

ARE STUDENTS LEARNING ABOUT HUMAN FACTORS AND ERGONOMICS IN INTRODUCTORY PSYCHOLOGY TEXTBOOKS?

Karen R. Young, Jeffrey J. Smith, Michael S. Wogalter,
Christopher B. Mayhorn, and J. Graham Baucom
North Carolina State University Department of Psychology
Raleigh, North Carolina 27695-7650 USA

An ongoing issue of the membership of the Human Factors and Ergonomics Society concerns efforts to educate audiences about human factors and ergonomics (HF/E). One important group to consider is students taking a beginning or introductory psychology course. The initial course in psychology usually reviews the scope of psychology and is taken by large numbers of individuals. In the present research, introductory psychology textbooks (n=123) published between 1969 and 2006 were consulted to identify the nature and extent of the coverage of HF/E. A clear increase in coverage was evidenced beginning in 1995. Although HF/E is now being mentioned significantly more often in newer texts, it is frequently limited in both amount and scope. The potential growth of graduate HF/E programs may be affected by the extent to which potential applicants are exposed to the discipline. Implications for HF/E are discussed and opportunities for increasing student exposure are identified.

The results of surveys of Human Factors and Ergonomics Society (HFES) members over the years indicate high levels of interest in the promotion of educational efforts about our discipline (e.g., Martin, Wogalter, & Yarbrough, 2000). One way in recent years that HFES has made an active effort to educate others about human factors and ergonomics (HF/E) has been to designate the month of October as National Ergonomics Month (NEM). In 2003, the NEM committee launched a series of articles describing NEM, its purpose, and how HFES members could get involved in the society's efforts (Cuevas, Shapiro, & Young, 2003; Young, Cuevas, & Shapiro, 2003; Young, Shapiro, & Cuevas, 2003). One of the goals of NEM is to educate students about HF/E. The NEM annual reports indicate that a number of HFES members have been engaging in active outreach to students in the K-12 system through class presentations or by inviting high school students to attend special Ergonomics symposia (Young, 2005).

One way that many HFES members contribute to the NEM effort without making a deliberate attempt at engaging in NEM activities is by introducing students to HF/E in their introductory psychology courses. HF/E professionals who are in the position to teach

introductory psychology courses would be expected to mention the HF/E discipline considerably more often and in more detail than most introductory psychology instructors who are not associated with HF/E. The reason is that most instructors tend to spend more time on topics related to their specialty area. Without this expected emphasis due to one's own specialty area, there is the question of whether HF/E is even mentioned at all, or in other words, whether students have any exposure to HF/E in the introductory psychology course. Introductory psychology courses provide students an overview of much of the scope of psychology, so some discussion of HF/E might be expected, particularly when we live in a technological age and usable technology is important. While no one would expect HF/E to receive greater attention in the course or textbook than social or developmental psychology, it would seem valuable to students' knowledge and their potential careers to receive some exposure to the discipline.

Instructors who regularly teach introductory psychology courses commonly receive numerous unsolicited review copies of introductory psychology textbooks. Despite seeming to be thorough books, they may not even mention human factors, ergonomics, or any other similar topics. Nine years ago, Martin and Wogalter (1997) noted

the problem of no or limited mention of HF/E in introductory psychology texts. In that report, an informal check of 19 introductory psychology books on their shelves revealed that only around 50% of them mentioned HF/E. When it was mentioned, the coverage was typically very poor and frequently treated HF/E as a part of Industrial/Organizational (I/O) Psychology rather than a distinct discipline.

Since Martin and Wogalter (1997) noted inadequate coverage of HF/E in introductory psychology texts, several HF/E professionals have worked to increase the visibility of the discipline. One way to attract the attention of introductory psychology textbook authors and course instructors is by making presentations about HF/E at conferences on the teaching of psychology (e.g., Hendrick & Wogalter, 1998; Rogers & Wogalter, 1999; Wogalter & Hendrick, 1998). As noted earlier, there have also been recent NEM efforts to introduce more people to HF/E. Of interest in the current study is whether there has been improvement in HF/E coverage in introductory psychology texts since Martin and Wogalter's (1997) study. In the present study, we examined a much larger sample of books covering a longer time span to identify the extent to which HF/E is mentioned in introductory psychology texts.

METHOD

Introductory psychology textbooks that were held and/or being discarded by several instructors in the departments of psychology at North Carolina State University and Meredith College (both in Raleigh, NC) were obtained for evaluation of the coverage of HF/E in the text. The subject index of 123 introductory psychology textbooks published between 1969 and 2006 were reviewed to determine whether the book contained one or more of the following three HF/E key terms: human factors, ergonomics, or engineering psychology. When the terms were found, the researchers noted the nature and extent of the coverage. Recorded was whether the textbooks mentioned a key term related to the discipline, and when it was mentioned, which key terms were used. Also recorded was whether a definition/description of HF/E was included and/or longer sections about specific topics such as ease of

use and safety were provided, as well as the length (e.g., sentence, paragraph, or page) of such coverage. Other data, including edition and publication year, were also recorded for analysis. It is important to note that only 82 of the 123 textbooks were completely different books. The remaining 41 were different editions of the other 82. Eighteen books had two editions, eight books had three editions, one book had four editions, and one book had five editions of the text included in the study. The different editions were retained in the study because in many instances different editions are substantially different and it allowed for a longitudinal comparison of HF/E coverage over time within a textbook.

RESULTS

In the sample of 123 textbooks, 41 (33%), mentioned HF/E in some way. A clear change in the proportion of times HF/E was mentioned was evidenced around 1995. Of the 77 books in our sample that were published before 1995, 15 (19%) mentioned HF/E. Of those that mentioned HF/E, one described the discipline in a single sentence, 11 devoted a paragraph to the topic, and three covered the topic with a half-page or more. Of the 46 that were published in or after 1995, 26 (57%) mentioned HF/E. Of the 26 that mentioned HF/E, 13 gave a paragraph or less (four only gave one sentence, nine gave a single paragraph). The remaining 13 gave a page or more to HF/E topics. Five books (Baron, 2001; Gerow, 1997; Lahey, 2001; Myers, 1996, 2001) dedicated one page and eight (Davis & Palladino, 2000; Gardner, 2002; Huffman, 2002; Lefton, 2000; Morris, 1996; Myers, 2004; Rathus, 1996; Weiten, 2001) provided two or more pages of discussion about the discipline. While newer textbooks are more variable in terms of the extent of HF/E coverage, there has been a substantial increase in the number of authors that mention something about the topic and/or devote two or more pages to the discipline, in comparison to the standard single paragraph before 1995.

The longitudinal type of data available from the multiple editions of the same text somewhat affirm these trends. In the 18 texts where two editions were available, two books had coverage of HF/E in both editions, three had no coverage in the

first edition but included coverage in the second edition, 12 books had no coverage in either edition, and one book had some coverage in the earlier edition but it was not present in the later edition (however, the later edition in this case was a briefer version of the text). In the eight texts where three editions were available, all but two texts showed an increase in HF/E coverage. Four books had no discussion of HF/E in the earlier two editions but had some discussion (varying between one sentence and three pages) in the most recent edition, two books discussed HF/E in every edition with increasing coverage in each edition, and two texts had no coverage in HF/E in any edition. In the text where four editions were available, there was a systematic increase in coverage across editions beginning at no coverage in the earliest edition and increasing to two and a half pages in the most recent edition (Lefton, 2000).

In the text where five editions were available, a surprising pattern of coverage was found. The earliest two editions had no mention of HF/E, the middle edition had three pages devoted to HF/E, and the more recent two editions offered only a single sentence about the topic. It is concerning to see this pattern of reduction in coverage. The edition with three pages about HF/E (Rathus, 1996) was one that included a chapter on applied psychology, where the HF/E information was located. This chapter is absent in recent editions. While there has been a general trend in introductory psychology books to remove applied psychology chapters that had been included at the end of some texts, many of these books have retained the information from those chapters and simply relocated it to other core chapters. The advantage of this newer technique is to help students make connections between basic principles of psychology and their applications in everyday life. Given this trend, it is surprising that this particular book decreased its coverage of HF/E and maintained that minimal level of coverage in later editions.

Another interesting difference between newer and older books is the treatment of HF/E as a distinct discipline. Older textbooks tended to describe HF/E as a sub-field of I/O psychology. Although an improvement has been made in the representation of HF/E as a distinct discipline since 1995, some authors (e.g., Ciccarelli & Meyer, 2006)

still describe human factors professionals as specialists within I/O psychology.

One book, of which we had access to three editions, had no coverage in the earlier two available editions but did have coverage in the most recent (17th) edition of the book (Gerrig & Zimbardo, 2002). Unfortunately, they misrepresent the field by providing misleading information about the discipline. They provided a table to identify the variety of questions that are asked in psychology and identified which sub-fields of psychology tend to ask and answer such questions. The question they claimed that industrial psychologists and human factors psychologists would ask and answer was “Why does my job make me feel so depressed?” (p. 14). The way this information is presented could suggest to readers that I/O and HF/E psychologists do therapy in the workplace (which is not true). Zimbardo coauthors another introductory psychology text, the fourth edition of which was also included in this study, and it provided a brief but more accurate description of HF/E (Zimbardo, Weber, & Johnson, 2003).

DISCUSSION

It is evident from the data that HF/E has been getting better exposure in introductory psychology textbooks in the last decade than in those prior. There are several potential explanations for this. Textbook authors may have become more aware of the discipline or gained a deeper appreciation of its value. The discipline has been getting better coverage in the print and broadcast media targeted to the general public. Some of the media attention is due to a few high-profile accident cases and attempts by marketing and advertising campaigns to capitalize on buyer interest in products that are ergonomically designed or dubbed “user friendly.” There has also been more coverage in psychology publications that are read by students and professionals interested in a wide variety of psychology sub-disciplines. One example is an article by Wogalter and Rogers (1998) published in *Eye on Psi Chi*, a magazine of the psychology honor society comprised primarily of undergraduates, which was later reprinted on the society’s web site. Across a period of one year or more, this article was one of the top 10 selected links on the Psi Chi web

site. The Science Directorate of the American Psychological Association (APA) has published several interviews of individuals about their job responsibilities, many of which are related to human factors, in its newsletter and on a particular page within its web site devoted to career information (http://www.apa.org/science/nonacad_careers.html). These improvements in frequency of coverage in introductory psychology books may be a reflection of better awareness and understanding of the discipline, perhaps due to better exposure of the discipline in the general professional psychology and lay audiences.

It is clear that there is room for improving the dissemination of information about HF/E. Although mentions of HF/E have increased, many texts still only include a single sentence or short paragraph about human factors. The discipline should be identified as distinct and deserving of more than a paragraph for the benefit of students' knowledge (as many students may not take another psychology course). A more substantial description of the field could also benefit the discipline. For example, such exposure could affect choice of major and decisions regarding graduate education. At the very least, textbooks could include a list of topics that represent the diverse range of human factors work rather than making narrow, singular statements such as "Human factors psychologists make technical systems such as automobile dashboards and computer keyboards more user-friendly" (Rathus, 2002, p. 5). Authors and publishers actively seek feedback from reviewers of their textbooks, so this provides an opportunity for promoting HF/E's inclusion in such books. Reviewers, particularly HF/E professionals, ought to request more coverage of HF/E. The rationale for the request is obvious given the growth of technology in our lives. The greater promotion of HF/E to textbook authors, the more likely our discipline will get some coverage in these books.

Another way to improve exposure of undergraduates to HF/E is for academic members of HFES to take advantage of opportunities to teach introductory psychology and to provide resources to colleagues in their and other departments to use in their classes. This would also increase the probability of the discipline being discussed in other courses besides introductory psychology. There are

two articles (Posada, 2003; Shapiro, 2003) available at the NEM web site (<http://hfesnem.org/>) that could be given to our colleagues who teach other popular psychology classes that are related to HF/E that could facilitate increases in HF/E mentions in a variety of courses beyond introductory psychology. Shapiro's (2003) article discusses many HF/E applications and their relationship to specific topics within psychology such as perception, memory, and learning. Posada's (2003) article describes issues related to the human factors of aging, which would be an excellent source to share with instructors and textbook authors of developmental psychology courses. The more aware our colleagues are of HF/E, the more likely they will be to discuss it in their courses and include its coverage as part of their textbook selection criteria.

The trend over the past decade to mention human factors in introductory psychology texts needs to continue with more detailed descriptions and greater emphasis on the relationships between HF/E and traditional introductory psychology topics (e.g., perception and memory). Such changes should increase exposure of HF/E in general and provide early exposure to students who may have an interest and/or aptitude in the discipline, which should have major benefits for HF/E. While there is greater mention in texts, it does not necessarily mean that students taking the class will be assigned the reading during the term or that they will read it if it is assigned. Most introductory psychology books have 15-18 chapters and are over 500 pages in length. Therefore, most instructors cannot cover and/or assign all pages and topics available in the text during the term. This is why sharing resources with our colleagues and encouraging them to discuss HF/E in their lectures is important.

Future research in this area could be done to identify what proportion of HF/E researchers teach introductory psychology, how many instructors supplement their courses with HF/E information due to inadequate coverage in the text, and whether or not students taking introductory engineering courses are exposed to HF/E in those courses.

The more students who know about HF/E, the greater the impact our field will have in a variety of applications. Increased exposure will likely increase the selection pool of students interested in HF/E graduate programs, leading to

larger numbers of high-quality candidates applying to our graduate programs. The more exposure non-HF/E students have to the discipline, the more likely they will be to know that they should seek our expertise and when to do so. This could have a tremendous impact if these students become important leaders in business or the government.

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