

Assessing Theory-Driven Research Studies in Dental Education

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Abstract: Ensuring that studies contribute to refining theory for practice and informing future investigations is an important research outcome. Cook, Brodage and Schmidt's work asserted that this validation occurs by reviewing researchers' alignment of research elements and their methodological decisions. Guided by their work, the authors analyzed researchers' explanations of how they connected the study's purpose to theory, theory to research questions, research questions to methods, and methods to results in the *Journal of Dental Education's* educational research publications from 2001 to 2014. 1230 research studies were reviewed. Using both manual and electronic keyword searches, they identified studies that mentioned theory (or form of the word, such as theoretical or theorize) as one of the criteria for continued analysis. 84 (6.8%) publications were identified. Of these studies, 10 (0.8%) demonstrated alignment between theory and other research elements. 33 (2.7%) studies almost demonstrated alignment among the research elements, but did not meet inclusion criteria because the research questions were not stated in those studies. The authors identify and explain the junctures where a linkage or alignment in the research elements did or did not occur. Suggestions for prospective authors and recommendations for the journal editors who aim to improve the quality of educational research publications are provided.

Keywords: Educational Preparation, Epistemological Beliefs, Faculty Development, Manuscript Writing, Research Methods, Theory

I. Introduction

Researchers' fundamental beliefs -- values, hunches and assumptions -- and reasons for engaging in a study constitute a belief set about what and how phenomena can be studied.¹ Typically, researchers approach studies with either a tentative or explicit use of theory. Thus, their inquiries are often grounded by philosophical propositions that help them decide what kinds of knowledge are possible. To engage in theory-grounded studies, researchers must be acutely aware of how their work can further existing knowledge claims or provide new knowledge. This process legitimizes not only generated knowledge, but also the route taken to explore the boundaries between what is already known and how it is being newly understood. Yet, how knowledge can be known, the means through which it can be observed or described, and then validated, rests with one's own epistemology concerning what knowledge is possible, and how it can be known. For instance, individuals who have ascribed to the objectivist/positivist framework (either personally or for the purpose of inquiry) typically conduct empirical/quantitative research.² Conversely, individuals who strive to draw meaning by observing or describing others' learning experiences or interactions (either through personal positioning or for the purposes of research) will typically publish qualitative research grounded in constructivism or subjectivism.³ While scholars agree that a researcher's epistemology will guide decisions about the appropriate use of theoretical perspectives, methodologies and overall research designs, practitioners and researchers differ on whether researchers' theoretical bases must be explicitly given for works to be useful. It is important to note that neglecting to divulge the theoretical underpinnings of research inquiries does not disqualify the researchers' assumptions and interpretive frames from the study they undertook.⁴ When researchers provide an overview of the theory that frames their study, readers are calibrated into what inferences can be made about what epistemology has informed a particular study, whether or not the elements of their research process are aligned or interconnected, and/or whether the findings extend what is already known in ways that are valid and/or trustworthy. Drawing attention to the drivers that guide research inquiry such as empiricism or constructivism can guide the type of studies that are conducted. Even when researchers do not explicitly state or reference theory in their studies, their epistemology and theoretical hunches play an important role in the development of research questions, the selection and application of methods used, and the interpretation of the study's findings. The authors propose that in research, unlike evaluation, the type, role, or absence of theory needs to be

discussed and that researchers must explain how these perspectives influence their work. In quantitative research, investigators may use theory to predict outcomes, select variables or provide an explanation.⁵ In qualitative research, theory may provide a lens or a broad explanation that raises questions about the results in relationship to the participants' demography or maybe the endpoint of the study.⁶ Research questions, study purposes, hypotheses, methods, and results should be consistent with the study's paradigmatic and epistemological assumptions.⁷

According to Kezar (2006), researchers are expected to explicitly reflect upon their choice of research purpose, theory, methodology, and design, and then provide evidence that the development of their research process is justified.⁷ This process may look different for each researcher, because the definition and interpretation of theory is so diverse.⁶ Further confounding the process of theory application is the role that personal epistemology can play in redefining possible uses of one theory. Because of this, it is imperative that researchers describe their epistemology and how it is reflected in their research design. In this way, the researcher can better substantiate knowledge claims and orient the reader to the positioning of those claims in the larger research landscape. The interconnectedness between research questions, study purpose, theory, and methods is essential to implementing and interpreting study results. Ensuring the meaningful coherence between epistemology, theory, methodology and methods, research questions must be grounded in researchers' understandings of the type of research that they are conducting, as well as their knowledge about existing approaches. Constructing a research study is grounded in a researcher's theoretical awareness, background, and tactical knowledge and may vary depending on the type of research and inquiries that a scholar chooses to pursue.⁸

This study explored evidence for using epistemologies and methodologies in studies published in the *Journal of Dental Education* from 2001 to 2014. This study, descriptive in nature, first provides an overview of the research elements of studies that are grounded by theory. Using the information given by the researchers of the works reviewed, this study's authors then applied Cook, Brodage and Schmidt's framework to determine whether the research elements of those studies were conceptually/theoretically consistent given the authors' stated purpose, methods employed, and overall research design.¹ Cook, Brodage and Schmidt's framework for establishing methodological rigor was provided in the standards for reporting empirical social science research by the American Educational Research Association.^{1,9}

II. Methods

First, publications from thirteen volumes of the *Journal of Dental Education* were split evenly between the second, third and fourth researchers. To locate articles that used theory, each researcher conducted a manual and independent review of each journal issue, searching for articles that mentioned the use of theory in their abstract and/or in the body of their work. In this stage, articles that used some form of the word theory or a phrase that implied its usage (e.g., theoretical, theorize, theorizing, perspective, framework, conceptual) were included in the study. After each issue was reviewed completely within their respective volumes, the second and third authors met to discuss their individual decision-making processes around the agreed-upon protocol and their own notes taken while reading through the articles. The goal was to refine the process of consensus and to reach agreement as to what studies exhibited evidence of the word theory in their research design. Two overall questions were used to guide this stage of inquiry 1. Did the author(s) mention a specific theory? 2. Did the author(s) describe the theory? After reaching consensus, the authors then presented their decisions to the first author for discussion.

Once the first three authors reached consensus, the second and third authors categorized the articles based on their research paradigm: conceptual, qualitative, and quantitative. The articles were then organized into an Excel spreadsheet. Following this, the second and third authors applied the Cook, Brodage and Schmidt's framework developed from the standards for reporting empirical social science research in the American Educational Research Association.^{1,9} Because this framework was specific to empirical research, conceptual studies were not included in the final sample for analysis. To ensure the accuracy of the results of the first search and to verify that all relevant studies were included, the second and fourth authors conducted a second search through the online archive of studies from 2001 to 2014 on the JDE website, using the word "theory" as the search term. This returned all studies with the word "theory" in any part of the study. 314 empirical studies were retained. After both searches were completed, 84 research studies remained, including 65 quantitative, 10 qualitative, and 9 mixed method studies.¹⁰⁻⁹³

The next analysis stage of inquiry was guided by two overarching questions: 1. Did the author(s) extend their use of the theory to the study's interpretation of its findings? 2. Could the author(s) use of theory be identified in their research design? To answer this, the authors reviewed statements of the study purpose, research questions, methodologies, and results while searching for an extension of their stated theory. For each component, the reviewers looked to see if the research elements were either explicitly linked to the stated theory or were heavily implied in the authors' internal chain of reasoning. If no explicit or implicit links were given, the nature of the error in logic based on the framework provided by Kezar and the work of Cook, Brodage and

Schmidt was described.^{1,7} Using an Excel table, the authors then documented the presence or omission of the interconnectedness among research elements within traditional modes of inquiries, citing the specific error in logic either through paradigmatic oversights or missteps in the application of the theory based on the specific information provided about the theory in the manuscript. The rubric showed in **Table 1** guided the authors' analysis of the research studies.

Table 1: Questions used for Analyzing Presence of Research Elements

1. Did the purpose statement align with the theory?
2. Were the theory and research question(s) connected?
3. Did the method align with the theory?
4. Did the research question(s) align with the methods?
5. Was the type of data appropriate, given the methods described?
6. Were the methodological details sufficiently described?
7. Did the purpose and research questions align with the methods and the theory?
8. Did the theory, research question(s), methods, and methodological details connect coherently?

III. Results

Of the 1230 publications reviewed theories were referenced in 84, 6.8% of the studies; 65 quantitative, 10 qualitative, and 9 mixed methods. Among all of the studies, only 10 (0.8%) demonstrated alignment (or linkage) among the research elements.¹⁰⁻¹⁹ 33 (2.7%) studies almost met the criteria for alignment, but were omitted because research questions were not stated.²⁰⁻⁵² 41 (3.3%) studies did not meet criteria for alignment due to other issues, like lacking clear explanation of how theory supported the research.⁵³⁻⁹³ In this section, the authors first explain the junctures in which alignment did and did not occur in the selected qualitative and quantitative studies. A complete description of the study in which the research elements were aligned is included. Then, full descriptions of selected studies representative of the common issues encountered in the analysis are described. Also, for the purpose of comparison selected representative articles in which theory was not described are presented.

3.1 Findings from Qualitative Studies that Met Criteria for Inclusion

Example 1.¹⁰ Reis, Rodriguez, Macaulay, and Bedos present a qualitative case study to explore dental students' perceptions and attitudes about poverty. This study is driven by Freire's theoretical concept of conscientização, a Portuguese word that, "refers to both critical consciousness and personal engagement with knowledge" (p.1605) and its application.¹⁰ Freire's theory states education is important to conscientização because it implies that critical consciousness relates to students' social reality. One of the theoretical tenets is that critical consciousness and knowledge can be instrumental in fostering their awareness of social justice. This theory guides all components of the study, including the statement of purpose, as well as statement of both of the two research questions, "1) to what extent did the students feel their education in dentistry has prepared them to take on the challenge of working with patients living in poverty? 2) how did these perceptions shape the students' plans for their professional careers?" (p.1605).¹⁰ To answer the research questions, an interpretive single case study is conducted with participatory approach. Qualitative data is collected among 35 participants, including interview, on-site participant observation, and document analysis, which are appropriate to the research purpose and research questions. Research methodological procedures are guided by conscientização theory, and described in detail. This qualitative study successfully meets all of the specified criteria.

3.2 Qualitative Study Findings that Did Not Meet Criteria for Inclusion

Example 2.⁵³ Hanson and Alexander's study explores the level of reflection that took place when students use two different types of media for reflective journaling: hardcopy versus electronic. The investigation is grounded in the Transformative Leadership Theory, which posits that reflection is a process whereby the learner undergoes cognitive and emotional change through negotiations of conflicts between prior knowledge and new information.²⁰ The three phases of the process includes critical reflection on assumptions, validating discourse, and action. In this study, the theory, the study's purpose, and the research question are aligned. Two relevant observations, one pertaining to methodological details and the other pertaining to the data sources, are identified. Regarding the methodology, the authors do not provide sufficient detail. Thus, it is difficult, if not impossible, to determine how reflective papers are rated and how category designation differs in deciding for example, what makes a response fit into the "understanding" framework. Thus, transparency of the research process is not ensured.

Pertaining to the data sources, electronic versus hard copy of student journals, the authors does not mention or describe the inherent limitations of one versus multiple readers. The reader is led to assume that only one individual -- the instructor -- read a hard copy of a student's journal at one point in time. However, it is unknown if the electronic journal is read only by the instructor or by the students as well. In that case, several interactions could have occurred at multiple time points between the instructor and the student and/or among

students if they had access to one another's works. The different use of media has significant implications for outcomes. The latter would likely foster a greater degree of reflection because it would permit many interactions over time. Therefore, the observed increase in reflection might have been a function of how the medium is used rather than which medium is used. Thus, if students or the instructor respond to students' electronic journals with prompts or questions, then this medium was more likely than not to promote deeper levels of conversation. In addition, because the student sample is raised in an era in which technology has been readily available, perhaps they had a modicum of comfort with digitized medium (the study's authors make this suggestion). Thus, it is not surprising that the electronic medium is reported to foster greater reflection in comparison to hard copies. Since there is no control group, it cannot be known whether several participants met together to share and discuss their hard copy journals and whether or no this might have achieved a similar outcome.

Example 3.⁵⁴ Hoelscher and Comer present an illustrative case study regarding conflict recognition and resolution within schools of dentistry. They examine several faculty interactions through the lens of "management theories", specifically mentioning, describing, and applying expectancy theory. However, because the statement of the study purpose is presented as an outline, it is difficult to determine whether any particular theory aligns with the authors' intended purposes. Also, because no research question is given, it is difficult to situate the case study within any particular line of inquiry. Expectancy theory is not used as the basis for the study; it only becomes important when addressing a specific portion of the case findings.

Example 4.⁵⁵ In a qualitative study conducted by Lopez and Blue, the authors aim to examine the first-year dental students' experiences and impressions of the inaugural class of dental therapy. The authors use grounded theory to support the research method design. As grounded theory suggests, using multiple data collection stages and considering the interrelationship of information categories, could increase the similarities and differences of information from the data. In this study, authors use focus groups and open-ended interviews with pre and post design. However, grounded theory does not directly align with the study's statement of purpose. Five research questions, all focused on students' perceptions do not directly align with the theory, either. In contrast, the methodological details are sufficiently described, and align with the grounded theory. Overall, this study meets some of the criteria, but fails to meet all of the criteria.

3.3 Quantitative Study Findings that Met Criteria for Inclusion

Example 5.¹¹ In the quantitative study conducted by Honny et al., the authors attempt to determine the prevalence of academic integrity violations among a nationally representative sample of dental hygiene students and compare it to that of general undergraduate students. Their study is grounded by the social learning theory – which states that observing someone else's activity and evaluating the rewards and benefits they receive could cause one to learn the behavior. The theory is used as a means of analyzing academic integrity violations. Social learning theory is the primary basis for the study as well as one of several proposed explanations for academic dishonesty. The theory is addressed in only one of seven research questions, which includes the following: "1. What is the influence of honor codes on reported academic integrity violations in dental hygiene educational programs? 2. Does educational setting affect the incidence of reported academic violations? 3. Do dental hygiene students have a lower incidence of reported violations compared to other undergraduate students? 4. In the population of dental hygiene students, is gender a factor in the incidence of violations? 5. Are academic violations independent of the age of the student? 6. Are academic violations independent of contextual factors? 7. Does the social learning theory play a part in academic integrity violations?" (p.252-253).¹¹ In this study the methods are aligned with the research questions, and the authors address social learning theory in each component of the study.

Example 6.¹² You and Bebeau conduct quantitative study to examine whether there is gender difference among dental students in moral functioning capacities. This study is based on Rest's Four-Component Model of Morality (FCM), which specifies four independent components of ethical abilities: moral sensitivity, moral reasoning, moral motivation, and moral implementation. Rest's theory is the basis of this study. The statement of purpose is linked to this theory. Also, the four-part research questions, "Is there gender difference on students' moral sensitivity scores/ moral reasoning scores/ moral motivation scores/ moral implementation scores?" (p. 1137)² are aligned with the theory.¹² Students' test scores, and the measurements are collected after dental ethics curriculum. Data analysis includes independent samples *t*-tests, ANOVAs, and the Mann-Whitney U test, which are appropriate to answer the research questions. In addition, the methodological details of this study are sufficiently described, thus meeting the criteria.

3.4 Quantitative Study Findings that did not Meet Criteria for Inclusion

Example 7.⁵⁶ In Jessee et al.'s quantitative study, the authors identify the most common personality types among selected classes of undergraduate dental students using the Myers-Briggs Type Indicator

(MBTI); assert that the MTBI types are related to learning preferences; and state that these findings can help determine a more effective approach to teaching clinical dentistry.⁹⁴ Perry's stages of intellectual development forms the basis for this study.⁹⁵ Perry proposes three levels: dualism, multiplicity, and contextual relativism. Based on the Carl Jung's theory of psychological types⁹⁶ and the MBTI measures, personality preferences are defined by four dichotomous pairs of mental functions or attitudes: (S) sensing or (N) intuition; (T) thinking or (F) feeling; (E) extraversion or (I) introversion; Judging (J) or (P) perceiving. The research question is not stated.

The theoretical perspective is not connected to the methodological details. The researchers assert that there is an association between MBTI types and learning styles but they do not provide a clearly stated rationale to support that such a linkage exists. Also, the authors provide no evidence to support the assumption that knowing students' MTBI types and learning styles has implications for increasing teaching effectiveness. The study lacks a balanced discussion of learning styles including research that refutes its validity. For example, despite the educational research community's assertion that differences in individual outcomes are attributable, in part, to learning styles, evidence contradicts this belief. According to Coffield, Mosley, Hall, and Ecclestone (2004) modifying teaching approaches to coincide with students' varied learning styles does not result in improved outcomes.⁹⁷ Neuroscientists suggest that the promulgation of learning styles is an educational neuromythology.⁹⁷

Example 8.⁵⁷ In Mariño et al.'s quantitative study, the authors attempt to investigate the value orientations of students from two different ethnic backgrounds. The study is grounded in Kluckhohn's and Strodtbeck's (1961) value orientation theory, which proposes that when comparing the profiles of two cultures, it is important to delineate five human problems and investigate the corresponding ranking pattern in each culture.⁹⁸ The theory and purpose of the study are connected; however, the authors do not state an explicit research question to guide the inquiry. The methods appear aligned to the central theory, albeit with several important caveats. The authors note that it is difficult to argue for a concept of "Asian culture", yet in their cultural comparison they assign all Asian students to one Asian category without providing a rationale for their decision. This action suggests that this culture is monolithic. However, individuals belonging to a specific cultural group could be very different. In addition, the authors mention factor analysis in their procedures, although they present no information on factor loadings and they state that there are five discrete factors. Also there is no confirmatory factor analysis is presented to support the identification of those discrete factors.

The authors use descriptive data to provide information on within group differences and compare group means to calculate between-group differences. That the conclusion appears to fit the data demonstrates that the methods and data type are aligned. In the discussion, the authors assert that it would be incorrect to attribute any differences to race or ethnicity, and that any negative effects on student educational experience may be due to cultural differences students even if they have similar value structures. The authors of this paper suggest that it may be equally important to assess value orientations of the faculty to determine the potential of unspoken biases towards culturally diverse groups within their institutions.

Example 9.⁵⁸ In Baghdady et al.'s quantitative study, the authors aim to examine the difference of the teaching outcomes on dental students' diagnostic accuracy between two teaching methods: segregating basic sciences, or integrating basic science with clinical features. Results show that teaching based on the integrated basic science with clinical features leads to significantly higher students' diagnostic accuracy outcomes than the segregated method. The results are supported by conceptual coherence theory, which suggests that the cognitive role of teaching basic science alongside with explaining features increases dental students' diagnostic accuracy. However, conceptual coherence theory only serves to support the results; it does not align with the statement of purpose. In addition, this study does not clearly state the research question. Though there is an implied research question, it does not directly align with the conceptual coherence theory, either. Quantitative scores are collected as data, and a 2x2 repeated measures ANOVA is used to analyze the data. Although the research design and data collection/analysis procedure are appropriate with the purpose of the study and described with sufficient detail, they do not align with the theory. So this study fails to meet the criteria.

Example 10.⁵⁹ In Itaya, Chambers, and King's quantitative study, the authors seek to determine the extent to which admissions criteria and cultural norms predict the success of foreign-trained dentists in US dental educational programs. Hofstede's cultural dimensions, distance, individualism, long-term view, masculinity and uncertainty avoidance are used to ground the study.⁹⁹ The authors connect the cultural norm predictor to Hofstede's theory. They pose the following research question: Do admissions criteria or cultural norms correlate to the separate or combined GPAs in the two years of the International Dental Studies (IDS) program? The purpose statement and theory are aligned; however, the theory and research questions are not aligned for two reasons. The survey data used to create Hofstede's theory are outdated. The participants in Hofstede's study are not reflective of the target population in this study. Specifically, Hofstede's data is 30 years old, and includes IBM employees as the study participants for fourth dimension and undergraduate students for

the fifth. In contrast, Itaya, Chambers, and King's study's population consists of international dental students, so misalignment is likely. The authors do not address this issue.

The research question and methods appear misaligned because the authors use correlation and regression analysis to find relationships between the variables of interest. However, they assign cultural norm ratings based on notion of education and not cultural heritage. This put forth the flawed assumption that an individual's country of education is an indicator of his/her own cultural norms, an issue the authors acknowledge in their limitations. Some of the methodological details are sufficiently described in the results section. Missing from the study are explanations of why the authors make particular methodological decisions such as, why they choose predictors and outcomes, and how they decide when to conduct each analysis.

Example 11.⁶⁰In Chamberlain, Catano, and Cunningham's quantitative study, the authors base their study of the Student Professionalism Scale on Holland's Realistic, Investigative, Artistic, Social, Enterprising and Conventional (RIASEC) model and Big Five personality types.¹⁰⁰ The authors' purposes include the following: 1. To examine the use of personality measures to predict the success of dental students in clinical and academic courses and compare their personality profiles to those of dental practitioners and 2. To develop a scale for assessing competencies deemed necessary for professional success. There are no stated research questions. The study's purpose links to the theories described, but the creation of the professional competencies instrument does not. It seems the authors are performing two separate studies, related tangentially through the idea of success; however, it appears that the intended purposes do not combine to form a cohesive whole. Questions regarding the creation and use of an instrument within the same study remain unanswered.

In total, 33 studies did not list research questions.²⁰⁻⁵² Except for this limitation these studies, nearly demonstrated alignment. When the research questions are not stated, it is nearly impossible to demonstrate alignment of research elements. 29 studies did not demonstrate a clear explanation of how theory guided the overall research process.^{55, 56, 58, 61-86} In some studies the theoretical perspective and research questions were not explicitly connected.^{56, 62} In others, the theory was not applicable to the study's purpose,^{61, 64} while in some studies the theoretical perspective was not connected to the methodological details.⁶³ For example, in Jessee et al.'s study,⁵⁶ the authors suggested a link between MBTI type⁹⁴ and learning style without indicating any reason for the specific associations. In another study⁶¹ the authors associated variables without justification and the applicability of the stated theory to the population of interest is dubious. In several studies, the methods were: (1) not described, (2) not clearly explained, (3) did not fit the research question, or (4) did not align with the theory.^{59-61, 87-91} Other problems associated with the methods included research results that were not clearly described;^{92, 93} and studies in which the research purpose was not clearly explained.⁶²

IV. Discussion

This study analyzed the interconnectedness among research elements in *Journal of Dental Education* publications between 2001 and 2014. 10 studies were found to have demonstrated an alignment between theory and other descriptive of research elements. For 33 studies, the only shortcoming was not stating the research questions. Thus these studies almost showed evidence of interconnectedness among the research elements, while the remaining 41 studies did not.

Research asserts that dental clinicians often omit theoretical considerations from their research due to a common misconception that 'interacting with reality' renders theory unnecessary.¹⁰¹ Such stances aren't compatible with the general standards of rigor required in quantitative or qualitative methodology. Also, this position undermines the importance of the lenses through which researchers consider reality and its impact on interpretations.¹⁰² Careful attention to these perspectives and to the assumptions and practices they produce, are instrumental in the promotion and dissemination of 'good science'.¹⁰³ As Ball (2012) observes: "Critique of one's ideologies, methodologies, and assumptions... can result in a move toward knowledge integration, translation..." (p. 289)¹⁰³ as well as the generation or verification of theory that guides practice and research.¹⁰⁴

When researchers overlook explicit assertions about their own assumptions relative to the theoretical foundations of research inquiries, this can enfeeble the credibility of those studies, and invite both erroneous scrutiny and misjudgment from readers. It can diminish the researcher's ability to ensure that the standards of rigor associated with their epistemology have been met. Additionally, even when unspecified, tacit assumptions will guide research methods.¹ To this end, foregoing a theoretical framework for one's research raises the question: What is the value of atheoretical research to knowledge building and practice? Although research may produce data or discrete information that adds to the knowledge base of a particular discipline, a lack of clarity with regard to theoretical bases has the potential to obscure accurate interpretations of findings and its larger applications among practitioners.¹⁰⁵ The weaknesses that these authors have pointed out may have occurred because researchers in the identified publications need more knowledge, training, and /or experience regarding how to demonstrate empirical rigor in the manuscript product, beyond reliability, validity and trustworthiness. The issues discussed are probably not just occurring in academic dental publications, but are most likely

common in any discipline wherein social science methodologies are employed to appraise learning outcomes/experiences.

In terms of the methodology employed in this present study, the task of finding studies with a description of theory warrants further clarification. Although the authors in this study calibrated the search technique, employing both an electronic and manual keyword search of studies using the word theory, the researchers found that merely mentioning the word theory in the text does not ensure that the study has utilized a theoretical framework in ways that demonstrate alignment with other research elements. There were many studies that mentioned theory in their titles and abstracts, but not within in the body of their work. Thus, the use of theory needs to be supported by alignment with the research elements.

Another factor to consider is that the term theory has been defined in many ways. Descriptions of theory range from articulating a proposition, to testing a hunch, stating a hypothesis, presenting a model, describing interrelated set of propositions, or testing empirically related concepts.¹⁰⁶ Thomas' claim that theory is rarely defined in educational research further nuance this task. Some researchers contest that scientific traditions are the only basis for theory.⁶ Alternative explanations of theory have been proposed suggesting that that theory can emerge from interpretivist, critical and participatory paradigmatic studies, which are grounded by constructivism. The contribution of these latter approaches is thought to be endemic to their intent to: 1. Connect knowledge with practice. 2. Highlight the importance of social construction of reality. 3. Engage in critical analysis. 4. Showcase research findings that stress their implications for subjective and relational stances.⁴ In order to extend what is already known in ways that are valid and/or trustworthy, the use of a theoretical framework is essential in studies that provide numerical or text-based results, and should be explicitly presented to the reader—either as a traditional theory or an integrative conceptual framework.

Faculty development initiatives aimed at helping professors engage in collegial discussions about the conceptualization of their research studies from inception through analysis and interpretation might assist researchers specifically those who need help identifying and applying the conventions of best practices for conducting educational research. Providing faculty with examples of when research elements are aligned and are not aligned in studies could be used as an exercise to help faculty identify the weaknesses in published work. The use of instances when research elements are not aligned could be used to encourage analysis, a discussion of why this occurred and how it could be remedied. Additionally, developing teaching modules focused on the variety of research designs, their purposes, related advantages and disadvantages could also be offered. Journal club reviews of current publications could be used to help faculty recognize characteristics of high quality educational research. Such an endeavor might become instrumental in building faculty knowledge bases about what constitutes the practice of excellence in conducting and writing educational research studies.

Keeping in mind that JDE is the flagship educational research publication for dental education researchers, this study's findings raise the question: Is a theoretical framework required for studies that are published in the journal? If so, how can the journal assist researchers in transparently grounding their work in theory? The findings of this study also suggest that dental educators and future authors may benefit from developing a greater understanding of methodology and approaches to conducting educational research, related standards. Utilizing a template that guides transparency and the explanation of researchers' choices related to selecting theoretical perspectives, research designs, and methodologies might also strengthen the quality of research studies. In **Table 2**, a set of guiding questions that can be used to develop a research study for publication is presented. The benefits of highlighting transparency in conceptualizing the development of a research study and in reporting related findings may ensure that readers and reviewers will not question whether or not studies were performed in vacuity.⁷ Applying the rigorous norms of inquiry will drive the generation of quality products. In its absence, the potential for proliferating inherently inconsistent, and consequently flawed, inferences is likely. Researchers must be explicit about the assumptions they have made in the conceptualization of their studies. Failure to describe the choices that guided the selection of theory, research questions, or methods may result in their work being incomplete or having its impact misjudged.

Table 2: Questions to Guide the Conceptualization of Research Studies

1. What is the purpose of my study?
2. What are the research questions?
3. Do the research questions address the study's purpose?
4. What theoretical framework grounds my study?
5. Are the research questions logically connected to the study's purpose?
6. Are the methods consistent with the type of research questions posed?
7. Are the methods consistent with the theoretical framework?
8. Are the data collection methods appropriate to the method of inquiry? Do they address the research questions?
9. Have I used analytical techniques that are appropriate to the research questions?
10. Are the analytical techniques appropriate to the theory that grounds the study?
For purposes of seeking publication:
11. What journal is suitable for my manuscript?

12. What are the journal's requirements for submission? Does my manuscript adhere to the journal requirements?

V. Conclusion

The overarching purpose of this study was to focus readers' attention on the issues of theory and methodology in the journal's empirical educational research studies and to promulgate awareness about the norms of rigor that are apparent in the last decade of publications.¹⁰⁷ The purpose of this study was not to critique individual authors. A lack of attention to these issues could have occurred due to editorial policies or decisions, reviewers' suggestions, or other unknown preferences. The unit of analysis for this study was solely educational research publications in the journal.

In this study, the authors explored researchers' evidence for the use of epistemologies and methodologies in studies published in the *Journal of Dental Education* (JDE) from 2001 to 2014. The authors conducted a keyword search of "theory" across a decade of JDE publications. 84 studies were identified as having content related to theory. After reading these studies to determine if they were grounded by theory, and whether or not the research elements that were aligned, 10 studies met the exclusion criteria. Utilizing the standards of rigor in selecting the research elements demonstrates how the researchers' epistemology informs their selection of a theoretical perspective. Using these standards as guidance requires that the theoretical perspective are aligned with the study's purpose. Similarly, the research questions should relate to the study's purpose and theory, while the selection of the methods is directly influenced by the research questions and epistemology. The union between the research purpose and methods is known as the *methodological congruence*, a term coined by Morse and Richards.¹⁰⁷ When the methodological details are insufficient or when any of the aforementioned research elements are not sufficiently described, it is difficult to analyze the interconnectedness among design components.¹⁰⁷ Those studies driven by theory might serve as exemplars of excellence and represent what constitutes a creditable research study for other dental educators. Perusing these studies before submitting manuscripts to the journal may be instructive for novice or emerging researchers. Additionally the methodology used in this study might assist other educational research journals in evaluating the creditability and alignment of research elements in their publications.

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