

- and Learning (pp. 119–124). Jacksonville: Florida Community College at Jacksonville.
- Lonka, K., & Ahola, K. (1995). Activating instruction: How to foster study and thinking skills in higher education. *European Journal of Psychology of Education*, 10, 351–368.
- Mathie, V. A., Beins, B., Benjamin, L. T., Jr., Ewing, M. M., Hall, C. I., Henderson, B., McAdam, D. W., & Smith, R. A. (1993). Promoting active learning in psychology courses. In T. V. McGovern (Ed.), *Handbook for enhancing undergraduate education in psychology* (pp. 183–214). Washington, DC: American Psychological Association.
- Mayer, R. E. (2004). Should there be a three-strikes rule against pure discovery learning? *American Psychologist*, 59, 14–19.
- McKeachie, W. J. (2002). *McKeachie's teaching tips: Strategies, research, and theory for college and university teachers* (11th ed.). Boston: Houghton-Mifflin.
- McKinley, N. M., & Hyde, J. S. (1996). The Objectified Body Consciousness Scale: Development and validation. *Psychology of Women Quarterly*, 20, 181–215.
- Nelson, C. E. (1996). Student diversity requires different approaches to college teaching, even in math and science. *American Behavioral Scientist*, 40, 165–175.
- Schwartz, D. L., & Bransford, J. D. (1998). A time for telling. *Cognition and Instruction*, 16, 475–522.
- Sivan, A., Leung, R. W., Woon, C., & Kember, D. (2000). An implementation of active learning and its effects on the quality of student learning. *Innovations in Education and Training International*, 37, 381–389.
- Yoder, J. D. (1999). *Women and gender: Transforming psychology*. Upper Saddle River, NJ: Prentice Hall.
- Yoder, J. D. (2003). *Women and gender: Transforming psychology* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

## Notes

1. We thank Tom Angelo for his helpful comments and learner-centered seminar on teaching, assessment, and learning.
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# The Pedagogical Value of Experimental Participation Paired With Course Content

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*This study investigated the educational value of research participation by assessing the accuracy of student perceptions regarding the scientific status and methodology of psychology at 3 times during a semester: during the first week, following introductory and methodology lectures, and at the end of the term. Students' understanding of contemporary psychology and research procedures improved across the term. Findings indicate that students' increased understanding of psychological research procedures may be due to their participation in research in addition to course content.*

Two goals that appear to be germane to most introductory psychology courses are that students gain an understanding of (a) the breadth of contemporary psychology and (b) the scientific methods psychologists employ. College students taking their first psychology course often have misinformed opinions about psychology based on exposure to the popular media. For example, the prevalence of psychological television talk shows and self-help books, in addition to the iconic status of Sigmund Freud as representative of the field of psy-

chology, might lead students to overestimate the extent to which psychology is a clinical field that relies on armchair observation methods (Stanovich, 1986). Often, teaching students to appreciate contemporary psychology necessitates attempting to correct these popular misconceptions (McKeachie, 1960; Vaughan, 1977). Indeed, several instructors explicitly mention on their syllabi that one of the goals of the course is to debunk popular myths regarding psychology (Project Syllabus, 2003), and correcting common opinions based on media misinformation is an avowed objective of popular introductory texts (e.g., Wade & Tavris, 2003) and supplements (e.g., Stanovich, 1986).

Does the common practice of requiring introductory students to participate in research help to meet these pedagogical goals of introductory psychology classes? Sieber and Saks (1989) found that 74% of the universities they surveyed used a participant pool, 93% of which recruited participants from introductory courses. Universities often claim educational value as the rationale for requiring introductory psychology

students to participate in experiments (Jung, 1969; Landrum & Chastain, 1995). Our study assessed the experimental evidence for the educational value of research participation, particularly whether such participation helps debunk common myths regarding psychology.

Many of the previous investigations about research participation have evaluated students' perceptions of their experiences (e.g., Britton, 1979; Nimmer & Handelsman, 1992). Students do regard participation as an enjoyable experience, but tend to rate the educational value of participation somewhat less favorably (Britton, 1979). Students' perceptions of the educational value of experiments are affected by whether their participation was mandatory and by what time during the semester they are questioned (Nimmer & Handelsman, 1992). As mentioned by Britton (1979), it is not possible to determine whether students' opinions about the educational value of research participation are less favorable because the experience actually is of little educational value or because students are unable to wholly appreciate its educational value.

Recently, researchers have assessed student satisfaction along with knowledge gained through experimental participation (as opposed to whether students believe they have learned something). Bowman and Waite (2003) found that students who participated in a research option (i.e., participating as a volunteer in research projects, participating in a "mass testing" session, or writing a brief summary of published research articles) had more positive perceptions of psychology and psychological research. More important, students who participated in research had a better understanding of research procedures than those who did not participate (Bowman & Waite), suggesting that research participation may increase students' appreciation of the scientific methods employed by psychologists. As Bowman and Waite suggested, however, the design of their study left doubt as to whether students who participated in research had more knowledge of research procedures prior to their participation in the experiments.

We used a repeated measures design to further investigate Bowman and Waite's (2003) finding that research participation increased knowledge of research procedures. Furthermore, this study explored whether participating in psychological research helps meet the goals of introductory psychology classes that involve correcting students' ill-informed opinions about the field of psychology and increasing the accuracy of students' beliefs regarding the scientific nature of contemporary psychology.

We designed a survey to assess students' perceptions of the contemporary and scientific nature of psychology. Introductory psychology students completed the survey three times throughout the semester: during the first week (prior to both explicit class instruction on the breadth and scientific rigor of contemporary psychology and research participation), during the fifth week (after explicit class instruction on the scientific nature and research methods of contemporary psychology, but before students participated in actual research), and during the final week of class (after students completed their research requirement).

We hypothesized that students would develop more accurate beliefs about psychology by having direct experiences

with psychology as a science (i.e., completing experiments, reading journal articles, or attending colloquia). Because the majority of these experiences were not available to students until after the second administration of our survey, differences in students' perceptions between the last two testing sessions should reflect knowledge acquired through experiences gained from the research-related activities being completed along with in-class experiences, whereas differences between the first two testing sessions should reflect only in-class experiences.

## Method

### *Participants*

Two-hundred twelve students (66 men, 146 women) enrolled in one of three sections of an introductory psychology course at a small private university completed the questionnaires at each of three testing sessions and consented to have their data included in the study. The majority of participants were first-year students (77.2%); 16.6% of participants were sophomores, 3.8% were juniors, and 2.4% were seniors. The age range of participants was 17 to 42 years ( $M = 18.65$ ,  $SD = 2.14$ ). Students reported a mean high school grade point average of 3.6 ( $SD = .33$ ). Forty-eight percent reported taking the class for their intended major. During the first week of class, 23.1% of the students reported participation in a previous psychology study, and 6.6% reported they had read a professional psychological journal.

### *Materials*

Students indicated their perceptions regarding the field of psychology on a 43-item questionnaire. We developed items based on those student misconceptions we had commonly encountered in our teaching. Questions focused on ethical practices in psychological research (e.g., A psychology experimenter must receive written consent from the participants in his or her experiment), appreciation of the breadth of contemporary psychology research (e.g., A lot of psychological research can be applied in education or business), and common myths regarding the exclusively clinical nature of psychology (e.g., Most psychologists do research on mental illness). Students rated their level of agreement with each statement using a 6-point Likert-type scale ranging from 1 (*strong agreement*) to 6 (*strong disagreement*). This type of scale offered a more sensitive measure of the students' perceptions about psychology than would a dichotomous scale. Thus, we took the degree of agreement with a factually accurate statement about the nature of psychology (and conversely disagreement with a factually inaccurate statement) to indicate better informed opinions than did less extreme ratings. A 6-point scale avoids neutral ratings.

In addition to demographic items, the students indicated how many research participation credits they had fulfilled by participating in research, summarizing colloquia, or summa-

rizing journal articles. Four open-ended questions added to the second and third administrations of the test assessed students' experiences while participating in experiments throughout the semester.

### *Procedure*

Introductory psychology students fulfilled an eight-credit research familiarization requirement intended to supplement the course content with more direct experience with psychological research. Students earned credits by participating in psychology experiments (one credit for every half hour) or by writing summaries of designated journal articles or psychology colloquia (one credit for each summary). If a student failed to complete the eight credits, her or his final grade for the course was lowered one letter grade. Students who completed their remaining number of credits during the following academic term had their grade restored.

Students completed the questionnaire during class at three times during the semester: Week 1 (pretest), Week 5 (Posttest 1), and Week 15 (Posttest 2). Students completed the pretest in each class before material pertaining to research methods was presented and immediately following the explanation of the research familiarization requirement. Two-hundred ninety students were present on the day of the pretest, and 73% of these students completed the other two surveys ( $N = 212$ ). A student researcher introduced the surveys as a departmental assessment of the introductory psychology courses. Because students completed surveys during class, they did not earn research familiarization credits. The researcher specifically informed the classes that they could choose to not complete the questionnaire. Students recorded identifying information on cover sheets coded to their questionnaires. Researchers removed the cover sheets from the questionnaires and stored them separately.

To avoid biasing participants' responses to survey statements addressing ethical guidelines for research, students completed an informed consent form revealing the nature of the study following the third administration of the survey. Students had the opportunity to withhold or provide consent for their data to be included in the analysis. Five students did not consent and we destroyed their surveys.

### *Results*

The students earned the vast majority of their eight required research familiarization credits through participation in experiments ( $M = 7.72$ ,  $SD = 1.39$  credits). Nearly every student (99.5%) participated in at least one experiment.

The results focus on participants' responses to the closed-ended survey questions. Researchers coded items such that stronger agreement with a statement indicates a more informed opinion about the issue raised.

### *Data Reduction*

A factor analysis of students' responses to the 31 objective items on the final posttest questionnaire with a varimax rota-

tion and using minimum eigenvalues of 1.0 revealed four reliable factors, accounting for 40.7% of the variance. Two factors pertained to an understanding of the breadth of contemporary psychology and two factors pertained to an understanding of research procedures. Researchers selected items with a good factor loading (greater than .55) for inclusion for each factor (Comrey & Lee, 1992).

*Perceptions about contemporary psychology.* The factor analysis revealed two factors relating to students' understanding of the focus of contemporary psychology. The first factor (factor loadings range from .59 to .76; Cronbach's  $\alpha = .81$ ) included six items regarding psychology's research focus (e.g., "Psychology can study how groups function," and "Currently, psychologists must adhere to strict ethical guidelines").

The second factor (factor loadings range from .65 to .82; Cronbach's  $\alpha = .73$ ) included three items dealing with the myth that psychology is strictly clinical in its focus ("Most psychologists do research on mental illness," "Most psychologists counsel their clients," and "Most psychologists are therapists").

*Awareness of ethical research procedures.* The factor analysis revealed two additional factors pertaining to students' awareness of ethical research procedures. One factor contained three items regarding knowledge of participants' rights (factor loadings range from .58 to .80; Cronbach's  $\alpha = .70$ ). Items that loaded on this factor were the statements, "Participants have the right to find out the results of the psychology experiment," "Participants have the right to leave the experiment at any time," and "At the end of an experiment a participant has the right to find out about the nature of the experiment."

Three items loaded on a second factor (factor loadings range from .56 to .78; Cronbach's  $\alpha = .64$ ). Although the reliability for this factor was somewhat lower than the other factors, the content of the items was clearly related to a single construct, and measures of internal consistency are not necessarily indicative of the unidimensionality of a scale (see Clark & Watson, 1995). The items that loaded on this fourth factor targeted students' awareness about informed consent (i.e., "When a person participates in a psychology experiment they must be informed about the general nature of the study," "A psychology experimenter must receive written consent from the participants in his/her experiment," and "Currently psychologists can run experiments on people without their consent").

### *Changes in Students' Perceptions Across Time*

We calculated participants' scores for the four factors by summing their responses to the items that loaded on that factor. We conducted separate repeated measures ANOVAs on each of the factors with time of test (pretest, Posttest 1, and Posttest 2) as a within-subjects variable. Additionally, we conducted two planned comparisons (pretest vs. Posttest 1 and Posttest 1 vs. Posttest 2) for each factor using paired  $t$  tests. Using the Bonferroni correction to adjust for the family-wise error, we accepted a  $p$  value less than or equal to .008



as significant. We predicted that participants' scores on each factor would decrease from pretest to Posttest 1 (reflecting knowledge gained from explicit coverage in class lecture) and from Posttest 1 to Posttest 2 (reflecting knowledge gained from the research familiarization requirement in addition to class lecture).

*Perceptions of contemporary psychology.* The within-subjects ANOVAs revealed significant differences in both factors relating to students' perceptions of contemporary psychology as a function of time. More specifically, students' understanding that psychology is research focused improved during the beginning of the semester,  $F(2, 400) = 23.64, p < .0001$ . Planned comparisons revealed significant increases in the accuracy of perceptions from the pretest ( $M = 12.29, SD = 3.49$ ) to Posttest 1 ( $M = 11.26, SD = 3.62$ ),  $t(204) = 4.58, p < .0001$ , but not from Posttest 1 ( $M = 11.26, SD = 3.62$ ) to Posttest 2 ( $M = 10.72, SD = 3.75$ ),  $t(202) = 2.14, p = .034$ .

Students' awareness that psychology is not strictly clinically oriented also increased throughout the semester,  $F(2, 400) = 18.32, p < .0001$ . Planned comparisons revealed significant increases from the pretest ( $M = 9.45, SD = 2.70$ ) to Posttest 1 ( $M = 8.92, SD = 3.10$ ),  $t(206) = 2.81, p < .005$ , and from Posttest 1 ( $M = 8.92, SD = 3.10$ ) to Posttest 2 ( $M = 8.37, SD = 2.84$ ),  $t(202) = 2.87, p < .005$ .

*Awareness of ethical research procedures.* The within-subjects ANOVAs revealed an overall significant difference in students' knowledge about the rights of research participants,  $F(2, 412) = 36.97, p < .0001$ , and informed consent,  $F(2, 400) = 21.33, p < .0001$ , as a function of the time of test. Planned comparisons revealed that students' knowledge of participants' rights was not significantly different between the pretest ( $M = 6.19, SD = 2.32$ ) and Posttest 1 ( $M = 5.98, SD = 2.59$ ),  $t(209) = 1.30, p = .20$ , but their awareness of participants' rights increased significantly from Posttest 1 ( $M = 5.98, SD = 2.59$ ) to Posttest 2 ( $M = 4.86, SD = 2.18$ ),  $t(207) = 7.09, p < .0001$ . Likewise, planned comparisons revealed students' understanding of informed consent procedures increased significantly from Posttest 1 ( $M = 7.59, SD = 3.17$ ) to Posttest 2 ( $M = 6.30, SD = 2.87$ ),  $t(205) = 6.36, p < .0001$ , but not from the pretest ( $M = 7.64, SD = 2.67$ ) to Posttest 1 ( $M = 7.59, SD = 3.17$ ),  $t(204) = .10, p = .92$ .

## Discussion

We designed a study to identify the pedagogical value of participating in psychological experiments. We predicted that experience with research in addition to explicit course instruction would, throughout the semester, increase student knowledge as indicated by the accuracy of students' opinions about psychology.

### *Perception of Contemporary Psychology*

As hypothesized, students' perceptions about contemporary psychology were more accurate as a result of class content (as demonstrated by the differences between the pretest and Posttest 1). During the first few weeks of class,

students heard about the different fields, research interests, and applications of psychology. Class instruction during the first weeks of the semester covered content beginning with the roots of psychology and progressing to psychology's scientific status and methodology today. During this time instructors attempted to debunk common "pop psych" myths about psychology.

Students' research participation (displayed by the difference between Posttest 1 and Posttest 2 ratings) led to further increases in knowledge. Students' perceptions of psychology as a science became significantly more accurate after participation in research, writing summaries of published research articles, and attending colloquia. Apparently, hands-on experience with research supplemented students' understanding of the function, purpose, methods, and fields of psychology.

### *Awareness of Ethical Research Procedures*

Results indicated that students' understanding of participants' rights and informed consent did not improve from the first week to the fifth week of class despite the fact that instructors explicitly covered the methodology and ethics of psychological research during this time. Course content focused on research with both nonhuman and human participants, classic studies that violated human participant rights, and an overview of the ethical principles to which psychologists strictly adhere. Consistent with earlier studies (McKeachie, 1960; Vaughn, 1977), class lecture alone was apparently not sufficient to significantly change students' misconceptions pertaining to ethical procedures.

After students had the opportunity to participate in psychological studies, however, their knowledge about participants' rights and informed consent procedures did increase significantly (between the fifth and final weeks of class). These results suggest that increased exposure to research, in addition to class lecture and readings, contributed to students' increased understanding of ethical procedures used by psychologists. Anecdotally, the fact that 5 of our students did not consent to have their data used at the end of the semester (an unusual occurrence in research) might show that they not only learned their rights in theory, but understood them enough to be comfortable exercising those rights.

## Conclusions

Although many universities tout the pedagogical benefit of requiring research participation on the part of introductory psychology students, researchers are just beginning to explore the real educational value of participation (Bowman & Waite, 2003; Landrum & Chastain, 1995). Consistent with previous research indicating that students demonstrate increased understanding of psychology after research participation (e.g., Britton, 1979; Nimmer & Handelsman, 1992), our results provide evidence that participation can aid in meeting at least some of the pedagogical goals of an introductory psychology course. Experience with research colloquia, classic psychological literature, and, predominantly, participating in experiments, appears to lead to more accurate perceptions

concerning the breadth and scientific rigor of psychology. Students obtained an increased awareness of current psychological research procedures, specifically informed consent and participant rights. This gain in knowledge occurred sometime after class lectures about these same topics. Thus, this study provides further empirical justification for the use of introductory psychology participant pools as pedagogical tools.

In this study we were interested in assessing the benefit of a research familiarization requirement in addition to traditional course content. As such, we did not include a control group of students who completed the research familiarization requirement but did not complete the course work. Additionally, instructors of the classes included in this study believed it would be unethical to relinquish the research requirement for a portion of the introductory students, given that the instructors thought the research requirement had educational benefits. Therefore, we did not strictly assess the isolated effect of experimental participation on changes in students' perceptions of the field of psychology. The lack of true control group limits the causal interpretations we can draw from this work. It seems reasonable to conclude, however, that differences in students' knowledge about psychology from Posttest 1 to Posttest 2 were due in large part to participation in research. Future research may address these issues by using a control group from an introductory class in a different discipline or conducting the experiment outside the regular classroom setting.

In conclusion, like other active learning methods (e.g., Benjamin, 1991; Mathie et al., 1993), research participation seems to have been an effective means of increasing knowledge about psychology. Direct, hands-on experience with research appears not only to be an enjoyable experience (Britton, 1979), but also an educationally valuable experience for introductory psychology students. Participation in a research familiarization requirement can be an active learning tool that enhances students' understanding of psychology as a science.

## References

- Benjamin, L. T., Jr. (1991). Personalization and active learning in the large introductory psychology class. *Teaching of Psychology*, 18, 68–74.
- Bowman, L. L., & Waite, B. M. (2003). Volunteering in research: Student satisfaction and educational benefits. *Teaching of Psychology*, 30, 102–106.
- Britton, B. K. (1979). Ethical and educational aspects of participating as a subject in psychology experiments. *Teaching of Psychology*, 6, 195–198.
- Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, 7, 309–319.
- Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Jung, J. (1969). Current practices and problems in the use of college students for psychological research. *The Canadian Psychologist*, 10, 280–290.
- Landrum, R. E., & Chastain, G. (1995). Experiment spot-checks: A method for assessing the educational value of undergraduate participation in research. *IRB: A Review of Human Subjects Research*, 17, 4–6.
- Mathie, V. A., Beins, B., Benjamin, L. T., Jr., Ewing, M. M., Hall, C. C. I., Henderson, B., McAdam, D. W., & Smith, R. A. (1993). Promoting active learning in psychology courses. In T. V. McGovern (Ed.), *Handbook for enhancing undergraduate education in psychology* (pp. 183–214). Washington, DC: American Psychological Association.
- McKeachie, W. J. (1960). Changes in scores on the Northwestern Misconceptions Test in six elementary psychology courses. *Journal of Educational Psychology*, 51, 240–244.
- Nimmer, J. G., & Handelsman, M. M. (1992). Effects of subject pool policy on student attitudes toward psychology and psychological research. *Teaching of Psychology*, 19, 141–144.
- Project syllabus. (2003, August 3). Retrieved August 11, 2003, from <http://www.lemoyne.edu/OTRP/projectsyllabus.html#introductory>
- Sieber, J. E., & Saks, M. J. (1989). A census of subject pool characteristics and policies. *American Psychologist*, 44, 1053–1061.
- Stanovich, K. E. (1986). *How to think straight about psychology*. Glenview, IL: Scott, Foresman.
- Vaughan, E. D. (1977). Misconceptions about psychology among introductory psychology students. *Teaching of Psychology*, 4, 138–141.
- Wade, C., & Tavis, C. (2003). *Psychology* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

## Notes

1. Danielle M. Beck is now a graduate student at the University of Washington, Seattle. Katie E. Luther is now a graduate student in the Department of Sociology, University of California, Riverside. Dana Anderson, Kelly Goedert, and Wendelyn Shore contributed equally to this research and preparation of the article.
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