

Engaging Students in Research: The Use of Structured Professional Dialogue

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“Argument seems to me a means of developing rather than merely demonstrating theories, and articulation a means of amassing rather than just disseminating insight.” Clardy.

Graduate education in agricultural economics traditionally emphasizes economic theory, statistical and programming methods, and courses to provide competence in specific fields such as production, price analysis, and international trade. Ladd (1979, 1987) has argued convincingly that the development of effective researchers requires more than these traditional offerings. He suggests that these courses stimulate only the left hemisphere of the brain, the side associated with logical analysis, but do little to exercise the right hemisphere of the brain, the side associated with creativity and imagination.¹ Ladd contends that the development of both components is essential for productive scholarship, and offers numerous suggestions to heighten the role of imagination in research. At the core of his suggestions is the notion that we should strive to develop active problem solvers, and that students must be confronted with problems, and given the opportunity to resolve them creatively.

Our experience is consistent with Ladd’s observation that graduate students spend considerable time and energy in learning the “tools” of the trade, but have little opportunity to imaginatively integrate them to solve problems. More basically, we find that many students are unaware of the components and details of the research process. This situation manifests itself in a variety of ways, including a heightened dependency on professors for creative ideas to define research problems, long delays in the successful completion of dissertation requirements, and difficulty evaluating and discussing research outside of a narrowly defined specialty area.

Consistent with Ladd, we argue that the development of active problem solvers is a fruitful direction to take our students. Effective problem solving defines the essence of research.

As Ladd identifies, students need to be able to identify topics and issues which lead to researchable problems. Also, they must learn to formulate problems by integrating theory and quantitative methods to address relevant research questions. In short, students need experience identifying significant research questions, and finding appropriate research methods to define a plan for answering those questions.

We argue that a non-traditional seminar emphasizing critical reading, writing, and professional dialogue helps graduate students become better researchers. We explain our contention by reporting on a graduate seminar that uses structured professional dialogue to help graduate students integrate knowledge from subject matter courses into independent research proposals. The basic premise of the seminar is that we can stimulate active problem solving by giving students the opportunity to develop and defend their research arguments before graduate students and professors in a socially interactive setting. The seminar has been conducted once a year for six years. With our comments, we hope to encourage discussion on how applied economists can better engage graduate students in research.

The Motivation

The motivation for the seminar was the need to help our doctoral students make timely progress preparing their thesis research proposals. In Spring 1996, a survey of students revealed that slightly less than half of our students were taking two years or more between finishing subject matter prelims and defending their research proposals. Our faculty expected students to complete a defense of research proposals within one year after written preliminary exams. The gap between expectations and performance was disturbing.

A discussion about these delays led to the conclusion that our graduate program lacked instruction and mentoring in using theory, research methods, and empirical observations to construct significant research questions, and research plans for answering those questions. We concluded that most students myopically learn the theory and methods that are taught in their courses, but do not develop the critical and creative thinking skills that enable them to systematically progress in their own research.

Our assessment may not be atypical of the situation that exists in many applied economics graduate programs. Ethridge identifies the segmentation in course material prevalent in graduate economics and applied economics programs, arguing that it is an efficient method of communicating subject-specific information but does little to strengthen the research skills needed by students. An American Economic Association Commission study reports that graduate students in economics were well prepared in the technical tools, but limited in their ability to apply theory to specific situations (Hansen). Among the Commission's recommendations to address the situation was a richer graduate student experience that emphasized the application of economics to "real world" problems, and the development of communication, particularly writing, skills (Ethridge; Krueger et al.).

Professional Dialogue

We agree with the idea that the advancement of knowledge through good research is a social activity involving dialogue among professionals interested in resolving common problems (Booth et al. p. 255). Professional dialogue is a framework that researchers use to communicate research issues and problems, to report and evaluate research findings, and to identify research

directions. For a well-defined problem, researchers are interested in finding solutions and communicating their results. The process involves explaining anomalies or contradictions, or providing decision makers with information that assists them to resolve their problems. The heart of the communication, the argument, focuses on providing an explanation (or claim) that clarifies the situation, and that is supported by relevant evidence, and appropriate qualifications (Figure 1). Claims need to be substantive, contestable, and explicit so that the reader can assess their usefulness in resolving problems. Evidence should be accurate, precise, representative, sufficient, reliable, and easily understood. In addition, the researcher needs to establish a logical connection (the warrant) between the evidence and the claim. A warrant is the general principle that establishes the relevance of particular evidence for a particular claim, and makes conclusions drawn from the evidence credible. Qualifications limit an argument's scope and certainty. Qualifications are also important in identifying areas for further research, and in developing the credibility of the researcher as a careful participant in professional dialogue.

Arguments are the building blocks of research, and when combined with the right questions offer a flexible research tool to address many activities in an integrated manner. The structure of claim, evidence, warrant, and qualification can be used as a recurring framework in research or in writing to support the numerous decisions researchers make (e.g., Why did I choose this specific theoretical framework, or statistical procedures, or data set to investigate the problem?). In an *ex ante* or planning context, the realization that an argument will need to be made to support research decisions underscores the importance of identifying and thinking through the dimensions of problems, and in developing an awareness of how problems should be addressed (e.g., What does the literature suggest are the most appropriate procedures for the

analysis? Are the dimensions of the problem consistent with the 'state of the art' procedures, or will modifications to the problem statement or procedures be required? How will the reasonableness of the modifications be supported under critical review?). More generally, the structure of claim, evidence, warrant and qualifications requires the researcher to integrate the theory, quantitative methods, handling of the data, and knowledge of the situation to provide an answer to the research question. This integration builds a comprehensive argument or explanation to the research question on the basis of other individual arguments such as the appropriateness of the theory or methods employed in the analysis. In effect, the process of developing the overall argument compels the researcher to integrate their knowledge of theory, quantitative methods, and the situation.

Professional dialogue is clearly observed in well-written journal articles and theses. For a particular problem, researchers provide a claim which identifies the explanation or resolution of the problem. Economic theory, quantitative methods and data then are marshaled to provide evidence to explain the problem, with the theory, the knowledge of the particular situation, and the knowledge of the properties of the quantitative methods serving as links (or warrants) between the evidence and the claim. Qualifications are made identifying the limiting conditions such as the reliability of the data or the empirical specifications which also can point to future work.

Participation in professional dialogue assumes the researcher has knowledge of a research community², and the existence of a well-defined problem. Research communities identify the relevance of research, and the theory, procedures, and data that are acceptable in their discourse. Learning about a research community helps define research problems. A well-

defined research problem addresses questions that are of interest to the individual researcher, and are also significant to other members of the research community.

The Course

The course we teach to develop participation in professional dialogue is a 15-week seminar designed to promote the preparation of Ph.D. thesis proposals. An outline of the seminar schedule is in table 1. For the first five weeks the class meets once a week to discuss assigned readings. The primary text is *The Craft of Research* by Booth, Colomb, and Williams, which we supplement with articles and theses from the applied economics literature. The objectives of the first five weeks are to develop common ideas and vocabulary about the details of conducting research, and to present and apply the structure of arguments to evaluate research. We begin by defining and discussing the structure of arguments, how to identify research topics, how to narrow topics to research questions and objectives, and how to generate research hypotheses. Emphasis is placed on the details of constructing an argument by making strong claims that are supported by warranted evidence. We also discuss the performance of research tasks such as outlining, and managing references and citations.

Students initially are encouraged simply to participate in discussion to help clarify their ideas. Assignments follow where students read articles of varying quality and evaluate in writing and verbally the authors' arguments, using the structure of professional dialogue. In effect, students identify what makes applied economics arguments credible, and present their assessment in the form of their own an argument. To emphasize the nature of arguments, and to focus attention on proposals, the students then are provided with an overview of the structure of

thesis proposals which defines and identifies the connections between the problem statements, objectives of the research, literature review, and the theory, empirical procedures, and data used in the research design. An assignment follows where students read a thesis of their choice, and outline its critical components and arguments.

During the last 10 weeks of the course, students develop research proposals by defining their research problem and constructing their arguments using the professional dialogue paradigm. Students often begin this process with fuzzy topics, and we find that a critical review of relevant literature aids in the development of the problem. We stress that a well-organized review of the literature sets the stage for the research problem, and identifies the theory and quantitative methods for the analysis. The review also permits the student to identify contradictions, limitations, and gaps in the existing literature. During this period, students are encouraged to work with their research director to identify topics or survey pieces that highlight the need for analysis. Students also are encouraged to use bibliographical research aids (such as *ECONLIT*) which relate concepts or themes across publications.

A key aspect of developing the proposal is an assessment of data needs. We emphasize that our ability as applied economists to perform productive research is highly influenced by the availability and quality of data. Further, we indicate that understanding the characteristics of data aids in developing more precise research questions and problem statements, and in assessing the compatibility of the data with theoretical and empirical constructs.

Booth, Colomb, and Williams argue that many important research problems are not found, but they confront us. They summarize the entire process that starts with a researcher who encounters a problem – a problem that will mean trouble if it is not solved. To find the answer

the researcher must then define a research problem based on what is not known, but needs to be understood. The circle is closed when the answer to the research problem helps to solve the problem that started the process.

During these final 10 weeks, bi-weekly meetings are held and small groups are formed composed of students at similar stages in their proposals. On alternating weeks, members of alternate groups submit written work that is distributed to the class several days prior to the seminar meeting. Students that are not in the same group and professors, provide short written assessments. The written documents also are discussed in class; a 10-minute verbal presentation is followed by student-led questions and suggestions. Alternating the groups gives students between two and three weeks to develop and revise their documents prior to their next submission. Students are evaluated on their ability to reach student-, and professor-defined objectives for writing their proposals, that are establish after the first five weeks. Final documents are submitted to research directors for comments, and we provide students with written journal-style reviews.

Professional Dialogue: Obstacles and Strategies

Reticence

Students are motivated to enter into professional dialogue, but encounter obstacles. Often, they are unaccustomed to voicing their own views in class settings. We address this problem by providing and reinforcing the structure of scholarly professional dialogue, and by fostering an environment supportive of their participation (Ladd, 1987). The readings and assignments during the first five weeks provide a common framework and vocabulary for class discussion,

and for evaluating and developing research. This stimulates participation because students know what they are expected to discuss, and understand the terms used in the discussion. We also strive to create an environment of uncertainty, doubt, and exploration by indicating that research, by definition, involves finding and communicating answers to unresolved problems. We then recount research experiences that highlight our search for new insights. Useful points of departure for discussion are anomalies, inconsistencies, or contradictions that we have faced, and how they have motivated our research. This environment of uncertainty and exploration is reinforced by asking students to read survey articles where experts identify what is known, and what needs to be discovered in their specific research communities (e.g., Carter; Helmuth et al.).

An aspect of futures market research identified in Carter's work can be used to illustrate how uncertainty or doubt motivates research to develop a deeper understanding of a situation. Consider that government agencies, universities, and market services have advocated the use of futures markets by producers to manage their price risks. Academicians also have invested considerable energy identifying optimal hedge ratios, and many studies have concluded that futures markets provide attractive risk management opportunities. In contrast, we know through surveys that the percent of producers who actually use futures markets is quite small, ranging from three to six percent depending on the market. Clearly, something was amiss in this situation and motivated a research agenda to address the anomalous findings. Recent research has attempted to resolve this uncertainty by investigating: 1) the structural factors influencing producer use of futures markets (Isengildina, and Hudson; Pennings and Garcia, 2001; Pennings and Garcia, forthcoming;); 2) the sensitivity of optimal hedging ratios to modest violations of the underlying theoretical model (Lence, 1995a, 1996); and 3) the effects of a dramatic restructuring

of farmer's objectives in the light of additional sources of risk (Arias, J., B.W. Brorsen and A. Ardian; Brorsen; Collins; Lence, 1995b). A complete resolution to the problem has not emerged, but the point that uncertainty or doubt about a particular situation motivates research can be readily made.

Finding the Research Problem

Students also face the difficulty of knowing how to initiate their research by finding a problem. Often, they are unaware of the sources of research problems. We indicate that topics can be developed by looking at textbooks and newspapers, by talking to professors, by looking through specialized journals, or identifying survey articles that provide suggestions for further research. Topics also can emerge from the availability of unique data sets which can stimulate the development of precise questions. At an early stage, topics tend to be quite broad, and we stress the importance of developing more specific, manageable topics. Working with more specific topics makes identifying limitations in previous research, and contradictions or gaps in the literature, easier. Here, extensive reading and writing are crucial. Reading provides information and strengthens the student's preparation; writing stimulates learning through summarizing, synthesizing, and critical exposition. We encourage our students to push their reading and writing skills beyond information gathering to critical exposition, to developing sensitivity for similarities and differences, and to identifying gaps of understanding in the literature.

Once a topic is identified, it is vital to find a question to answer. Students need to question broadly their topic to understand, in general terms, the structure, components and their relationships, history, and potential value. Following Ladd (1987), we the ask students to focus on the "economics" by asking and answering questions such as: What is the economic situation?

Who are the actors (e.g., individual producers and consumers, firms, governments)? What are their objectives or performance concerns? What conduct or behavior is relevant (e.g., growth, transformation or exchange), and how do economic factors come into play? What are the economic decisions to be made, and how do constraints (e.g., technological, resource, governmental) limit the actor's activities? We then encourage students to identify what has changed over time, why change occurred, and how the change has affected the relationships and the ability of the actors to reach their objectives. The questioning identifies what is unknown (the problem), and motivates the information that will clarify the situation (the claim).

Booth et al. provide useful guidance that aids thinking and communicating about a research problem. They suggest a three-step approach to identify research problems: name the topic; suggest a question; motivate the question. The steps can be summarized in the statement: "I am studying _____, because I want to find out who/how/why _____, in order to understand how/why/what _____. It is the last step or the understanding sought that distinguishes advanced research. Research is well advanced when what follows the phrase *in order to understand* is important to a professional audience.

Significance of the Problem

A related concern for students is uncertainty over what constitutes a "significant" problem. Following Booth et al., we argue that the relevance or significance of a problem is determined by the expected opportunity cost of not having an answer to the research question. For applied research, the cost is determined by identifying a decision maker's actual or potential economic loss or foregone opportunity. For more basic research, the cost is defined in terms of the more general issues that are not understood because the answer to the specific research question is

unknown. Regardless of whether applied or basic, the significance of research is often determined by how successfully it changes the thinking of the research community.

An alternative expression of significance is the phrase “So what?” Using professional dialogue, a good answer to the “So what?” question identifies the actual or potential costs of further ignorance. For example, we had a student develop a research proposal to understand the value of site-specific information in agricultural production. The significance of the problem is supported by the argument that failure to understand the factors that give value to information about field characteristics causes ignorance about the adoption of technology, and its effect on the use of inputs that can have environmental externalities. Hence, the research problem must be solved to learn how to create incentives to reduce the application of polluting inputs by adopting site-specific technology. Alternatively, the significance of the problem can be supported by calling attention to producer foregone profits from inappropriate adoption and use of the technology. With the uncertainty surrounding the value of site-specific technology (Bontems and Thomas; Hennessy and Babcock), the research proposal focused on a problem that can influence the thinking of its professional audience.

What becomes evident is that researchers must understand their professional audience in order to identify significant research problems. How is this understanding developed? We fall back on the notion of dialogue. We discuss the importance of writing for an audience, and establishing a sense of personal voice. We emphasize that one of the objectives of critical reading, and writing, and the literature review is to develop a sense of the research community. This involves identifying what is known (unknown), what is controversial, and how compelling arguments are developed. Concretely, we ask students to study the arguments used by their

research community to determine: What types of problems are investigated? How are the costs of ignorance established? What types of claims, evidence, and warrants are used? How are they integrated in the most convincing arguments?

A good example of identifying significant research problems by understanding the professional audience appears in *The Economics of Contracts* by Bernard Salanié. Salanié is very conversant with the literature on the theory of contracting in the presence of risk and asymmetric information, an area that has experienced a significant growth in knowledge over the last twenty years. Salanié identified that researchers did not know how new theoretical knowledge applied to observed economic behavior. He then specified a research agenda to develop empirical tests of the significant implications or predictions of contract theory. The objective of the research agenda is to produce new understanding that addresses significant ignorance of the research community. The practical dimensions of the research agenda are highlighted by the importance and rapid of growth of contracting in the production and marketing sectors of agricultural industries throughout the world (e.g., Singh; Batabyal; Gillespie and Eidman; Kliebenstein and Lawrence; Vandeman, Sadoulet and de Janvry.).

Warrants

An aspect of the professional dialogue paradigm that is difficult for students to grasp initially is the notion and importance of warrants. Warrants are the logical links that connect the evidence to the claims. For applied economists, warrants are the theoretical and empirical models and the data, i.e., the research design. The quality and credibility of the warrants, and hence the research, are dictated by the ‘state of art’ in theory, quantitative methods, and data development

As an example of the role of warrants in an applied economics research argument,

consider a study of the long-term relationship between weather variables measuring global warming and crop yields in order to better understand possible greenhouse effects. The use of ordinary least squares to estimate these relationships, and to test relevant hypotheses with a long time series of observations would be subject to question. The time series analysis literature has developed a good understanding of the difference between unit root stochastic processes and trend nonstationarity. The nature of nonstationarity needs to be understood because there are significant differences in the implications between trends and unit roots. For example, there are significantly different dynamic multiplier effects. A one-time shock to a trend stationary process eventually wears off, while a one-time shock to a unit root process causes a permanent change in the level of the series. Further, the application of ordinary least squares to nonstationary data can lead to spurious regression results. Thus, the literature recommends that unit root tests be employed to determine the presence and nature of nonstationarity before choosing estimation procedures. Information about the results of the unit root tests is necessary to warrant statistical evidence relating long-term yield and weather time series.

One reason it is difficult to define warranted evidence is the controversy in applied economics over research methodologies that generate new knowledge. Evidence is warranted if it is supported by an accepted research methodology. However, applied economics does not follow a single research methodology. Fox argues, "Philosophically, economics is a house divided. Most economists who have written on methodology have combined elements from various methodological doctrines in an eclectic manner. But these hybrid methodologies are not coherent. ...methodological orthodoxy is precarious. Economists believe many things about the nature of science and the cognitive status of their discipline that have been rejected by

philosophers of science. Many of the things that economists believe about science are an eclectic and inconsistent mixture of ideas from competing philosophies of science” (pp.122-123).

Randall provides details about the methodologies that applied economists mix. “From the rationalists, we have learned that logical coherence is a highly desirable property of an argument, and we have some well-established principles of logic to guide us. From the empiricists we have learned to respect the evidence...The logical positivists taught us to respect the distinction between empirical and metaphysical propositions...[and] From falsificationism, we learned to cherish opportunities to conduct a definitive test of an interesting and refutable hypothesis” (p.54). Students are exposed to these methodologies in courses, but in a fragmented manner. They learn the value of coherent logical deduction in theory classes. And they learn how to evaluate empirical evidence and test refutable hypothesis in econometrics classes. However, they have limited opportunities to mix these diverse methodologies into coherent arguments before they conduct their thesis research. The process of presenting research proposals and evaluating the research proposals of peers using a common framework that explicitly identifies claims, evidence, and warrants provides students valuable experience using research methodologies to create warranted evidence.

On a practical level, the reliability of the warrants depends on the quality and acceptance of models and the data, as they provide the bridge between the evidence and the claim. Because theoretical and empirical models are limited, we stress the importance of developing criteria for evaluating model credibility, and guidelines for developing an effective design. We argue that theoretical and empirical models should be straightforward and focus on explaining specific problems. We find that it is useful to begin with simple theoretical models and then expand as

their limitations become evident, and the development of models to address specific problems leads naturally to relevant hypotheses (Varian). Empirically, we argue that it is important to formulate and identify clearly the procedures, and steps used to arrive at the final model, including specification and validation (Tomek). Ultimately, credibility is developed through the use of logically and internally consistent theoretical and empirical models based on empirically accurate data that reflect the appropriate theoretical concepts, and that produce results which conform to observed behavior and are consistent with a priori expectations formed from the literature and knowledge of the situation (Randall; Ethridge). We encourage students to assess carefully the credibility of warrants as their limitations motivate research through the need for better models, and more precise data.

Discussion

Professional dialogue provides a framework for communicating ideas, assisting students to think critically and imaginatively about their research problem, and to internalize a structure for their *ex ante* planning of research activities. Professional dialogue strengthens students' learning experiences as they see the need to develop coherent arguments to explain why they select specific theory or procedures. When students use this structure to address their overall research question developing a coherent argument requires the integration of theory, quantitative methods, data, and knowledge of the situation.

How has the course been received? We have received strong support from students and other professors. Students indicate that they benefit from open discussion of their written work and from written comments. They report that the comments received from peers and professors help them to clarify confusing ideas. They also indicate that participation in the seminar helped to accelerate

completion of their proposals. Students have asked us to teach the course every semester to provide additional opportunities for regular peer and professor feedback. The quality of the course also has been consistently ranked among the highest in the department, and the students have supported our teaching efforts with similarly high rankings. Recently, we have attracted students from other departments, and one department indicated that they were developing a similar course. Several professors have noted the positive change in the quality and structure of their student's thesis writing, and are beginning to use the *Craft of Research* to structure their professor-student interactions. Further, the course seems to be shortening the time between the passage of preliminary exams and the successful defense of their proposals. The median students in the seminar typically have completed drafts of at least a portion of their proposals. Some of the students complete defensible proposals by the end of the semester. A few students continue to struggle with the definition of their problems. However, all students advance in their understanding of: the research process; the importance of arguments; and their topic.

Why have students progressed? In our view, students make significant progress because of the multiple opportunities to write and discuss their writing with peers and professors. Writing, receiving critical comments, and discussing controversial or confusing points helps students refine and express their ideas. Verbal presentations and the interaction among diverse students and professors also seem to stimulate solutions to problems through a cross-fertilization of ideas (Ladd; Moll). The productivity is enabled by the organization of the course, by common language, and by a paradigm for thinking about research that is consistent with many of Ladd's suggestions to stimulate imaginative research through effective problem solving.

Table 1: Seminar Schedule

Week of Semester	Seminar Activity
1	Problems and Questions
2	Claims, Warrants, Evidence
3	Organization, Citation, Writing
4	Critical Analysis of Journal Article
5	Critical Analysis of Thesis
6	Group 1 – First Draft
7	Group 2 – First Draft
8	Group 1 – Second Draft
9	Group 2 – Second Draft
10	No meeting
11	Group 1 – Third Draft
12	Group 2 – Third Draft
13	No meeting
14	Group 1 – Fourth Draft
15	Group 2 – Fourth Draft

Final Drafts Submitted at the end of Finals Week

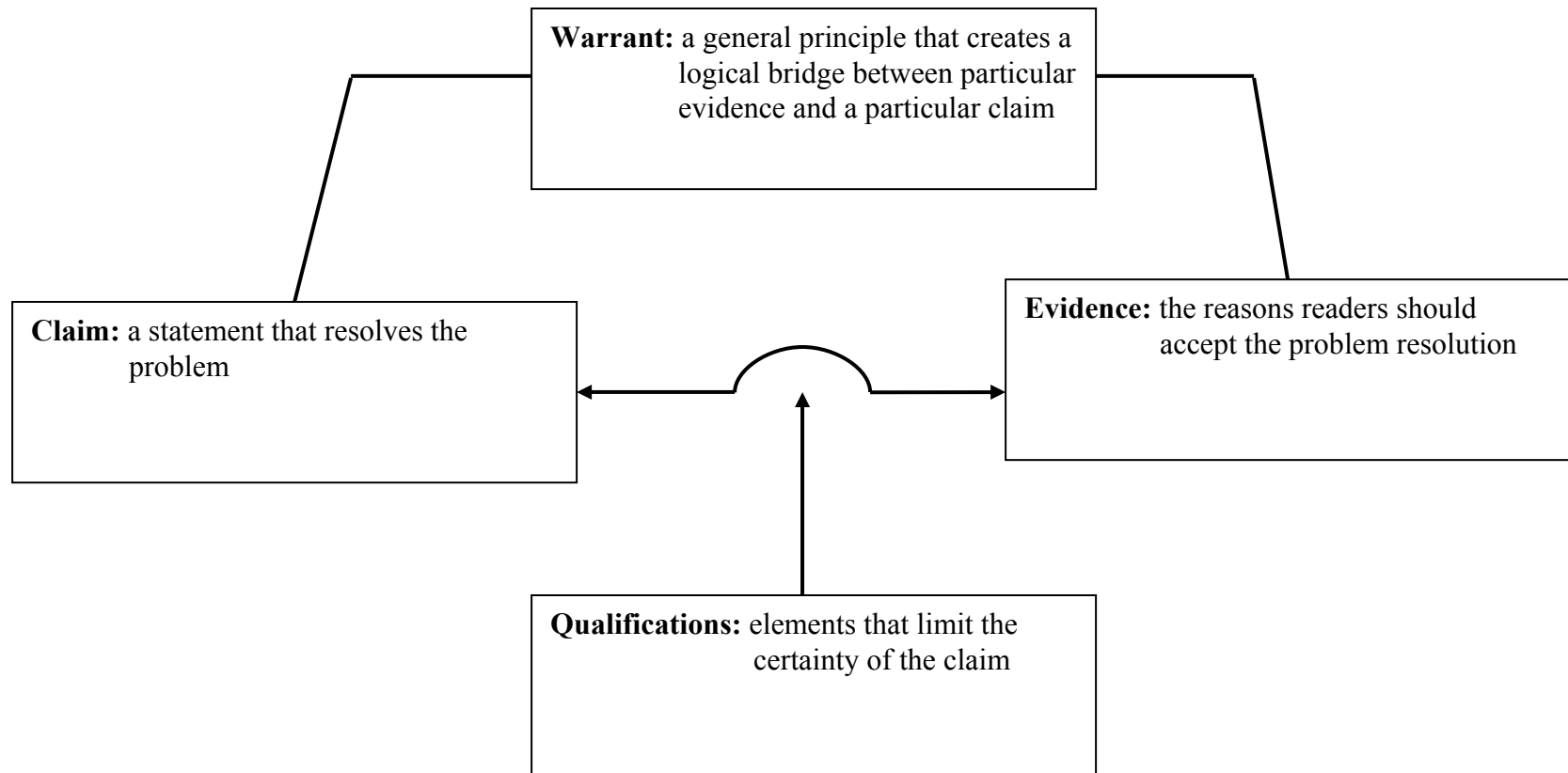


Figure 1: The Structure of an Argument
(Source: modified from Booth et al., p.142)

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ENDNOTES

¹ Ladd (1987) provides a good discussion of the factors that stimulate creativity.

² We use research community to refer to academic, private, and government professionals who are interested in the resolution of common problems.