

Learning about the means to the end: what US Introductory Psychology students report about experimental participation

JESSICA DARLING,

Pacific Lutheran University, US

KELLY GOEDERT¹,

Seton Hall University, US

MICHELLE CEYNAR, WENDELYN SHORE AND DANA ANDERSON

Pacific Lutheran University, US

Previous research has shown that when asked to rate their agreement with statements regarding their attitudes towards participation in psychological experiments, students reported that their participation was of educational value (e.g. Bowman and Waite, 2003; Landrum and Chastain, 1995). We investigated what kinds of learning experiences students would report when prompted with open ended questions regarding their participation. Four open ended questions asked how seriously participants took the research experience, what participants gained from studies, what were commonalities among the studies and how their classroom experience helped with understanding the experiments. In addition to reporting that they took their participation seriously, students reported that they learned not only about psychological content but also about the process of conducting psychological research.

In an effort to meet the need for research participants, many universities have established participant pools in which students enrolled in introductory courses are required to spend a designated number of hours participating in experiments carried out by faculty or other students at the university (Sieber and Saks, 1989). American Psychological Association (APA) ethical guidelines state that one can require students to participate in research studies only when the required participation is of potential educational value for the students (APA, 1982, p. 48). A number of studies during the past few decades have evaluated students' perceptions of required participation in experiments, including their perceptions of its educational value (e.g. Bowman and Waite, 2003; Britton, 1979; Landrum and Chastain, 1995; Leak, 1981). These systematic studies have found that students do report educational benefits from the experiments (cf. Coulter, 1986), suggesting that the use of participant pools meets APA ethical guidelines.

But what are these educational benefits? What is it that students learn? One could roughly classify the potential learning as either content-based or process-based: participants may gain knowledge about particular content areas within psychology (e.g. Davis and Fernald, 1975). Participants may also learn about the process of scientific investigation employed when conducting psychological research. For example, by participating in an experiment on long-term memory,

students may learn about the characteristics of long-term memory (i.e. content-based learning). Likewise, by participating in a cognitive experiment employing a dual-task paradigm, students may learn about how this methodology is used to answer psychological questions (i.e. process-based learning). In this study, we investigated what kinds of self-reported learning took place among students who participated in psychological experiments.

To date, studies assessing students' perceptions of experimental participation and its educational value have used Likert-type scales (e.g. Bowman and Waite, 2003; Landrum and Chastain, 1995). According to these assessments, students agreed that participating in research boosted their interest in psychology (Leak, 1981), that they learned about psychology or found experiments of educational value (Landrum and Chastain, 1995; Nimmer and Handlesman, 1992) and that they were satisfied or felt comfortable with their research experience (Bowman and Waite, 2003; Britton, 1975). In some instances, students rated the educational value of experimental participation less positively than other aspects of participation such as the courteousness of the experimenter or the adequacy of the debriefing (Britton, 1979; Landrum and Chastain, 1995; Leak, 1981). But even in these instances, students rated the educational value of experimental participation positively. Finally, it has been shown, again via responses to Likert-type statements, that

¹ Correspondence concerning this article should be sent to the second author at Department of Psychology, Seton Hall University, 400 South Orange Avenue, South Orange, NJ 07079, US. Email: goederke@shu.edu.

participation in a research requirement is associated with more accurate perceptions of the field of psychology (e.g. an increased awareness that psychology is not strictly clinically oriented; Rosell et al., 2005).

In the current study, we investigated the kinds of learning experiences, if any, students would report when prompted with an open-ended question, as opposed to being asked to report their agreement with a statement. The university at which we conducted our study required students enrolled in Introductory Psychology courses to complete a research familiarisation requirement. Students could complete this requirement by acting as participants in ongoing experiments run by faculty members and other students, by attending and summarising psychology colloquia, or by summarising journal articles. This study focused on students who completed at least part of their requirement by participating in experiments. Using four open-ended questions, we assessed how seriously students took their participation in experiments, what they felt they gained from participating in experiments, what commonalities they noticed among the various experiments and how their classroom experience may have aided their understanding of the experiments.

METHOD

Participants

Participants were 208 students (68 male, 140 female) enrolled in Introductory Psychology at Pacific Lutheran University who reported completing at least one experiment to meet a research familiarisation requirement. The participants ranged in age from 17 to 42 years old ($M = 18.65$, $SD = 2.14$). The majority of the participants were freshmen ($n = 156$; 42 were sophomores², 5 juniors and 5 seniors). Of all the participants, 72 of the participants reported having taken a psychology course in the past. When asked their reason for taking the course, 121 students reported taking the course to fulfill a university general education requirement, 29 reported intending to major in psychology and 36 reported taking the course for personal interest (six students responded "other").

Implementation of research familiarisation requirement

Students enrolled in Introductory Psychology at Pacific Lutheran University were required to earn eight research familiarisation credits as part of their course work. Students could earn research familiarisation credits by acting as participants in experiments (one credit per half hour), attending and summarising psychology colloquia (one credit), or summarising psychological journal articles (one credit). When a student failed to earn all eight credits her or his grade

was lowered one letter grade. Such students had the opportunity to restore their grade by completing the remaining number of credits in the subsequent semester. In the semester during which these data were collected, students had the opportunity to participate in experiments spanning several subfields of psychology, including cognitive, social, personality, learning and perception.

Materials

The open-ended questions, along with a set of demographic questions, were part of a larger survey administered to students at three points throughout the semester (see Rosell et al., 2005). The larger survey assessed how participation in a research familiarisation requirement changed students' knowledge of psychology across the course of the semester, via students' responses to statements on a Likert-type scale. The open-ended questions of interest to the current study were part of the final survey administration.

After completing the Likert-type questions, students stated how they had completed their research familiarisation requirement. Those students who had completed at least one experiment responded to the following four questions, presented in this order: "Other than fulfilling the requirements, what did you gain from participating in the psychology experiment(s)?"; "While participating in various experiments, what commonalities did you find among them?"; "How did your classroom experience in Psychology 101 help in your understanding of the psychology experiments?"; and "How seriously did you take the psychology experiments?".

Procedure

Students took the larger survey in one of three sections of Introductory Psychology during the regular class period at three different times during the semester: the first week, the fifth week, and the final week of the semester. The survey was truthfully introduced as a student research project and a student researcher administered all surveys during the last 20 minutes of the class period. The course instructor did not remain in the room while students completed the survey and students were reminded that their course instructor would not read their survey responses. The open-ended questions of interest in the current study were administered in the final week of the semester, after students had completed their research familiarisation requirement.

Participants provided informed consent after the final administration of the survey, at which point they could either provide or withhold consent for the analysis of their data. Of 217 students, five students did not give consent and their surveys were destroyed. Of the

² In US colleges offering four-year psychology degrees, students in the first, second, third and fourth years of the degree are known as freshmen, sophomores, juniors and seniors, respectively.

remaining 212 students, 208 reported having completed at least one experiment to fulfill the research familiarisation requirement; their data were retained for analysis. Most students fulfilled their entire requirement by participating in experiments (171 students participated in at least two experiments to do so and 37 students fulfilled their entire requirement by participating in one eight credit experiment).

RESULTS

Two student researchers, working independently, performed a content analysis on the responses to the open-ended questions. When a participant made multiple responses to a question, researchers coded only the first response made by the student. To create the initial set of response categories, 45 questionnaires were randomly selected from the entire batch of 208, and each researcher created her own set of categories for coding the responses in this set. The researchers then discussed their independent sets of categories and agreed upon a single set of coding categories. Inter-rater reliability for the final coding process was Cronbach's alpha of .85. The researchers discussed and resolved any remaining coding discrepancies.

Seriousness of approach to psychology experiments

The coding categories and the frequency they were endorsed for the question "How seriously did you take the psychology experiments?" appear in Table 1. Comparing the number of students who reported taking

the experiments seriously (sum of "very serious", "moderately serious", and "serious" for a stated reason, $n = 169$) to the number who either reported not taking the experiments seriously or did not respond to the question ($n = 39$) revealed that most students reported approaching the experiments with some level of seriousness, $\chi^2(1, n = 208) = 81.25, p < .001$.

Students who stated that they took the experiments seriously for a reason identified empathy for the experimenter, interest in the integrity of the results and, in a few instances concern over their own or the student experimenter's grade.

Benefits of experiment participation

The coding categories and the frequency of student responses for "What did you gain from participating in the psychological experiment(s)?" appear in Table 2. Comparing the number of students who reported gaining something ($n = 141$) to the number of students who either reported gaining nothing or left the question unanswered ($n = 67$) revealed that most students reported gaining something from their participation in the psychological experiments, $\chi^2(1, n = 208) = 26.33, p < .001$.

Of the students who reported gaining something from their participation, the majority reported gaining a greater understanding of the process of conducting an experiment (see Table 2). The learning of 'how' psychological studies are conducted was a common theme in the students' statements. For example, one student reported, "I now know how some of

Table 1

Frequency of coded responses to the question: "How seriously did you take the psychology experiments?"

Response Category	Number Reporting	Percent of Total
Very serious	75	36.1
Moderately serious	45	21.6
Serious for a stated reason	49	23.5
Not serious	16	7.6
Left question blank	23	11.1

Table 2

Frequency of coded responses to the question: "Other than fulfilling the requirements, what did you gain from participating in the psychology experiment(s)?"

Response Category	Number Reporting	Percent of Total
Understanding process of conducting an experiment	46	22.1
Understanding content of particular experiment	37	17.8
Found experiments interesting or fun	21	10.1
Understanding methods/techniques of research	13	6.3
Understanding breadth of research topics	12	5.8
Understanding goals of research	6	2.9
Understanding of process experimenter undergoes	6	2.9
Nothing	38	18.3
Left question blank	29	13.9

psychological research is conducted". Others reported that they learned "...how experiments were conducted", and "...how it [the psychological experiment] works". In addition, others reported, "The research process takes a lot of time and effort. It is very scientific", "I learned what I might be doing if I were to major in psychology" and "They [the experiments] helped to clarify the classroom experience".

Commonalities among experiments

A total of 37 students reported participating in only one experiment. These students were excluded from the analyses of the question, leaving 171 student responses. Table 3 contains the coding categories and the frequency of student responses to this question. As mentioned previously, one potential educational benefit of experimental participation is to familiarise introductory psychology students with the research process first-hand. Indeed, students reported recognising methodological commonalities and commonalities regarding ethical procedures among the experiments. For example, students reported, "They were all run according to strict guidelines", "Ethical guidelines were enforced" and "All experimenters required we sign consent forms". The number of students who reported these meaningful commonalities among the experiments ($n = 103$) exceeded the number

who either reported incidental features of the experiments (e.g., testing in similar rooms), reported not noticing any commonalities or did not answer the question ($n = 68$), $\chi^2(1, n = 171) = 7.16, p < .01$.

Effect of class lecture on understanding of experiments

The coding categories and the frequency of student responses appear in Table 4. Approximately one-third of the students ($n = 68$) failed to respond to this question. The number of students who reported the classroom experience as being of some benefit in understanding the experiments ($n = 113$) did not significantly differ from the number of students who reported either that the classroom experience did not help or who left the question blank ($n = 95$), $\chi^2(1, n = 208) = 1.56, p = .212$.

Of those students who did respond to the question, the largest number indicated that the classroom helped them understand the research process and the research methods. For example, students stated, "I learned the reason why they [the experimenters] were doing the experiments", "I learned the necessity of experiments" and "It [class lecture] helped explain the process of research. I could see the steps in the experiment I participated in".

Table 3

Frequency of coded responses to the question: "While participating in various experiments, what commonalities did you find among them?"

Response Category	Number Reporting	Percent of Total
Methodological commonalities	60	35.1
Use of consent/debriefing (IRB/APA)	43	25.1
Incidental features	37	21.6
Did not notice commonalities	7	4.1
Left question blank	24	14.0

Note: Total $N = 171$, as 37 participants reported participating in only one experiment.

Table 4

Frequency of coded responses to the question: "How did your classroom experience in Psychology 101 help in your understanding of the psychology experiments?"

Response Category	Number Reporting	Percent of Total
Understanding of process and methods	34	16.3
Understanding of ultimate objectives of research	28	13.5
Understanding of content of particular study	23	11.1
Understanding of ethical guidelines	13	6.3
Understanding of psychological terminology	5	2.4
Understanding of what researcher does	5	2.4
Led to greater appreciation of the research	5	2.4
Did not help	27	13.0
Left question blank	68	32.7

It is difficult to assess why, in particular, we had such a large number of students fail to respond to the last question. We cannot rule out the possibility that those who failed to respond did not think the classroom experience helped their understanding of the psychological experiments.

Relationship between responses to open-ended questions and participant characteristics

We assessed whether students' responses to the open-ended questions varied as a function of participant characteristics. For each of the above questions, separate chi-square tests of independence were performed on each of the following participant characteristics: gender, class standing (freshman, sophomore, junior, or senior), reason for taking the class (general education requirement, intended major, or personal interest) and previous participation in a psychology class (yes or no). There were no significant relationships between any of the participant characteristics and the participants' responses to the open-ended questions.

Relationship among the open-ended questions

We assessed whether there were relationships amongst participants' responses to the open-ended questions. One might expect, for example, that those who report taking the experiments seriously to be more likely to report gaining something from the experiment. Chi-square tests of independence for relationships amongst students' responses revealed several significant relationships.

As depicted in Figure 1A, students who claimed approaching the experiments with some amount of seriousness were more likely to report gaining something from their experiment participation, $\chi^2(1, n = 208) = 4.27, p < .05$. They were also more likely to report noticing meaningful commonalities amongst the

experiments (see Figure 1B), $\chi^2(1, n = 171) = 6.43, p < .05$, and they were more likely to report that their classroom experience aided their understanding of the experiments in some way (see Figure 1C), $\chi^2(1, n = 208) = 4.87, p < .05$. No other relationships among responses to the questions approached significance.

Figure 1. Interaction of seriousness with which students approached participating in experiments with their responses to other questions. Dark bars represent frequency of students reporting some amount of seriousness. Light bars represent frequency of students who either reported that they did not take the experiments seriously or left the question blank. (A) Interaction of seriousness with reported gain. (B) Interaction of seriousness and noting of meaningful commonalities. (C) Interaction of seriousness and finding class lecture helpful in understanding experiments.

DISCUSSION

We investigated what kinds of educational benefits, if any, Introductory Psychology students would self-report as a product of their experiment participation. We found that students were able to verbalise specific educational benefits. The majority of students reported taking their experiment participation seriously. Additionally, most students reported gaining something from their experiment participation; these gains included learning about the process of conducting psychological research and learning about content. Finally, students noticed commonalities amongst the experiments that were both process- and ethics-based. Although the students indicated that participating in experiments aided their understanding of the concepts they were learning in the classroom, they did not perceive that what they learned in the classroom benefited their understanding of the particular experiments in which they participated.

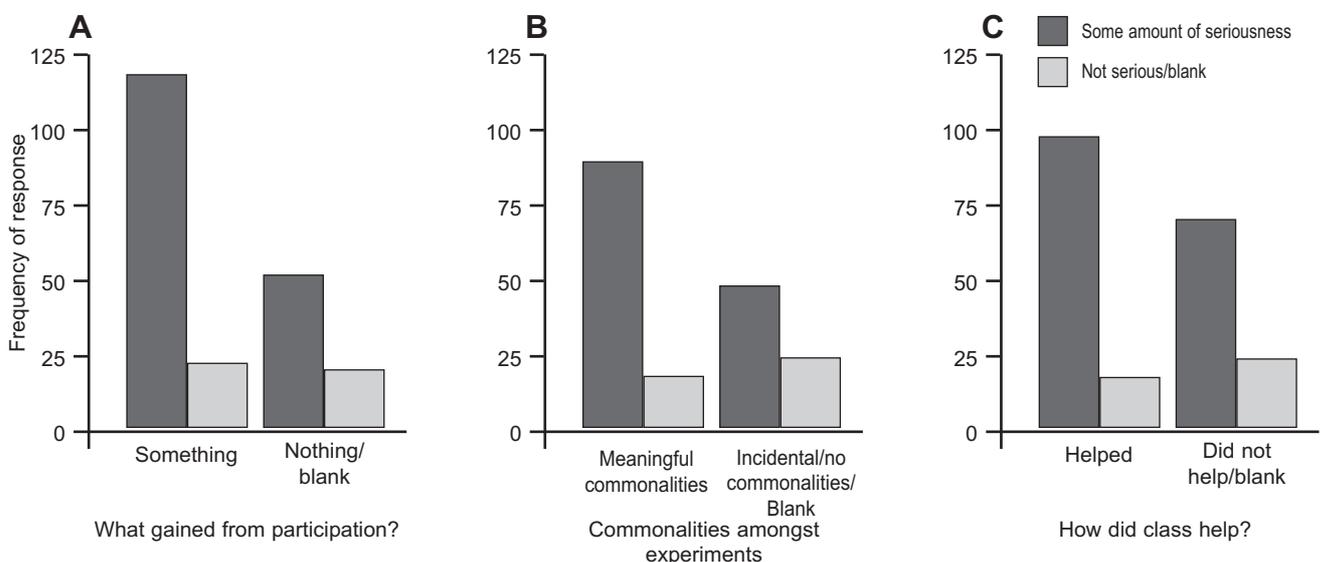


Figure 1

Students' responses to these open-ended questions are consistent with their responses to Likert-type statements as assessed by other researchers. Bowman and Waite (2003) found that students who participated in experiments reported greater satisfaction with the requirement and a piqued interest in psychology. According to Landrum and Chastain (1995), students agreed that they learned about psychology from participating in experiments. We have found that students are not only able to voice agreement with these benefits, but they actually generate specific educational benefits of research participation on their own.

Our results are inconsistent, however, with other findings regarding how participant characteristics interact with their perceptions of participation. Bowman and Waite (2003) found that women were more likely to participate in experiments as opposed to using another option to complete their research requirement and women seemed more satisfied with their experience. They also found that social science majors had more favourable perceptions of psychological research compared to other majors. We did not find any differences in perceptions based either on gender or on students' stated reason for taking the course.

One potential reason for this discrepancy between the research of Bowman and Waite (2003) and our own research may be the difference in the size and variability of the sample of students. Bowman and Waite questioned 774 students, whereas we questioned only 208. Our restricted sample may have prevented us from seeing interactions between students' perceptions and characteristics.

Why might experimental participation impart educational benefits? One possible explanation is that experiments encourage active learning, allowing students to participate at a 'hands-on' level. Such types of active learning experiences increase interest and motivation for the student (Benjamin, 1991). Although the experiments performed by students in the current study were not directly linked to topics covered in the classroom, the hands-on experience of acting as a participant in experiments allowed students to abstract some general principles regarding how psychological experiments are conducted. Moreover, it is likely that students did not perceive that their classroom learning aided their understanding of the experiments because of this lack of direct connection between the experiments and classroom lecture. Indeed, one would expect a greater synergy between classroom learning and experiment participation were the experiments directly linked to lecture topics, as might happen in courses including a laboratory component (e.g. Berthold, Hakala and Goff, 2003).

In the current study, students primarily reported gains in

'understanding', while only a minority reported other kinds of benefits such as finding the experiments interesting or fun (e.g. the 10% indicated in Table 2). One might expect students to gain more than knowledge from participating in the experiments. There may, for example, be social benefits to participation. Students may meet peers or more senior students and faculty through the experimental process. The majority of students in our sample did not, however, verbalise such benefits.

Although the majority of students verbalised specific educational gains from participating in the experiments, we must caution that not all students perceived the experiments to be beneficial. Indeed, approximately 32% of the sample reported either gaining nothing from their experiment participation or did not explicitly answer this question.

Furthermore, the questions posed were biased towards the positive. We did not, for example, ask students about negative aspects of their participation experience or how their participation experience could have been better. Pursuing this line of questioning could yield insights for improving the experiment participation requirement, such that it becomes a more positive experience for all students involved.

One danger lies in all studies attempting to assess students' perceptions of their research participation experience. Such studies ask students to self-report on what they gained from their experience. The classic notion of cognitive dissonance would predict that by virtue of making the commitment to participate in the experiments, students would thereby find their participation worthwhile (e.g. Festinger and Carlsmith, 1959). According to dissonance theory, dissonance occurs when there is some discrepancy between an attitude and a behaviour; people are motivated to reduce dissonance, either by changing their attitude or their behaviour such that they are consonant with one another. It is wholly possible that students have positive perceptions of their experiment participation as a result of reducing dissonance. They have already produced the required behaviour of participating in the experiments, and therefore, they develop an attitude consonant with that behaviour.

Dissonance theory predicts, however, that dissonance and the ensuing attitude change will be greatest when there is little external motivation for a behaviour (e.g. lack of monetary reward for performing the behaviour or lack of punishment for failing to perform the behaviour). Consistent with this prediction, Nimmer and Handelsman (1992) found that students in a mandatory experiment participation requirement (i.e. strong external motivation) had less favourable attitudes toward participation than did students in a semi-voluntary option (i.e. low external motivation).

The experimental participation in the current study is neither completely mandatory, nor is it truly voluntary. Experiments comprised one of three potential ways in which students could complete their research familiarisation requirement; they also had the option of attending colloquia or summarising journal articles. Therefore, in this particular case, there is at least some external motivation. Cognitive dissonance theory would predict that our students would have less favourable attitudes than those students who were truly volunteers. We do not believe that there is an easy way to get around a cognitive dissonance explanation for any of the studies showing positive perceptions of a research experience after having participated. However, because we demonstrated that students were able to verbalise particular knowledge gained through experiment participation even when such participation was mandatory, we think that the notion of cognitive dissonance cannot explain away all of the reported benefits of participating in experiments.

CONCLUSION

Early researchers concerned over the educational value of research participation focused on the psychological content students gained (e.g. Davis and Fernald, 1975). Our study demonstrates that students feel they do learn about content, but perhaps more importantly, they report learning about the process of psychological experimentation. The value of learning the process of scientific psychology must not be underestimated. Our students benefit when they more clearly appreciate how science is conducted. When students better understand the means by which psychological content is obtained, they are better equipped to critically think about and question the 'answers' to psychological questions.

ACKNOWLEDGEMENTS

We would like to thank Danielle Beck and Katie Luther for help with data collection and Amy Smith for help with coding.

REFERENCES

- American Psychological Association, Committee for the Protection of Human Participants in Research. (1982). *Ethical principles in the conduct of research with human participants*. Washington, DC: American Psychological Association.
- Benjamin, L. T. (1991). Personalization and active learning in the large introductory psychology class. *Teaching of Psychology, 18*, 68-74.
- Berthold, H. C., Hakal, C. M. and Goff, D. (2003). An argument for a laboratory in Introductory Psychology. *Teaching of Psychology, 30*, 55-58.
- 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.
- Coulter, X. (1986). Academic value of research participation by undergraduates. *American Psychologist, 41*, 317.
- Davis, J. R., & Fernald, P. S. (1975). Laboratory experience versus subject pool. *American Psychologist, 30*, 523-524.
- Festinger, L., & Carlsmith, J. M. (1959). Cognitive consequences of forced compliance. *Journal of Abnormal and Social Psychology, 58*, 203-210.
- 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.
- Leak, G. K. (1981). Student perception of coercion and value from participation in psychological research. *Teaching of Psychology, 8*, 147-149.
- 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.
- Rosell, M. C., Beck, D. M., Luther, K. E., Goedert, K. M., Shore, W. J., & Anderson, D. A. (2005). Progression of students' knowledge about psychology: The value of experimental participation paired with course content. *Teaching of Psychology, 32*, 95-99.
- Sieber, J. E., & Saks, M. J. (1989). A census of subject pool characteristics and policies. *American Psychologist, 44*, 1053-1061.