Using Student Choice to Increase Students' Knowledge of Research Methodology, Improve Their Attitudes Toward Research, and Promote Acquisition of Professional Skills

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Students often approach their research methods course with dread typically because of the broad and abstract nature of the content. In the study presented here, we introduced a variety of student-driven, content-specific assignments that allowed for a more active learning experience when compared to the typical research methods course. Providing a range of student choice in the research methodology curriculum offers the advantage of incorporating an active learning approach as well as fostering an environment that promotes students' intrinsic motivation for learning the material. After completing this course, students reported a significant gain in skill acquisition and showed significant gains in knowledge of research methods, and they reported improved attitudes toward research. An examination of the pre-course student characteristics and their correlations with post-course student characteristics suggests that this kind of approach to teaching was effective for a range of students. These findings lend support to the growing body of literature that suggests that students learn best when they are actively engaged in the process and are most intrinsically motivated when they feel they have autonomy over their learning.

Across many disciplines both the importance of teaching research methodology along with the difficulties associated with this task are well known. Those teaching in a range of content areas, including public health (Hovell, Adams, & Semb, 2008), political science (Turner & Thies, 2009), psychology (Freng, Webber, Blatter, Wing, & Scott, 2011), sociology (Shostak, Girouard, Cunningham, & Cadge, 2010; Singleton, 2007), social work (Reinherz, Regan, & Anastas, 1982), and education (Onwuegbuzie, 2001), discuss challenges or possible solutions to this endeavor. While those teaching graduate students also face challenges teaching research methods to their growing professionals (Reinherz et al., 1982), teaching undergraduates presents its own unique obstacles. Many undergraduate departments require that students complete a methods course near the beginning of their college careers. Students taking this course early in their academic trajectories benefit from this by building critical thinking skills necessary to evaluate the knowledge they gain through subsequent content courses (Freng et al., 2011). Moreover, this approach allows for the cumulative development of students' professional and intellectual skills (Kain, Buchanan, & Mack, 2001). This early placement of the research methods course presents a pedagogical dilemma; students must gain research knowledge before moving on to other courses but it is difficult for them to learn methodological skills without exploring a specific content area.

Students are, therefore, often faced with dual task of developing an understanding of abstract research concepts without a requisite foundation of concrete content knowledge in which these abstract notions can be applied successfully. As Jean Piaget and others have noted, it is difficult to master an abstract knowledge of any phenomena without a basic concrete understanding of its principles (Lawson & Wollman, 2003). Moreover, students become disconnected from the process and have difficulty linking the methodological skills they are asked to develop with their academic, personal, and professional goals (Sizemore & Lewandowski, 2009). Perhaps this is why many students approach their methodology courses with apprehension or anxiety (Papanastasiou, 2005) and report more enthusiasm for registering for content-driven courses (Rajecki, Appleby, Williams, Johnson, & Jeschke, 2005). This is unfortunate, because many studies suggest that students are more able to sustain devotion to their studies when they feel intrinsically motivated to pursue subjects that are consistent with their purposes and goals (Butler, 2000; Linnenbrink & Pintrich, 2000). The self-determination theory of motivation suggests that human beings simultaneously have needs for autonomy, competence, and relatedness (Ryan & Deci, 2000; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). Theoretical models (Ryan & Deci, 2000) and empirical evidence (Vansteenkiste et al., 2004) suggest that humans thrive in circumstances that satisfy these needs for autonomy, competence, and relatedness. It is under these conditions that we are likely to be intrinsically motivated to learn and perform at our peak. To the extent that personal autonomy and competence needs are met, students are more engaged with an activity and are more likely to be persistent (Vansteenkiste et al., 2004).

The theoretical and empirical literature would, therefore, suggest that learning occurs best when students, who feel that they have been given autonomy and choice, are also pursuing activities that provide them with a forum in which they might engage in

concrete experiences upon which a more abstract understanding can be built. Several instructors and researchers have included various features of these ideals in their methodology courses. For example, Longmore, Dunn, and Jarboe (1996) discussed a curriculum in which students developed and administered their own survey examining a student-chosen research question. The authors reported that this student-choice was an important component to the success of this approach to teaching, but these choices rested with individual groups of students and not with a class-wide activity. Singleton (2007), however, described a curriculum for teaching research methodology that involved institutional research conducted by the class as a whole. The benefits of this approach were that the campus survey provided a "constant source of examples in the methods course" (Singleton, 2007, p. 53). However, the research question was ultimately chosen by the professor who also developed the first draft of the survey used in the study. Similarly, Kain, Buchanan, and Mack (2001) asked students to conduct telephone interviews with college alumni or sociology majors, and Chapdelaine and Chapman (1999) asked students to conduct community-based research regarding residents' attitudes toward police involvement in domestic violence cases. Students were given some choices in the implementation of these studies but they were not given full autonomy over the research process.

While many instructors have included some student autonomy and concrete learning experiences in their methodologies, few of these studies have examined the related outcomes in students' reported experience and attitudes toward research or their gains in knowledge of research methodology. Even when instructors are able to document improvements in knowledge, sometimes this improved knowledge is associated with a decline in positive attitudes toward research (Sizemore & Lewandowski, 2009). One recent study employed a pedagogical technique that involved elaborate scaffolding beginning with a critical analysis of a research article, leading to a demonstration of an experimental design, and ending with the implementation of students' own experiments (Ciarocco, Lewandowski, & Van Volkom, 2013). Students were not given the opportunity to choose their research question in this approach, but this curriculum still resulted in improvements in student-reported attitudes towards research.

The current study aims to investigate a research methods curriculum which scaffolds student understanding by capitalizing on both this active learning methodology shown to be effective in teaching science-related material (Michael, 2006) while also maximizing students' ability to feel connected with the material. Moreover, changes in student understanding of the material, their related professional experiences, and their attitudes toward research are examined. In this research methodology course, the two main assignments were designed to promote students' sense of autonomy and enthusiasm through both group and individual assignments. Individual assignments revolved around the development of a written research proposal, on a topic chosen by the student individually on some area of personal interest. Group projects revolved around conducting a study of some aspect of student life on a topic chosen by the class as a whole. This approach benefits from using students' rich experience as members of the college community and their knowledge about the culture of students on campus to provide concrete experience in order to allow students to develop a more abstract understanding of the process of research as a whole.

Students chose the research topics for the Study of Student Life unit. To help students choose a topic that would evoke engagement, the professor asked students to generate several ideas of interest to bring to class for consideration. Through class-wide discussions, the professor facilitated a focus-group style discussion regarding elements of interest regarding life on campus. Based on these extended discussions, the class voted for the topic of study to be pursued by the class as a whole over the course of the semester. This method both allowed the students to choose a topic in which they were personally interested and allowed the professor to moderate these selections to ensure a viable project. Some example topics that students have chosen over the years include an assessment of attitudes toward campus expansion, an examination of campus involvement and attachment to campus, an examination of student attitudes toward dining on campus, and a study of students' time-management skills. Subsequently, students developed and implemented a well-designed quantitative survey of the chosen topic and conducted a qualitative study related to the same topic. Though others have incorporated student research projects in their methods courses (Chapdelaine & Chapman, 1999; Marek, Christopher, & Walker, 2004; Singleton, 2007), we are unaware of other models that incorporate this level of student choice into the curriculum. Additionally, students choose which aspect of the project they will lead (including development of the survey, the analysis of the quantitative or qualitative data, or constructing the consent form and obtaining IRB approval; see Appendix). As a group, the students work together to develop the survey, evaluate the merits of the survey, make appropriate revisions, and administer the survey to a sample of students. As part of this project, students write a final report of their findings which, when appropriate, is submitted to relevant administrators or departments. It was anticipated that students learning through these methods

would directly perform those activities most relevant for direct professional development within the field (Kruger & Zechmeister, 2001).

In addition to conducting this classroom-wide study of student life, students in this course also completed an individual research proposal on a topic of their own and one that was of particular interest to them. Students were also encouraged to choose a research topic that had some professional or personal interest so that they might better sustain enthusiasm and interest in the topic. In order to maximize the extent to which students felt connected to their proposal topics, two class periods were devoted to library-based sessions in which the professor asked students to generate research questions directly related to their future professional goals or their current personal interests. In order to scaffold students' abilities to generate these questions, the professor engaged in one-on-one discussions about choosing the topic of the proposal, and students were reminded that the class was related to their abilities to excel in their post-collegiate lives. Research proposal were extensive and followed American Psychological Association guidelines including a title page, an abstract, an introduction, methods, proposed results and discussion, references, and appendices (when necessary and appropriate).

It is this mixture of laboratory-style research and individual development through the process of proposal construction that was hypothesized to effectively prepare students to begin their professional lives in the field. The combination of personal and group projects within the context of a research methods course, with a great degree of choice incorporated into both assignments, satisfies both the growing call to incorporate more active learning approaches (Stoloff, Curtis, Rodgers, Brewster, & McCarthy, 2012; Ryan & Deci, 2000) with a growing understanding that allowing students to build their own knowledge base results in deeper understanding of the material (Lawson & Wollmon, 2003). Further, the current study examined whether this curriculum was associated with an increase in students' knowledge of research methodology, their attitudes toward the research process and their professionally-related experiences.

Method

Participants

Participants were 47 students in a small Northeastern residential college campus. All participants were enrolled in a research methods course that was a requirement to fulfill the obligations of a psychology or human development major. Most students complete this research methods course after the Introduction to Psychology course and prior to

completing the required Statistics course. This sequence of three classes provides the theoretical and practical foundation to the majors, and is required to proceed on to upper-level laboratory and capstone courses.

Measures

Knowledge of research methods. To test students' knowledge of research methodology, students completed an identical pre- and post-test consisting of 16 multiple-choice items. This test was based on one offered as a part of a free review service for students attempting to pass A-level exams in the United Kingdom (S-Cool, 2010). The measure was chosen because it was a standardized test that assessed a range of research understanding (e.g., "An experimental design in which the same participants are tested under different conditions is known as _____" and "Which of the following correlation coefficients could be interpreted as a strong positive correlation?"). This measure assessed general knowledge across a breadth of areas covered in psychology research methods and statistics courses, including experimental design, qualitative methodology, statistical understanding and correlational methods. The material covered in the course was presented from an unaffiliated textbook, and the classroom materials were developed by the instructor and unrelated to this standardized test. It was, therefore, considered a reasonable and objective assessment of students' knowledge of research methods in psychology.

Attitudes toward research. Attitudes toward research were assessed using an established, multidimensional measure of students' research-related attitudes (Papanastasiou, 2005). This 32-item measure evaluated students' perception of (a) the usefulness of research in helping them meet their own professional goals (e.g., "Research should be indispensable in my professional training"), (b) research anxiety (e.g., "Research makes me nervous"; "I feel insecure concerning the analysis of research data"), (c) positive attitudes towards research (e.g., "I like research"), (d) attitudes regarding relevance of research to life in general (e.g. "I use research in my daily life"), and (e) the difficulty of research (e.g., "Research is complicated"). Participants rated their agreement with these items on from a score of 1 (*strongly disagree*) to 7 (*strongly agree*), with negatively-worded items being appropriately reverse-coded. This overall assessment of attitudes toward research methodology contained high internal reliability at both the pre- and post-test assessment, Cronbach's a = .85 and .90, respectively.

Skill-based experiences. The third measure evaluated whether this curriculum for research methods advances students' professional skills. An academic skills inventory checklist assessed 10 broad skill sets as

important for students to develop during college (Kruger & Zechmeister, 2001). The measure includes items to assess whether students engage in activities related to interpersonal and counseling skills, behavioral management or teaching skills, experiences working with special populations or understanding individual differences, and critical thinking or problem solving skills. Additionally, the assessment includes items in which students check off whether they have engaged in activities that (a) build communication skills (e.g., "I have made at least 3 oral presentations in a classroom"), (b) build information gathering skills (e.g., "I have read 3 articles in a scientific or professional journal"), (c) help them learn to work effectively in teams (e.g., "I have worked in a group project for class"), (d) deepen their knowledge of research methods and statistics (e.g., "I have helped conduct a research project in the natural or social sciences"), (e) understand best ethical practices in the field (e.g., "I have discussed whether a research project was ethical or unethical"), and (f) develop technology-related experiences (e.g., "I have created a multimedia presentation using computer software").

Procedure

Assessment of the three outcomes was completed at the beginning and end of the semesters. On the first day of class, an individual who was not an instructor of the course and had no prior knowledge regarding the purpose of the study administered the consent forms and measures. On the last day of class, someone naïve to the study asked students to complete the same body of measures to assess any changes in research knowledge, skills, or attitudes made over the course of the semester. This post-assessment timing occurred before the finals period. The college Institutional Review Board approved these procedures prior to data collection.

Throughout the semester, students completed two large projects; one was group-based and the other individually developed. The Study of Student Life was a semester-long project that began with the class collectively deciding which aspect of student life they would like to investigate. Students signed up for groups, and they were assigned to complete all of the tasks described previously (see Appendix). The second major project, the development of a research proposal, was completed by the student individually and was based on a student-chosen topic of interest. It was completed in sections throughout the course of the semester.

Results

Using paired-samples t tests, we first examined whether students' knowledge, attitudes, and reported skill-based experiences had significantly changed

between the beginning and end of the course. Subsequently, we performed a series of correlational analyses to investigate the extent to which activities, knowledge, and attitudes measured prior to the course and then subsequent to the course—or the differences between the two assessments—were related to one another.

Changes in Student Knowledge, Attitudes, and Skills-Experience Activities

As can be seen in Table 1, students made significant gains in their knowledge of research methods, as assessed through an independent measure, unrelated to the text-book or classroom-based materials. Students' attitudes toward research were also significantly higher at the end of the course compared with their attitudes at the beginning of the course. Even during the pre-course assessment, students in this sample held globally neutral to positive views of research. Prior to the course, students responded with an average of 4.46 on the research attitudes measure, above the mid-point of the scale. At the end of the course, students reported a mean of 4.66 on the same scale, representing a slight, but significant increase in students' attitudes toward the research process, $t(46) = 2.41, p < .05$.

Over the course of the semester, students also reported significant gains in their professional experiences, particularly those related to the topic of research methods and others directly addressed by the content and activities of the course. We first examined whether students' reported overall levels of skill-based experience had changed between the beginning and end of the course. At the beginning of the course, students indicated that they had engaged in approximately 39 of the 60 activities, and by the end of the course, students reported they had engaged in an average of 48 of these, $t(46) = 7.04, p < .001$. As can also be seen in Table 1, the areas in which students made the most professional progress were written and oral communication, information gathering, group work, research methodology, and professional ethics—those content areas most directly addressed during the course of the semester.

Correlations Between Student Knowledge, Attitudes, and Experiences

A series of correlations were calculated to determine whether students' characteristics prior to taking the course predicted the changes they made during the semester or their characteristics at the end of the course (see Table 2). We also calculated whether students held toward research prior to taking the course were completely unrelated to their scores on the

Table 1
t *Tests Indicating Change from Pre-Course to Post-Course Scores, Attitudes, and Skills*

	Pre-course measurement M (SD)	Post-course measurement M (SD)	Paired difference at post-course M (SD)	*Paired Sample* t test
Knowledge of Research	7.81(2.17)	10.11 (2.03)	2.30 (2.30)	$t(46) = 6.84$***
Attitudes toward Research	4.46 (0.58)	4.66 (0.67)	0.21 (0.59)	$t(46) = 2.41$*
Total Skill-based Experiences	38.65 (10.12)	48.19 (10.36)	9.54 (9.29)	$t(46) = 7.04$***
Written and Oral Communication	3.81 (1.38)	4.49 (1.23)	0.68 (1.35)	$t(46) = 3.45$**
Information Gathering	4.79 (1.65)	7.04 (1.12)	2.26 (2.04)	$t(46) = 7.59$***
Groups/Organization/Community	4.55 (1.69)	5.38 (1.64)	0.83 (1.65)	$t(46) = 3.45$**
Interpersonal/Counseling	3.23 (1.51)	3.96 (1.73)	0.72 (1.78)	$t(46) = 2.79$**
Behavior Management/Supervision/ Teaching	3.55 (1.97)	3.85 (2.00)	0.30 (1.77)	$t(46) = 1.16$
Individual Differences	4.34 (1.83)	4.65 (1.78)	0.32 (1.59)	$t(46) = 1.38$
Critical thinking/Problem Solving	3.25 (1.75)	3.57 (2.22)	0.32 (2.15)	$t(46) = 1.00$
Research Methodology/Statistics	2.07 (2.03)	4.13 (2.28)	2.07 (2.44)	$t(46) = 5.73$***
Ethics/Values	3.17 (1.89)	4.98 (2.19)	1.80 (2.25)	$t(46) = 5.45$***
Technology/Computer	6.02 (1.77)	6.54 (1.72)	0.52 (1.77)	$t(46) = 2.00$+

Note. $N = 47$ individuals.
+$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 2
Correlations Between Research Knowledge, Research Attitudes, and Skill-Based Experiences from Pre- to Post-Course Assessment

	1	2	3	4	5	6	7	8	9
1. Pre-course research knowledge									
2. Post-course research knowledge	.40**								
3. Change in research knowledge	-.59***	.50***							
4. Pre-course research attitudes	.25+	-.02	-.26+						
5. Post-course research attitudes	.03	.22	.17	.57***					
6. Change in research attitudes	-.22	.27+	.45**	-.34*	.58***				
7. Pre-course skill-based experiences	.44**	.42**	-.04	.33*	.30*	.02			
8. Post-course skill-based experiences	.39**	.55***	.13	.24	.44**	.26+	.59***		
9. Change in skill-based experiences	-.05	.16	.19	-.09	.16	.27+	-.43**	.47**	

Note. $N = 47$ individuals.
+$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

increases in one domain (e.g., research knowledge) were associated with increases in another domain (e.g., research attitudes). Change over the semester was computed by subtracting students' pre-course assessment from their post-course assessment scores.

Prior to taking the course, students' knowledge of research methods was positively related to the number of skill-based experiences in which they had engaged and marginally related to their attitudes toward research, $r = .44$ and $.25$, respectively. The attitudes

research knowledge test at the post-course assessment ($r = -.02$), indicating that students who already held more positive attitudes toward research did not achieve higher knowledge scores at the semester's end. Indeed, those students who scored lower on the research attitudes scale at the beginning of the course made marginally more gains in knowledge over the course of the semester ($r = -.26$), perhaps because, prior to the course, they had been completely unfamiliar with both the goals or the process of research. Additionally, students' knowledge of research prior to taking the course was not related to either their research attitudes at the end of the course or to the changes in these attitudes over the course of the semester. In other words, students who knew more about research at the beginning of the course had marginally more positive attitudes at the beginning of the course, but these pre-course differences among students disappeared by the end of the course.

The overall number of students' skill-based experiences was associated with research-based knowledge both at the beginning of the semester and at the end of the semester, $r = .44$ and $.55$, respectively. Increases in the number of professional, skill-based experiences was marginally related to an increase in attitudes toward research, but these changes in professional experiences were unrelated to changes in knowledge of research. By the end of the course, students' attitudes toward research were positively related to their overall number of skill-based experiences, $r = .44$.

Discussion

The current research examined whether this curriculum which involved a great deal of student choice along with two research activities mirroring those that occur for professional researchers promoted knowledge, improved attitudes toward research and provided a forum for students to gain important experiences. Findings from the current study suggest that this combination of a campus-life group research project and individual proposal development is associated with increases in students' knowledge of research methodology, positive attitudes toward research, and the number of professional experiences gained during college. This combination may significantly enhance their expertise in the field relatively early in their academic careers, thus better preparing them for subsequent courses (Freng et al., 2011). The current study also elucidated the ways in which student characteristics are interrelated both before and after taking a research methods course.

These results indicate that learning research methods by engaging in research activities is associated

with increased positive perceptions of research, but the current findings extend previous research by examining students' responses to a curriculum in which a broad range of student choice has been introduced. These findings are consistent with those that have found that this active learning approach in research and quantitative methodology is associated with positive attitudes among students (Harlow, Burkholder, Morrow, 2002; Marek et al., 2004). An examination of the pre-course student characteristics and their correlations with post-course student characteristics suggests that this kind of approach to teaching is effective for a broad range of students. We examined whether students who came into the course with more positive attitudes toward research finished the course with more knowledge of research, but this was not the case. Pre-course attitudes toward research were unrelated to the post-course level of research knowledge. This suggests that an active learning approach, in which students are afforded a range of opportunities to pursue research topics that are personally meaningful, is an effective pedagogical approach, even when students enter the course with relatively less positive attitudes toward the process of research. When learning new information, learners are better able to recall it later when it has been encoded using some kind of reference to the self, perhaps because it allows for richer elaboration of the new material or perhaps because it aids in the organization of the new material, or perhaps because of some combination of the two (Klein, 2012).

These results converge with Ciarocco et al. (2013), who demonstrated more positive attitudes towards research associated with active-learning pedagogical strategies; however, their findings are in contrast to other research conducted by Sizemore and Lewandowski (2009) who found that learning more about research methodology reduced student's positive attitudes toward the process. These authors suggested that this reduction may have arisen because, after taking a research course, students may have experienced a disconnection between their enhanced understanding of methodology and their ability to directly apply these skills to their personal or professional goals. The current study, however, reveals that a boost in attitudes toward research is also attainable with activities that are personally relevant to the student. In this sense, the current study extends findings beyond previous research discussed earlier and suggests these gains are possible under conditions which provide extensive opportunities for student autonomy within the context of concrete learning experiences. Consistent with the theory of levels of processing (Craik & Tulving, 1975), this type of learning should foster long-term retention of the material. Follow-up research should focus on the possible future

benefits of these different types of strategies. The choice-driven curriculum described in the current study may offer a way to help facilitate student's connection between understanding research methodology and their personal goals, and thus may also be responsible for students' maintained and enhanced attitudes toward the benefits and usefulness of research.

As part of this project, students work together to write a report of their findings, which can be submitted to the appropriate administrators or department. As a group, students interpret their findings and strategize about the best way to present them. This final stage of the proposed project provides an opportunity for students to appreciate the power of the social sciences and the implementation of good critical thinking skills. After completing this project, students are also in a better position to evaluate the findings of the studies they encounter in peer-reviewed articles. It is this kind of understanding which will allow them to translate specific concepts to a range of situations in their future work as students and in their professional lives.

Just as Singleton (2007) observed, throughout the semester, the Study of Student Life provides a foundation for a concrete discussion of the costs, benefits, opportunities, and struggles with data collection. For example, when students work together to develop a survey that will be distributed to their fellow students, they confront the challenges associated with construct development and the operational definition of a specific, delineated idea. When we discuss what "campus involvement" entails, students begin to comprehend that this is a multi-dimensional idea, which requires clear, sharp language to assess reliably.

Students also gain an awareness of the underlying reasons some methodologies are chosen by researchers and described in the literature. Because students are allowed to choose which kind of sampling method they use to gather quantitative data, we discuss the benefits and detriments of using a convenience sample versus a random sample. Faced with obtaining a sampling frame from the registrar's office and being required to obtain 10 participants from either people they know on campus or strangers that they must contact, students understand why much research relies on a convenience rather than a representative sample. They also understand that they have limited the impact the survey can have on the policies of the school. If they cannot assert that the findings are representative of the campus as a whole, they come to realize that administrators are less likely to rely on their findings to shape campus practices. Another benefit of this approach to teaching methods is student-led discussion of the implications of their findings. Typically, students assume that the majority of other students will agree with their opinions regarding campus life, but both the quantitative and qualitative data often indicate that, generally, other members of the student community hold more moderate views than was hypothesized. Moreover, they appreciate the powerful combination of qualitative and quantitative research in understanding the complexity of a phenomenon. This provides an important lesson for students regarding the value of systematic research in contrast to personal assumptions and conjecture.

In addition to allowing students to build their understanding of research methodology while improving their attitudes toward research, this curriculum was associated with an increase in professional, skill-based experiences across several domains, including communication, information gathering, and working effectively with groups. This approach to teaching methods is consistent with other research that suggests successful undergraduate programs allow students to engage in experiential learning and also connect their understanding of curriculum-based principles to the solution of "personal, social, and organizational problems" (Stoloff et al., 2012, p. 91). Experience-based opportunities, which allow students to become proficient, may be particularly valuable as they leave their undergraduate institutional lives and enter the field as professionals or graduate students. Some have argued that a skills-based curriculum vita can be particularly advantageous to students as they pursue their post-collegiate careers (Kruger & Zechmeister, 2001; Stoloff et al., 2012). This kind of assessment can provide benefits to individual students, but it can also provide benefits to all members of the department. For example, this evaluation of students' professional development can promote an understanding of departmental strengths as well as identify areas that should be expanded to provide a richer student experience throughout their academic trajectories (Stoloff et al., 2012).

While the group study on campus life clearly has benefits for the class and the individuals as a whole, the research proposal really allows students to entertain their personal intellectual curiosities about research. Because students are encouraged to and supported in the process of choosing a topic consistent with their professional goals, they often become more involved with the process of writing a research proposal. During several course sessions, they are given an opportunity to explain their proposal goals and potential methods to others in the course, and these opportunities also provide students with a forum in which they can engage in activities in a way that is consistent with those more advanced in the profession.

Limitations

Certainly there are important limitations to the current study. Perhaps most significant is the lack of a control group to which student growth in these arenas might be reasonably compared. Given the needs of the

students, it was not possible to find another research methodology course engaged in a contrasting curriculum to which changes in students' knowledge, attitudes and experiences could be compared prior and subsequent to the course. Other limitations relate to the interpretation of these findings. While the degree of student choice is theoretically related to an increase in the positive attitudes students had toward the process of research (Ryan & Deci, 2000), we have not empirically identified these meditational variables. Future research should incorporate assessments of student's changes in their levels of intrinsic motivation for understanding research methodology as a function of taking this kind of course (Jang, 2008). Moreover, findings from the current study make it impossible to disentangle effects associated with the group study of student life activities from those involved with the individual assignments associated with the development of a grant proposal. Finally, the test of knowledge gains that we incorporated into the present study included four statistics-related concepts, a topic which was not specifically targeted within the course, but mentioned only in connection with other content. In fact, students may dread their statistical methodology course even more than the other research methodology courses they take (Onwuegbuzie & Wilson, 2003). Future studies of research methodology courses, *per se*, should include measures that separate these two subject matters to test knowledge gains.

Conclusion

Despite these limitations, findings from the current study lend support to the growing body of literature which suggests that students learn best when they actively engaged in the process (Stoloff et al., 2012) and are most intrinsically motivated when they feel they have autonomy over their learning (Jang, 2008; Ryan & Deci, 2000; Vansteenkiste et al., 2004). By teaching research methods in this way, students engage in many of the same processes that researchers do as they collect and analyze data. The practical challenges researchers confront through the research process or through working out the details of proposing a new one often precipitate a greater understanding of not only the topic they are studying but also of research design more generally. To build an abstract understanding of the necessary concepts, students must also have an opportunity to engage directly in the research process. Students who take part in this direct practice have an opportunity to translate information learned in the classroom into a more personal and deeper knowledge base that they can carry forward into other courses as well as their professional lives after college.

Findings from the current study may extend beyond research methods courses, however. We hope that the motivating force behind these results is grounded in collaborative learning and student choice. Therefore, professors teaching a range of courses across many disciplines can provide some range of choice in their assignments and class interactions to enhance students' sense of autonomy in their learning. To further develop students' connections to course content, professors might provide assignments that prompt students to reflect on ways in which the material covered in the course is related to the other academic pursuits or challenges they face in their personal lives. Other projects might ask students to make explicit connections between the content of the course and their future professional lives. Finally, whenever possible, professors may provide their students with authentic tasks that help them to make concrete connections between the material of the course and the ways in which these concepts are enacted in the world. To summarize, the results of the current research can be generalized across several disciplines as long as assignments involve a level of student choice and collaborative learning (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010).

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Appendix
Sample Outline for Study of Student Life Group Descriptions

Student Life Study: Description of Group Papers and Presentations
(Handout to students)

Student Life Study Presentation & Paper: The Student Life Study will be conducted by the class as a whole throughout the semester. Findings from the study will be presented by the class to the appropriate members of the faculty, student, staff, and/or administration. Through this unit, students will develop a well-designed quantitative survey and qualitative study of some aspect of student life. The class will choose a topic to investigate together. Students will work together to develop the research questions, the hypotheses, the survey, evaluate the merits of the survey, make appropriate revisions, administer the survey to a sample, and present findings. In addition, each member of the class will make naturalistic observations and the analysis of those will take place as a class. There will be 5 group projects associated with this unit. Please choose one aspect of this and work together with other students to write the appropriate materials. Each group will then present its part of the study to the other members of the class and receive feedback. Please take this feedback and make the necessary revisions before turning in the final, written product (sometime the next week). Each group will be graded on the content and clarity of the presentation, the incorporation of comments by peers in the class, and the content of its written work.

Institutional Review Board (IRB) application, Consent Form, & Introduction: Members of the IRB application, consent form, and Intro group will be responsible for completing the IRB application and submitting it to the IRB Committee. In addition, the two members of this group will design appropriate consent forms which will be used as part of the Survey. Finally, this group will write the overall introduction for the study. This introduction will include an abstract and two double-spaced written pages detailing the research questions and the methods used for the investigation (both the survey and the naturalistic observations). The paper and presentation for this group will include two consent forms (one for the quantitative study and one for the qualitative study), the completed IRB form, and the introduction (an outline should be presented before the actual written text). The paper should follow APA formatting guidelines.

Survey Questionnaire Design: The members of the Survey Design Group will use Survey Monkey or Google Forms to construct the questionnaire administered to members of the Student community. Based on the research questions, hypotheses, and questionnaire items developed by the class as a whole, the members of this group will develop a questionnaire that will include a set of directions to participants. The presentation for this group will largely consist of the formatted questionnaire. A second presentation will be shorter and incorporate all feedback from the class. Members of this group will also write the Method section of the final report that should be two written pages of text (and should follow APA guidelines). The methods section will include details about the questions and procedures for the study.

Qualitative Write-Up: The members of the Qualitative Group will be responsible for analyzing and presenting the qualitative portion of the Study of Student Life. Data from this study will include the naturalistic observations conducted by the entire class. In addition, the members of this group will perform eight intensive interviews with participants (each member of the group will conduct two of these interviews). Members of this group should work together to write a four-page double-spaced paper that includes their interpretation of the data supported by quotes from participants and quotes from the field notes generated by the naturalistic observations. In addition, the members of this group should include three conclusions based on their interpretations of the data. The presentation to the class should include data (holding the participants' personal information confidential) and an analysis of the data. In this case the data will include the quotes from participants' interviews and field observations.

Quantitative Write-Up: Members of the Quantitative group will be responsible for presenting the data gathered though the online survey. The quantitative paper should be four to five double spaced pages long and include a participants section with a complete description of the demographic characteristics of the sample. In addition, this paper should include the interpretations of the quantitative results. Based on the research questions, the hypotheses of the study and through class discussions, a series of analyses will be generated (the professor will perform the statistical analysis and provide the group with the overall results). This section should also include 1 to 3 tables

and/or figures portraying the findings. The presentation of the quantitative findings should include an outline, the sample section, the results sections, and the figures and tables for the study.

Integration of Final Report: Members of the Integration Group will work together to compile all of the materials generated by the other four groups of students. As part of their work, the two members of this group will write a two-page discussion section that presents the final conclusions of the investigation. In addition, members of this group will integrate the introduction, methods, quantitative, and qualitative reports. The presentation for this group will include an outline of the overall report.