching, moral method, problem-based learning, team-based learning, trainee active participation, humor, case-based, and examples (1–7 scale). Finally, the activity variables examined in the present study included: goals, book review, essays (1–7 scale), workbooks, worksheets, discussion, large-group discussion, small-group discussion, web-based discussion, role plays, debates, computer-based, self-reflection, review, note taking, games, current events, mentoring, and service learning.

Training Program Evaluation

In appraising the relative effectiveness of the various training types, Cohen's *d* effect size estimates were drawn from Medeiros et al. (2016) and Watts et al. (2016). Cohen (1992) suggests effect sizes of .20 indicate a small effect, .50 indicate a medium-sized effect, and .80 or greater indicate a large effect. These effect sizes were collapsed across the nine criteria utilized in these meta-analyses. Specifically,

the criteria included moral reasoning, knowledge, ethical awareness, ethical decision making, perceptions of self, moral judgment, meta-cognitive strategies, conceptual development, and perceptions of others. In total, across the nine criteria categories, 234 unique effect sizes could be calculated in the present study.

Analyses

The clustering procedure employed in the present study followed the approach outlined by Scott et al. (2004) in their identification of types of creativity training. Specifically, an agglomerative hierarchical clustering procedure, as described by Ward and Hook (1963), was used to cluster similar programs together based on content, process, delivery method, and activity variables. In this procedure, a squared Euclidean distance measure is used to assess the similarity of programs. The Ward and Hook (1963) procedure groups similar units into clusters until only one cluster remains for all units. A measure of within-group variation assesses the amount of variation of each subsequent grouping of units. This within-group variation can be examined through a scree plot to determine the point at which variation substantially increases. The appropriate number of clusters can be determined by identifying this point in the within-group variation index.

After determining the appropriate number of clusters, a K-means analysis was conducted. The K-means analysis uses the pre-established clusters obtained in the Ward and Hook procedure to assign the units, in this case training programs, to the appropriate cluster. Following this K-means analysis, a discriminant analysis was conducted to determine the adequacy of the cluster solution selected (Mumford et al. 1990).

The final training types were described in terms of: (a) means and standard deviations of scores on instructional content, processes, delivery methods, and activities, (b) number of training programs, (c) prototype programs, (d) average effect size, and (e) highest and lowest scoring programs.

Results

The 8, 13, and 23 cluster solutions all appeared to be viable options based on the within-group variation index obtained from the Ward and Hook (1963) clustering procedure. However, upon further examination of the cluster solutions, it became apparent that the 23 cluster solutions contained multiple clusters with fewer than five programs. In deciding between the 8 and 13 cluster solutions, the 8 cluster solution appeared most interpretable based on examination of high and low scores of instructional variables obtained within clusters. Furthermore, selecting the 8 cluster solution over the 13 cluster solution reduced the number of small clusters retained. Thus, the 8 cluster solution was selected as the final cluster solution.

More direct evidence for the adequacy of the cluster solution was obtained from the discriminant analysis. Specifically, the discriminant functions for over 75 % of the instructional content, process, delivery method, and activity variables were significant ($p < 0.05$). The remaining non-significant variables were not influential

in assigning cluster membership due to the low base rate seen among these variables. Namely, many of the variables were seldom coded due to the infrequency of these variables observed in course descriptions. Posterior probabilities provide an indication of the likelihood of assignment to the assigned cluster and next most likely cluster. Specifically, it was found that over 99 % of posterior probabilities for the assigned cluster lay above .80 whereas less than 1 % of posterior probabilities for the next closest cluster lay above .20. Furthermore, the classification results proved little ambiguity in the assignment of clusters as 99.4 % of the original cases were deemed correctly classified.

Generally speaking, the 8 cluster solution appears to provide a viable typology of programs in ethics education. Table 1 presents the labels and prototypic programs for the training types based on the variables producing high scores in each cluster. Additionally, for each training type, average effect sizes as well as variables producing high scores relative to other training types are also presented in Table 1. Table 2 presents the ethics training programs associated with the highest and lowest effect sizes for each cluster.

Content and Frequency

General Discussion Training and Norm Adherence Training were found to be the two most common types of ethics education. General Discussion Training, the most common type of ethics education containing 75 training programs ($N = 75$), emphasized moral philosophy. This type of training also used a moderate amount of discussion in small and large groups. The next most common type of ethics training was Norm Adherence ($N = 61$). In terms of instructional content, Norm Adherence Training covered moral philosophy to a moderate extent. Moreover, this type of training utilized a low to moderate amount of lecturing.

Moral philosophy, while popular in the two most common training types, was even more prevalent in Philosophical Self-Reflection Training ($N = 30$), which stressed moral philosophy and meta-ethical processes. Regarding instructional content, this type of training also scored highly on generality of guidelines, values, historical development, and contemporary ethical issues relative to other training types. In terms of delivery methods and activities, Philosophical Self-Reflection Training emphasized self-reflection and essays. A somewhat related, albeit distinct, type of training can be found in a less common approach to ethics education, Exemplar-Based Training ($N = 5$). This approach featured personal responsibility, human rights, stakeholders, codes of conduct, privacy, and field-specific content. As the label suggests, Exemplar-Based Training employed a considerable number of examples evidencing salient ethical situations. Lecturing was also frequently used in this type of training.

An altogether different form of ethics education can be found in Online Training. With respect to content, Online Training ($N = 35$) placed emphasis on guidelines. In terms of delivery methods and activities, this type of training is marked by online instruction, interactivity in online instruction, self-directed instruction, and web-based discussion. Although this type of training lacked a specific focus in terms of content, the unifying theme is the medium by which the training is delivered, which

Table 1 Summary of cluster analysis results

Cluster	<i>N</i>	<i>d</i>	<i>d_n</i>	Key markers of cluster	Prototypic programs
1: Field-specific compliance	41	.46	33	Lecture, discussion, compliance, guidelines, field specific content, protection of human participants, legality, human rights	Ramalingam et al. (2014) Lin et al. (2010) Malek et al. (2000)
2: Online	35	.40	27	Online, online interactive, self-directed, computer based, web-based discussion, guidelines	McKellar (1998) Pascual-Leone et al. (2010) Pearson et al. (2014)
3: Professional decision processes	34	.50	30	Professionalism, stakeholders, ethical awareness, consequences, strategies, lecture, problem-based, team-based, case-based, discussion	Seiler et al. (2011) Hergenrader (2010)
4: General discussion	75	.31	66	Discussion, small to moderate moral philosophy	Liao et al. (2009) Yarborough et al. (2000)
5: Targeted experimental interventions	49	.89	4	Self-directed, case-based, active participation, FFP, mentor–mentee relationships, ethical awareness, consequences, constraints, forecasting, strategies	Peacock et al. (2013) MacDougall et al. (2014) Thiel et al. (2013)
6: Norm adherence	61	.37	57	Small to moderate lecture, small to moderate moral philosophy	Cannon (2001) Borenstein et al. (2010) Bosco et al. (2010)
7: Exemplar based	5	.55	1	Lecture, examples, personal responsibility, human rights, stakeholders, codes of conduct, privacy and confidentiality, field-specific content	Kemp et al. (2008) Elger and Harding (2002)

Table 1 continued

Cluster	<i>N</i>	<i>d</i>	<i>d_n</i>	Key markers of cluster	Prototypic programs
8: Philosophical self-reflection	30	.40	16	Moral philosophy, generality of guidelines, values, historical development, contemporary ethical issues, meta ethical, self-reflection, essays	Ryden and Duckett (1991) Jurkiewicz (2002) Lee and Padgett (2000)

N = Number of training programs assigned to cluster, *d* = average Cohen's *d* for cluster, *d_n* = number of training programs providing effect size estimates in cluster, Prototypic programs = studies closest to cluster centroid as defined by variables used in clustering

is, through an online or web-based system. Guidelines, the key content feature of Online Training, also appeared highly relevant in another type of training. Namely, Field-Specific Compliance Training (*N* = 41) offered yet another unique approach to ethics training. This type of training emphasized compliance, guidelines, and field-specific content. Other content areas receiving moderate levels of attention for this type included protection of human participants, legality, and human rights. Regarding delivery methods and activities, Field-Specific Compliance Training utilized high levels of lecturing and discussion.

Targeted Experimental Interventions (*N* = 49) presents an additional distinctive approach to ethics education. The key distinguishing features of this type of training included case-based instruction and active participation. This training approach also presented a high level of self-directed instruction for the trainee. Regarding instructional content, Targeted Experimental Interventions emphasized FFP (falsification, fabrication, plagiarism) and mentor–mentee relationships. Additionally, this type of training incorporated multiple process variables including consequences, constraints, forecasting, and strategies. The final training type identified also placed considerable emphasis on processes. Professional Decision Processes Training (*N* = 34) emphasized professionalism and stakeholders in dealing with ethical issues. Moreover, processes such as ethical awareness and cognitive analysis were given considerable attention. With respect to delivery methods and activities, Professional Decision Processes Training used a variety of techniques including lecture, problem-based learning, team-based learning, case-based instruction, and discussion.

Training Program Effectiveness

In aggregate, all of the various training types seem to demonstrate small to moderate effectiveness in terms of traditional ethics criteria. The average effect size obtained across the eight training types was $d = .40$, a relatively modest effect. As may be seen in Table 1, the variation among the training types was relatively small given

Table 2 Study conditions associated with smallest and largest effect sizes by cluster

Cluster	Status within cluster	Study	Study condition	<i>n</i>	Criterion category	Cohen's <i>d</i>	<i>SD</i>	Description
1: Field-specific compliance	Largest effect size	Cho and Shin (2014)	Nursing students	69	Perceptions of self	2.13	0.22	Blended 30-h program focusing on six nursing topics
	Smallest effect size	Chase (1998)	Ethics class comparison group	10	Reasoning	-0.45	0.44	Professional ethics course for counseling graduate students
	Largest effect size	Chung (2014)	Domestic students	12	Knowledge	1.93	0.49	Online ethics simulator presenting ethical norms and situations for engineers
2: Online	Smallest effect size	Ellison et al. (2013)	CITI RCR course	156	Knowledge	-0.13	0.12	CITI training
	Largest effect size	Kavathatzopoulos (1994)	Ethics training	17	EDM	2.29	0.46	Instruction in autonomous cognitive ability for managers in pharmaceutical company
3: Professional decision processes	Smallest effect size	DuBois et al. (2008)	Ethics in Mental Health Research course (On-site)	12	EDM	-0.61	0.31	Ethics course designed for mental health researchers with an emphasis on case analysis
	Largest effect size	Rozmus et al. (2014)	Interactive novel-biomedical pilot study	109	Knowledge	2.07	0.17	Choose-your-own-adventure novel emphasizing professional ethics
4: General discussion	Smallest effect size	Drake et al. (2005)	Embedded ethics component	109	Reasoning	-1.76	0.24	Lectures and short cases on ethics embedded in an engineering course
	Largest effect size	Keefer et al. (2014)	Pilot study	10	EDM	2.02	0.60	Pilot study presenting a case on mentor-mentee issues

Table 2 continued

Cluster	Status within cluster	Study	Study condition	<i>n</i>	Criterion category	Cohen's <i>d</i>	<i>SD</i>	Description
6: Norm adherence	Smallest effect size	Gawthrop and Uhlemann (1992)	Ethics workshop	24	EDM	0.66	0.33	Three-hour workshop on ethical decision making
	Largest effect size	Borenstein et al. (2010)	Ethics and Technical Professions course	134	Reasoning	2.91	0.18	Graduate course presenting case studies of ethical engineering issues
	Smallest effect size	Bernstein et al. (2010)	Embedded ethics component	31	Knowledge	-0.32	0.29	Ethics integrated into engineering course
7: Exemplar based*	n/a	Wilson (2013)	Ethics instruction	9	Reasoning	0.55	0.36	Discussion and debate on the Chernobyl incident
	Largest effect size	Jurkiewicz (2002)	Ethics course	232	Reasoning	1.93	0.11	Ethics course presenting introduction to ethical frameworks and discussion of ethical cases
8: Philosophical self-reflection	Smallest effect size	Ryden and Duckett (1991)	Nursing curriculum (winter 1988)	27	Reasoning	-0.40	0.28	Multi-course ethics component integrated in nursing curriculum

* Only one effect size could be calculated for this cluster

that six of the eight training types fell in the $d = .31-.50$ range. Moreover, it should be noted that the two highest scoring clusters, Targeted Experimental Interventions and Exemplar Based Training, contained very few studies in which an effect size could be calculated. Targeted Experimental Interventions, the highest scoring training type, yielded an effect size of $d = .89$ across four programs. The effect size for Exemplar Based Training was $d = .55$ for just one training program.

Beyond these two training types, an interesting pattern emerged among the two most popular training types. It was found that General Discussion Training and Norm Adherence Training obtained the two lowest effect sizes, $d = .31$ and $d = .37$, respectively. The lack of focus in terms of content and processes found in these two training types may diminish the potential value for numerous ethical outcomes.

In contrast, Professional Decision Processes Training appeared to offer some value with a moderate effect size of $d = .50$. This type of training placed emphasis on multiple processes and also employed multiple delivery methods and activities. An altogether different approach, Field-Specific Compliance, also proved to be of some value ($d = .46$) in terms of improving ethical outcomes. Field-Specific Compliance Training placed a more narrow focus on content by stressing certain regulatory issues such as compliance, legality, and human rights. To conclude, the final two training types, Online Training and Philosophical Self-Reflection Training, both obtained small to moderate effect sizes of $d = .40$.

Discussion

Before discussing the broader implications of the present effort, several limitations should be noted. To begin, although a considerable number of variables were included in the clustering procedure, other variables bearing on instructional effectiveness could be envisioned. Inclusion of additional instructional variables may have impacted the subsequent grouping of training programs into clusters. However, given the broad pedagogical approaches and characteristics in ethics education, the development of an entirely comprehensive list of instructional characteristics would prove to be a difficult task. Moreover, the instructional characteristics included in the present effort comprise the most commonly employed variables in ethics education, suggesting that the training types identified are likely representative of the most prevalent instructional approaches in ethics training.

An additional point regarding the instructional variables should be mentioned. In particular, a number of studies provided cursory descriptions of the instructional features of training programs. These cursory descriptions limited the judges' ability to content code all potentially relevant instructional variables for a given training program. As a result, a number of courses were coded with respect to a limited set of notable instructional characteristics rather than every potentially relevant instructional characteristic.

Furthermore, caution should be exercised in interpreting the effectiveness of certain training types. Namely, multiple training types contained relatively few programs in which an effect size could be calculated. Of particular note, the two

training types with the highest effect sizes each contained fewer than five training programs in which an effect size could be calculated. Thus, to gain a more robust estimate of the true effectiveness of these training types, additional studies containing quantitative data would need to be available.

An additional consideration with respect to program effectiveness should be stated. In particular, program effectiveness was determined by calculating a Cohen's *d* statistic for one of nine criteria. However, effectiveness of training types was assessed in an aggregate form, such that multiple criteria were collapsed into a single overall composite score. Collapsing across criteria did not allow for examination of the relative effectiveness of a given training type for a specific criterion category. Although, this certainly should not obviate the need to carefully consider evaluation methods in the development of a novel training program (Antes 2014). Indeed, a variety of evaluation methods currently exist in ethics education, and the selection of an appropriate evaluation method should be as meticulously considered as the selection of an instructional approach (Steele et al. 2016).

One further point regarding program effectiveness is worthy of mention. Namely, effect sizes were calculated with respect to general training types in this study. Thus, the effectiveness of a training type is impacted by a multitude of instructional variables. This does not allow for examination of the effectiveness of individual instructional characteristics. Readers interested in specific instructional features in isolation are encouraged to consult Watts et al. (2016) and Medeiros et al. (2016).

Even taking these limitations into account, a number of noteworthy conclusions may be drawn from the present effort. To begin, the number and diversity of objectives and instructional approaches in ethics education has undoubtedly increased substantially in recent years (Kalichman 2014; Kalichman and Plemmons 2007; Steneck and Bulger 2007). The cluster procedure employed here represents the first systematic attempt to develop a viable typology of ethics training programs. Indeed, the eight training types identified seem to offer a useful framework for conceptualizing the common instructional approaches in ethics training. Given recent attempts by the federal government to improve ethics education, a number of institutions and educators may be tasked with developing an ethics training program. Simply put, the training types identified here may offer a useful resource in developing a plan of instruction for new ethics training programs. However, it is important to bear in mind that a systems approach to training suggests the instructional approach should also relate to objectives and criteria (Antes 2014; Goldstein and Ford 2002). In other words, course developers should not be viewing the instructional approach in isolation from the other components of the training system.

One promising finding in this respect is the general effectiveness seen across the eight training types. Overall, the identified training types evidenced moderate effectiveness with limited variability across training types. While some instructional approaches appear to be more effective, few, if any, training types should be abandoned altogether based on the findings of the present study. At a minimum, the majority of the training types identified are worthy of further investigation to better understand the characteristics contributing to effective instruction for a given instructional approach. The potential benefit of the eight training types is most

clearly evident in Table 2 where the most, and least, effective training programs for each training type are identified. The variability within each cluster demonstrates that each training approach can be beneficial, or detrimental, in terms of instructional effectiveness depending on the training content, delivery methods and activities, and criteria employed. As stated previously, regardless of the training type that one espouses, a systems approach to the development of an ethics training program is the first step in developing a training program that actually works (Goldstein and Ford 2002; Steele et al. 2016).

Regarding the effectiveness of specific training types, a noteworthy effect was found with respect to the two most commonly employed instructional approaches. Namely, General Discussion Training and Norm Adherence Training, despite being the most popular training types, proved to be the least viable instructional approaches based on effect size estimates. The relative ineffectiveness of these training types can likely be attributed to the lack of a specific emphasis in terms of content and processes. Moderate levels of discussion with respect to moral philosophy and ethical awareness appear to exemplify the General Discussion Training. Alternatively, Norm Adherence Training presents few unambiguous distinguishing characteristics. Like General Discussion Training, Norm Adherence Training also covers a small to moderate amount of moral philosophy. Overall, Norm Adherence Training seems concerned with presenting the minimum amount of content required through a lecture-based training program. Thus, the lack of an overarching framework for both General Discussion Training and Norm Adherence Training is a concern given the call for increased evaluation and accountability in ethics education in recent years (Antes 2014; Kalichman 2014; Mumford et al. 2015; Steele et al. 2016). The training literature would suggest that establishing clear objectives and developing instruction and criteria based on those objectives should be a fundamental concern for instructors (Goldstein and Ford 2002).

Despite the relative lower effects of General Discussion Training and Norm Adherence Training on evaluation outcomes, other training types proved to be more effective. Namely, Targeted Experimental Interventions was found to be the most effective training type. This type of training placed emphasis on individual active deliberation on a case. In interpreting this finding, two points should be borne in mind. First, as the name suggests, this training type might not present a viable training approach for longitudinal ethical outcomes. Programs categorized in this training type provide incremental value with respect to better understanding ethical situations, particularly in the context of a case. Thus, while these training programs present value in terms of research purposes, they may be limited in terms of transferring skills or knowledge to a professionally relevant context. Second, only four effect sizes could be calculated for this training type, suggesting that further research is required. Turning to another approach, Exemplar Based Training also scored reasonably high in terms of effect size estimates. This type of training heavily relied on the use of examples to illustrate points in relation to human rights and welfare concerns. However, caution should be exercised in interpreting this result considering that only one effect size could be calculated for this training type.

Turning to yet another instructional approach, Professional Decision Processes Training seems to offer an effective approach to ethics education. This type of

training places considerable emphasis on processes, or strategies, in ethical decision making. One potential reason for the effectiveness of this approach is that processes can provide individuals with the necessary tools to manage the ambiguous, ill-defined nature of ethical decisions (Mumford et al. 2008). Indeed, many of the decisions in ethical situations are not black-and-white (Steneck 2006), and providing individuals with strategies to work through these inherent complexities is one viable approach to ethics instruction. One other notable feature of the Professional Decision Processes Training is its use of multiple delivery methods and activities. For example, this type of training scored moderate to high on lecturing, group-based, problem-based, active participation, case-based, and discussion. This range of delivery methods and activities further clarifies a result obtained in Watts et al. (2016) regarding instructional methods. In particular, these authors found that no single delivery method or activity was particularly effective in enhancing ethical outcomes. However, based on the results of the present study, it appears that the use of multiple delivery methods and activities may reinforce content presented. In other words, relying on a single instructional technique may be limited in terms of effectively conveying complex concepts.

The moderate effectiveness attributed to Professional Decision Processes Training points to a broader implication regarding ethics education. Specifically, Professional Decision Processes Training offers a clear focus in terms of instructional objectives and content. The focus is to provide individuals with professionally-relevant strategies for dealing with complex ethical issues. General Discussion Training and Norm Adherence Training, two less successful approaches, do not feature a strong distinctive instructional approach. Given the increased recognition of questionable research practices (John et al. 2012), it would stand to reason that a viable framework for understanding and navigating through these ambiguous scenarios is warranted in ethics education.

One final instructional approach worthy of mention is Field-Specific Compliance Training. This type of training also proved to be of some value as judged by effect size estimates. Field-Specific Compliance Training emphasized regulatory aspects of ethical situations such as compliance, guidelines, legality, and human rights. Thus, for educators interested in outcomes related to legal or severe repercussions as they apply to a specific field, Field-Specific Compliance Training may offer one viable approach to ethics education. As a result, this type of training might be more applicable to fields concerned with adherence to guidelines as opposed to ambiguous ethical decision making (e.g., Mumford et al. 2016). In terms of delivery methods and activities, lecture and discussion were the two primary modes for delivering content to trainees. Thus, Field-Specific Compliance Training featured a narrower, more restricted delivery approach in comparison to Professional Decision Processes Training. Taken as a whole, Field-Specific Compliance Training presents an additional viable instructional approach for complying with a set of standards applicable to a particular field.

Conclusion

This investigation offers an initial step in understanding what contributes to effective instruction in these eight training types. As such, we urge researchers to examine how moderators impact training effectiveness in each training type. For example, trainee field might influence the effectiveness of a given instructional approach (e.g., Mumford et al. 2016). Alternatively, expertise or age may impact how trainees respond to a specific training type. Further, the success of an instructional approach may also be influenced by the setting (e.g., professional or academic) of the training. To put it briefly, the typology of instructional approaches presents a roadmap for future research bearing on instruction in ethics education.

To conclude, a variety of instructional characteristics and approaches currently exist in ethics education. Eight distinct training types were identified in the present effort through a quantitative clustering procedure. Overall, the instructional approaches demonstrated small to moderate effectiveness in terms of ethical outcomes with some training types demonstrating benefit over others. Regarding specific training types, Professional Decision Processes Training and Field-Specific Compliance Training appear to present the most viable ethics training approaches moving forward. More specifically, Professional Decision Processes Training instructs trainees on processes for navigating through complex, ambiguous ethical issues whereas Field-Specific Compliance Training emphasizes adherence to a commonly accepted standard for a given field. We hope that the present study stimulates other researchers to not only use, but also improve upon, the training types identified.

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For Meta Analysis

References with an asterisk (*) symbol indicate articles that provide one or more study conditions for inclusion in the cluster analysis. References with a dagger (†) symbol indicate articles that provide one or more study conditions where an effect size could be calculated.

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