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*cognitive*  
**DEVELOPMENT**



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*students' beliefs*  
**ABOUT  
KNOWING**

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After a 15-year research project involving interviews with just over 100 Harvard men in the 1960s, educational psychologist William Perry theorized that adult learners move through different stages of learning, or developmental positions. By placing emphasis on “the forms that student voices would take” (Knefelkamp, 1998, p. xiv), Perry brought attention to the changes students undergo in the post-secondary education setting.

**A word about terminology:** While “development” suggests that moving forward to another position is improvement, Perry emphasized that students may revert to a previous stage when confronted with new or challenging learning situations, a response that can help in adjusting to these new situations. His word “positions” also reflects this dynamic movement, rather than an absolute state of being or a fixed identity.

### **Perry’s Scheme of Cognitive Development**

While Perry originally identified nine positions, subsequent scholars (Knefelkamp & Slepitz, 1978; Kloss, 1994; Moore, 1994; Hofer & Pintrich, 1997) have condensed these positions to simplify his scheme as follows:

<b>dualism</b>	perceiving knowledge as facts, either correct or wrong
<b>multiplicity</b>	in addition to recognizing that knowledge is made up of facts and sometimes even subordinating fact, recognizing that opinions are also knowledge--transitioning through a process of seeing all knowledge as opinion, to sifting through opinions with an inclination to dismiss those that contradict one’s understandings
<b>relativism</b>	recognizing knowledge as complex and contextual and that multiple, even contrary opinions can co-exist
<b>commitment</b>	taking a position by harnessing multiple opinions to converge into a personal worldview

Two important themes with direct implications for post-secondary teaching and learning emerge from these overarching positions: students’ understanding of *knowledge* and their relationship to *authority*.

#### ***Students’ Understanding of Knowledge***

Traditional university-aged students typically come to the classroom thinking dualistically, perceiving knowledge as either right or wrong. They expect that a professor (or other authorities) will provide the content by clearly indicating what is factual and true and important. When they attempt to process diverse perspectives, students may recognize that knowledge is constituted of conflicting content and move into Perry’s position of multiplicity. They may experience confusion in how to process conflicting perspectives and, as they see some authorities as good and others bad, they may dismiss unpalatable ideas to resolve that confusion. Although students are increasingly open to uncertainty in knowledge, they have yet to be able to cope with diversity in knowledge.

If students become able to hold multiple perspectives at the same time and recognize that knowledge is complex and contextual, then they move into relativism. This is a qualitative shift from dualistic thinking (which frames knowledge one dimensionally—either true or false—and coming from an external source) and from multiplicity (which perceives knowledge as mostly opinion).

If students arrive at a worldview shaped by the multiple perspectives they have been exposed to over time, they may move into a position of commitment. Here, students recognize that they can be producers of knowledge. Few students were identified at the final stages of the scheme.

### ***Students' Relationship to Authority***

In the early stages, students feel dependent on authority figures. When confronted with new learning situations, students in dualistic modes expect the instructor to tell them what they need to do, and even if they move to multiplicity, they still tend to expect the instructor to clearly set most of the parameters of their learning. In the latter positions, students are more reflective about what they know and more likely to make their own decisions about knowledge. Eventually, they take responsibility and apply their knowledge, perhaps even commit to their own beliefs and create new knowledge.

Perry's research was important for its insight about how young adults confront unfamiliar content in new learning environments. According to Hofer and Pintrich (1997, p. 93), Perry was the first to suggest that how university students make meaning of their educational experiences is not simply a reflection of their personalities but instead an evolving developmental process. Previous models of how students learn had simplistically presented students as passive recipients of knowledge. Perry's interviews, which focused on how the students understood their learning contexts, resulted in indications that these students actively engage in their learning, providing an alternative model for interpreting students' responses to the university environment.

Perry's research encourages educators to reconsider some common assumptions about adult learners. Adult learners are not necessarily independent learners, nor able to recognize that knowledge is diverse, even though they may have had many years of formal schooling; neither are they blank slates. In new learning situations, even mature learners will resemble the dualistic students who are highly dependent on authority until they become more comfortable with the subject matter and slightly more independent learners. Perry's developmental model offers educators tools for evaluating students' varying levels of readiness for subject matter and skills.

The Perry scheme has found multiple iterations in its applications in specialized studies of how post-secondary students learn. The limitations of the original scheme have led researchers and educators to modify his categories, but the framing principles that students move from passive, dependent stages, to more assertive, independent stages is a consistent application of the Perry scheme.

### **Building On Perry**

Some of the most well-known developmental work on how students learn had been predominantly about children, conducted by psychologists such as Lev Vygotsky, Jean Piaget, and Jerome Bruner. Perry shifted the focus to adult learners and learning in new and challenging situations for even experienced students. His work has contributed to at least noticeable three branches of thought about adult learners:

- Mary Field Belenky, Blythe McVicker Clinchy, Nancy Rule Goldberger, and Jill Mattuck Tarule extend Perry's work by focusing on "women's ways of knowing," as they titled their book,
- Baxter Magolda introduces a way of recognizing learners' awareness of what and how they know, and
- Patricia King and Karen Kitchener focus on ways of thinking about problem solving.

All of these branches pivot on Perry’s emphasis of how students articulate their understanding of their learning processes and knowledge. The themes “students’ understanding of knowledge” and “students’ relationship to authority” are taken up to varying degrees by each of these branches.

***Belenky, Clinchy, Goldberger, and Tarule: Women’s Ways of Knowing***

*Women’s Ways of Knowing: The Development of Self, Voice, and Mind* (1986) reports on the research of Belenky, Clinchy, Goldberger, and Tarule, all of whom had previously been studying student development. Belenky and Tarule had studied with Perry, and Belenky had also worked with Carol Gilligan in looking at women’s voice in human development.

Concerned with female students’ complaints about their educational experiences, the four researchers set out to study women because Perry’s ongoing research concluded that women conformed to his scheme based on his work with male students. In the early stages of their research, many of the answers women gave to Perry’s interview questions did not easily fit his well-accepted scheme, so while Perry’s emphasis on epistemology or “ways of knowing” became the main organizing principle of the data that emerged from their interviews, they expanded the scope of influence by selecting 135 women from diverse learning contexts: college women, alumnae, and women in what they called “invisible colleges” or human service agencies.

Belenky, Clinchy, Goldberger, and Tarule found that the women’s assumptions about their knowledge ultimately influenced how they perceived themselves. The women in their study did not describe their learning in linear ways; instead they described learning in terms of speaking and listening. Their findings thus focus on the interrelatedness of women’s minds, voices, and selves—as indicated in their subtitle—identifying five ways of knowing:

<b>silence</b>	identifying themselves as mindless, voiceless, and at the whim of external authority
<b>received knowledge</b>	believing themselves capable of receiving knowledge
<b>subjective knowledge</b>	believing themselves capable of intuiting knowledge
<b>procedural knowledge</b>	investing in pursuing knowledge
<b>constructed knowledge</b>	seeing themselves as producers and consumers of knowledge

Although this work was groundbreaking as it drew attention explicitly to women’s ways of processing knowledge, the authors are careful to point out that similar categories can be found in men’s thinking and resist essentialist or binarial characterizations of women and men.

***Baxter Magolda’s Epistemological Reflection Model: Awareness of What and How One Knows***

Belenky, Clinchy, Goldberger, and Tarule influenced other researchers to look at gender-based distinctions in how adults learn. In *Knowing and Reasoning in College: Gender-Related Patterns in Undergraduates’ Intellectual Development* (1992), Marcia Baxter Magolda sought to close the gender divides in the research conducted by Perry and Belenky and colleagues. She modeled her research on Perry’s interviewing style of listening to students’ voices but set out to reveal gender patterns in students’ ways of knowing, so she studied about 100 students (half men and half women). Like Belenky and colleagues, she found dimensions of student development not accounted for in Perry’s scheme, but

she also found more similarities in women’s and men’s ways of knowing, so her book ultimately spends very little time looking at gender-related differences.

Her resulting work focuses instead on recognizing learners’ *awareness of* what and how they know. Her Epistemological Reflection Model (ERM) identifies four stages describing specific conditions (or domains) where learners identify their knowledge: in relation to what the learner believes her role to be, in relation to peers, in relation to the instructor, and finally in relation to ways of evaluating her knowledge.

<b>absolute knowing</b>	believing <ul style="list-style-type: none"> <li>• knowledge is absolute or certain</li> <li>• their peers have limited knowledge, but should share materials</li> <li>• authorities have that absolute knowledge and should communicate it</li> <li>• evaluations (i.e., tests) are opportunities to show what they know by reproducing the authority’s knowledge</li> </ul>
<b>transitional knowing</b>	believing <ul style="list-style-type: none"> <li>• transitional understanding, so some knowledge is certain, but there are limitations to what one can know</li> <li>• peers ought to exchange ideas</li> <li>• authorities have limited knowledge and should facilitate rapport with students</li> <li>• evaluations may focus on understanding rather than memorization</li> </ul>
<b>independent knowing</b>	believing <ul style="list-style-type: none"> <li>• knowledge is uncertain because all people have their own beliefs and can create knowledge</li> <li>• peers are now a source of knowledge</li> <li>• authorities promote independent thinking and exchange of opinions</li> <li>• evaluations reward independent thinking</li> </ul>
<b>contextual knowing</b>	believing <ul style="list-style-type: none"> <li>• knowing depends on analyzing contextually significant evidence, and they can merge their knowledge with others after this analysis</li> <li>• peers and authorities enhance learning through discussion and critique</li> <li>• evaluation can actually measure competence as students and teachers work toward shared goals</li> </ul>

**King and Kitchener’s Reflective Judgment Model: Ways of Thinking about Problem Solving**

King and Kitchener’s *Developing Reflective Judgment: Understanding and Promoting Intellectual Growth and Critical Thinking in Adolescents and Adults* (1994) emphasizes how people make decisions to resolve difficult situations. They credit John Dewey’s notion of “reflective judgment,” some of Piaget’s developmental concepts, and work done by a range of other developmental theorists, including Perry, whose work was being widely discussed in the academic community as King and Kitchener were conducting their research. They were inspired to ask questions about the nature of intellectual development, focusing on analyzing responses to problems which do not have explicit solutions. They conducted research with a range of adult learners including but not limited to college students (from high school students to middle-aged adults) and developed the Reflective Judgment Model (RJM).

Framed by the analysis of people’s responses to “vexing problems” (King & Kitchener, 1994, p. 2), the RJM describes how *beliefs of what knowledge is and how it can be justified* change throughout

life and affect the ability to process these vexing problems. Their model can be seen as an elaboration of the latter positions of the Perry scheme (commitment in relativism), when people are aware of their knowledge and can make decisions based on the scope of their knowledge.

The RJM looks at how people make judgments, solve problems, and think critically through seven developmental stages:

<b>pre-reflective thinking stages 1-3</b>	learners believe that knowledge is absolute and derived from experience, so they have difficulty evaluating competing claims and making decisions to solve problems
<b>quasi-reflective thinking stages 4 and 5</b>	learners describe knowledge in self-centered, subjective ways and are limited in their abilities to resolve problems
<b>reflective thinking stages 6 and 7</b>	learners recognize knowledge as constructed and are able to integrate perspectives to draw and make decisions for problem-solving

King and Kitchener are important additions to the discussion of developmental markers of learning because they add to the ongoing discussion of how we understand students' developmental patterns of knowing and learning, here with emphasis on critical thinking in the face of complexity.

## Applications of Perry in Different Contexts

Perry's work and the subsequent research which built on his findings have contributed to a body of thinking which continuously considers how post-secondary students engage in new learning situations. Many researchers have used the tenets of Perry's work to critically examine students' learning processes in specific disciplines and other academic contexts.

See pages 12 to 16 for a list of resources arranged by discipline or context.

## The Perry Scheme of Cognitive Development: An Annotated Bibliography

This bibliography provides references to a range of books, edited collections, and journal articles that provide sound discussions and applications of the Perry scheme. The main research that branched off from the scheme is also included.

### *The Original Text*

Perry, W. G., & Harvard University. (1968). *Forms of intellectual and ethical development in the college years: A scheme*. Cambridge, Mass: Bureau of Study Counsel, Harvard University.

### *Accessible Summaries*

Some of the best general introductory summaries to Perry, in order of simplicity to complexity in the discussions, are as follows:

Perry, W. G. Jr. (2014). Cognitive and ethical growth: The making of meaning. In P. G. Altbach, K. Arnold, & I. C. King (Eds.), *College student development and academic life: Psychological, intellectual, social, and moral issues*. (pp. 48-88). New York, NY: Routledge.

This synopsis of the collaborative work that came to be called the Perry scheme is presented in significant detail, but the language is fairly accessible. There are several examples of statements from students which represent the various positions. As a report presented by Perry himself, this is a sound starting point for understanding the fundamentals of the scheme and how others have built upon this.

Furthermore, Altbach, Arnold, & King (2014) is a volume of work on developmental theories of learning. The introduction "Reflections on Student Development" prefaces the various developmental theories and locates the relevance of each of the theoretical orientations which branched off from Perry. The volume contains chapters that give an overview of the three branches: "Women's Ways of Knowing" (p. 89-116), "Students' Epistemologies and Academic Experiences: Implications for Pedagogy" (p. 117-140) and "The Reflective Judgment Model: Transforming Assumptions about Knowing" (p. 141-159). (The anthology also summarizes other theories of development, such as Arthur Chickering's psychosocial theory of students' development, Minority Identity Development model, and Homosexual identity formation).

Widick, C. (1977). The Perry scheme: A foundation for developmental practice. *The Counseling Psychologist*, 6(4), 35-38. doi:10.1177/001100007700600415

This is a brief introduction to the Perry scheme with a straightforward summary of the various positions. This article is a gentle introduction to anyone reading about Perry for the first time and is useful for understanding the practical use of the theory when applied to teaching. The article goes on to look at the utility of the scheme for educational counseling practice.

Moore, W.S. (1994). Student and faculty epistemology in the college classroom: The Perry schema of intellectual and ethical development. In K.W. Prichard & R. M Sawyer (Eds.), *Handbook of college teaching: Theory and applications* (pp. 45-67). Westport, CT: Greenwood Press.

This chapter claims that the Perry scheme offers a "powerful framework" for understanding student perspectives on knowledge and learning within the complex and dynamic nature of the college setting. Moore provides a succinct overview of the Perry scheme on pages 47-51, looking at the positions in the categories of dualism, multiplicity, contextual relativism, and commitment within relativism. Then the chapter goes on to look at the implications for faculty and students.

King, P. M. (1978). William Perry's theory of intellectual and ethical development. In L. Knefelkamp, C. Widick, & C. A. Parker (Eds.), *New directions for student services: Applying new developmental findings* (pp. 35 – 51). San Francisco, CA: Jossey-Bass.

Patricia King, who worked with Karen Kitchener on the reflective judgment model, provides a brief review and critique of the scheme. This is useful for understanding the early reactions to the theory and contextualizing the way other researchers built on some of Perry's concepts.

Evans, N. J., Forney, D. S., Guide, F. M., Patton, L. D. & Renn, K. A. (2010). *Student development in college: Theory, research and practice*. San Francisco: Jossey-Bass.

This collection of essays looks at a range of theories. Chapter five, "Perry's Theory of Intellectual and Ethical Development," begins with anecdotes of profiled students (pp. 88-98). This helps the reader recognize the types of students that represent the various stages of the scheme. The chapter provides a historical overview of Perry's research and considers how it has been instrumental in understanding student affairs. The chapter also includes classroom applications of his work and an overview of other work influenced by his research. It closes with a critique and considerations of future directions for the scheme.

Knefelkamp, L. L. (1998). Introduction. In W. G. J. Perry, *Forms of ethical and intellectual development in the college years: A scheme* (pp. xi-xxxviii). San Francisco: Jossey-Bass.

In the introduction to this republication of Perry's work, Knefelkamp states that there are at least three distinct but related uses of the Perry scheme as metaphor: General Perry – an overview of individuals' development based on analysis from several interviews about knowing, and education; Contextual Perry – a way of thinking within a particular context, in a particular discipline or course; Functional Perry – when adult learners undertake new learning experiences and functionally regress until they feel comfortable (p.

xviii). This way of looking at the Perry scheme is useful for educators who would like to make sense of the diversity of adult learners, not just the type of learner represented in the limited demographic of Perry's original research. Knefelkamp is careful to add that Perry's scheme does not claim universality or applicability across cultures, and the research instruments used by Perry have had to be adjusted for varying kinds of research participants.

Love, P. G. & Guthrie V. L. (1999). *Understanding and applying cognitive development theory*. San Francisco: Jossey-Bass.

This book provides an overview of several theories of cognitive and intellectual development. Chapter one, "Perry's Intellectual Scheme," begins with an overview of the actual theory and goes on to look at it in relation to other theories of cognitive development (pp. 5-16). This is a detailed look at the various positions and the transitions between the positions. It also analyzes the relevance of Perry's ideas many years after the development of the theory. This chapter can be accessed as an online article:

Love, P. G., & Guthrie, V. L. (1999). Perry's intellectual scheme. *New Directions for Student Services*, 88, 5-15. doi:10.1002/ss.8801

The book is also a strong introduction to the interconnectedness of the research that built on Perry's ideas with chapters that summarize Women's Ways of Knowing (pp. 17-28), Baxter Magolda's Epistemological Reflection Model (pp. 29-40), and King and Kitchener's Reflective Judgment Model (pp. 41-52).

Moore, W. S. (2009). Understanding learning in a postmodern world: Reconsidering the Perry scheme of intellectual and ethical development. In B. K. Hofer, & P. R. Pintrich (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing* (pp.16-36). New York: Routledge.

In chapter two of this collection, Moore reviews the Perry scheme and evaluates its effectiveness as a theory to understand college students 30 years after the theory arrived on the academic scene. He critiques the model that was grounded in the white privileged world of Harvard 1950s-1960s and claims it is time for a review to pose the question, "what is the continuing relevance of such a model for today's postmodern world" (p.18). He considers the work that built on the model and examines recent theoretical developments in educational research which can benefit from the ideas in the scheme. He concludes that the Perry scheme still has a critical dimension that can help educators understand students' learning.

Lochrie, J. S. (1989). Perry revisited—A fresh look at Forms of Intellectual and Ethical Development in the College Years. *Studies in Higher Education*, 14(3), 347-350, doi: 10.1080/0307507891233137723

This is a review of the theory 20 years after the first publication. After a brief review of some of the criticisms, Lochrie concludes that in spite of the limitations of the research and the resultant theory, the work remains relevant for understanding learning in higher education settings.

### ***An Allegorical Summary***

Domholdt, E. & Preusz, G. (1987). Randi, the round-the-clock rabbit: An allegory based on Perry's theory of cognitive development. *Innovative Higher Education*, 12(1), 42-46. doi:10.1007/BF00892447

This quirky story is an allegorical summary of Perry's stages of development. Framed by quotations from Perry's original publication, this allegory provides an entertaining application of the stages of development in a fable style, but it requires some prior understanding of Perry. The themes "what is knowledge" and one's "relationship to authority" are prominent in this allegory. Although the story puts a fairy-tale spin on the conceptualization of the theory, it is a valuable reading for reminding educators that Perry's theory offered insight into students' learning.

### ***Understanding the Full Perry Scheme***

The following resources (arranged chronologically) include condensed explanations of the full nine-position scheme:

Knefelkamp, L. L., & Slepitzka, R. (1976). A cognitive-developmental model of career development: An adaptation of the Perry Scheme. *Counseling Psychologist, 6*(3), 53–58. doi: 10.1177/001100007600600310

or

Knefelkamp, L. L. & Slepitzka, R. (1978). A cognitive-development model of career development: An adaptation of the Perry scheme. In C. A. Parker (Ed.), *Encouraging development in college students*. Minneapolis: University of Minnesota Press.

Kloss R. J. (1994). A nudge is best: Helping students through the Perry scheme of intellectual development. *College Teaching, 42*(4), 151-158. doi: 10.1080/87567555.1994.9926847

Hofer, B. K., & Pintrich, P. R. (1997). The development of epistemological theories: Beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research, 67*(1), 88–140. doi: 10.3102/00346543067001088

### ***Using Perry to Evaluate Cognitive Development***

The following resources (arranged chronologically) indicate some of the research that has sought to strengthen the research instruments for determining students' cognitive development.

Mentkowski, M., Moeser, M., & Strait, M. J. (1983). *Using the Perry scheme of intellectual and ethical development as a college outcomes measure: A process and criteria for judging student performance*. Milwaukee, WI: Alverno College, Office of Research and Evaluation.

Moore, W. S. (1988). *The learning environment preferences: An instrument manual*. Olympia, Washington: Center for the Study of Intellectual Development.

Moore, W. S. (1989). The learning environment preferences: Exploring the construct validity of an objective measure of the Perry scheme of intellectual development. *Journal of College Student Development, 30*(6), 504-514.

Brooks, G. P. (1998). Perry: fact, fiction, and outcomes assessment. A paper presented at the annual meeting of the Midwestern Educational Research Association, Chicago, IL.

Baxter Magolda, M. B. (2001). A constructivist revision of the measure of epistemological reflection. *Journal of College Student Development, 42*(6), 520-534.

### ***Building On Perry***

The following resources (arranged chronologically) examine the three branches of thought that built on Perry's foundational research.

### ***Belenky, Clinchy, Goldberger, & Tarule: Women's Ways of Knowing***

#### ***The Original Text***

Belenky, M. F., Clinchy, B. M., Goldberger, N. R. & Tarule, J. M. (1986). *Women's ways of knowing*. New York: Basic Books.

Brookes, A. (1988). Review of Women's Ways of Knowing: The Development of Self, Voice, and Mind. *Curriculum Inquiry, 18*(1), 113-121. Retrieved from <http://www.jstor.org/stable/1179565>

This succinct review outlines the strengths and limitations of the research and is a simple summary of the study.

Holland, M. (1988). Review of *Women's Ways of Knowing: The Development of Self, Voice, and Mind*. *Hypatia*, 3(2), 177–179. Retrieved from <http://www.jstor.org/stable/3809967>

This is a two-page snapshot style of the main ideas of the research.

Ashton-Jones, E., Thomas, D., & Belenky, M. (1990). Composition, collaboration, and *Women's Ways of Knowing: A conversation with Mary Belenky*. *Journal of Advanced Composition*, 10(2), 275-292. Retrieved from <http://www.jstor.org/stable/20865731>

This interview with Belenky provides insight into the research process reported in *Women's Ways of Knowing* and contextualizes the findings of that research.

Tedesco, J. (1991). *Women's ways of knowing/Women's ways of composing*. *Rhetoric Review*, 9(2), 246-256. doi:10.1080/07350199109388931

This article points out how Belenky et al.'s research connects to Perry's scholarship and indicates that both streams of research make educators aware of the importance of personal teaching style.

Handlin, D. (1993). Structuring the silence: An interview with Mary Belenky and Blythe Clinchy. *New Ideas in Psychology*, 11(2), 245-251. doi:10.1016/0732-118X(93)90037-E

Handlin begins with a synopsis of the research and the various stages of women's ways of knowing and then provides an interview with Belenky and Clinchy.

Goldberger, N. R. (1996). *Knowledge, difference, and power: Essays Inspired by Women's Ways of Knowing*. New York, NY: Basic Books.

In this collection of essays, the researchers of *Women's Ways of Knowing* extend their discussions about their findings and present new questions that emerge from the impact of their research. Some chapters explore the theme of "knowing" in diverse contexts, such as Goldberger's "Cultural Imperatives and Diversity in Ways of Knowing" (pp. 335- 371).

Love, P. G., & Guthrie, V. L. (1999). *Women's ways of knowing*. *New Directions for Student Services*, 88, 17-27. doi:10.1002/ss.8802

This summary explains the background to the research, the various influences (including Perry and Carol Gilligan) and provides a comprehensive overview of the stages of women's ways of knowing.

Hartog, M., & University of Bath. (2004). *A self-study of a higher education tutor: How can I improve my practice?* Bath: University of Bath.

Chapter three of this doctoral dissertation provides a strong review and critique of *Women's Ways of Knowing*. It begins with a summary and then goes into more detail about the various stages.

Khine, M. S., & Hayes, B. (2010). Investigating women's ways of knowing: An exploratory study in the UAE. *Issues in Educational Research*, 20(2), 105-117.

This cross-cultural application of *Women's Ways of Knowing* to the United Arab Emirates context indicates the importance of a developmental way of interpreting learning.

### ***Epistemological Reflection Model: Awareness of What and How One Knows***

#### ***The Original Text***

Baxter Magolda, M. (1992). *Knowing and reasoning in college: Gender-Related patterns in undergraduates' intellectual development*. San Francisco: Jossey-Bass.

McEwen, M. K. (1994). Knowing and Reasoning in College: Gender-Related Patterns in Students' Intellectual Development by Marcia B. Baxter-Magolda. *Naspa Journal*, 31(2), 153-157.

This is a quick and easy introduction to the work.

Smith, D. G. (1994). Review of Knowing and Reasoning in College: Gender-related patterns in students' intellectual development. *The Journal of Higher Education*, 65(4), 513–515. doi: 10.2307/2943859

This is a two-page synopsis of Baxter Magolda's research. Smith offers a pertinent critique: that Baxter Magolda's title suggests a focus on gender but by the end of the book, gender does not emerge as a theme of the publication.

Hofer, B. K. & Pintrich, P. R. (1997). The development of epistemological theories: beliefs about knowledge and knowing and their relation to learning. *Review of Educational Research*, 67(1), 88-140. doi: 10.3102/00346543067001088

Hofer and Pintrich point out that Baxter Magolda's work saw gender implications but the emphasis of her research was on the epistemological developments where she saw few gender distinctions. Their article looks at how Baxter Magolda's model allows educators to see why considering how students view their knowledge is critical to students' progress.

Baxter Magolda, M. B. (1999). Constructing adult identities. *Journal of College Student Development*, 40(6), 629-644.

Subsequent to the 1992 publication, Baxter Magolda continued producing work which further developed understanding of the epistemological reflection model, with emphasis on how students construct arguments. This article examines the epistemological development of the same group of students from college to age 30.

Bock, M. T. (1999). Baxter Magolda's epistemological reflection model. In P. G. Love & V. L. Guthrie (Eds.), *Understanding and applying cognitive development theory* (pp. 29-40). San Francisco: Jossey-Bass.

Bock provides a thorough overview of the research with detailed explanations of the various stages of knowing and applies the model to student affairs. This resource can also be accessed as an article:

Bock, M. T. (1999). Baxter Magolda's epistemological reflection model. *New Directions for Student Services*, 88, 29-40. doi:10.1002/ss.8803

Hofer, B. K. (2001). Personal epistemology research: Implications for learning and teaching. *Educational Psychology Review*, 13(4), 353–383. doi: 10.1023/A:1011965830686

This essay follows the basic premise that what students think knowledge is and how they think they know are critical components of understanding student learning. The article addresses three questions: What is personal epistemology research? How are individuals' conceptions of epistemology related to learning and instruction? What might educators do?

Shaw, J. D. (2001). *An application of Baxter Magolda's epistemological reflection model to black and latino students* (Order No. 3001673). Available from ProQuest Dissertations & Theses Global. (230929871).

Retrieved from

<http://ezproxy.lib.ucalgary.ca/login?url=http://search.proquest.com/docview/230929871?accountid=9838>

This study aimed to determine the extent to which Baxter Magolda's Epistemological Reflection Model is applicable to Black and Latino students. The study used semi-structured interviews and the Measure of Epistemological Reflection questionnaire in order to understand, from the students' perspectives, their ways of knowing.

Torres, V. & Baxter Magolda, M. B. (2004). Reconstructing Latino identity: The influence of cognitive development on the ethnic identity process of Latino students. *Journal of College Student Development*, 45(3), 333-347. The Johns Hopkins University Press. doi: 10.1353/csd.2004.0043

In this article emerging from a qualitative longitudinal study of Latina/o college students, Torres and Baxter Magolda look at cognitive development and its influence on ethnic identity development. This article offers a way of looking at cognitive development beyond the cultural parameters of previous works.

### *The Reflective Judgment Model: Ways of Thinking About Problem Solving*

#### ***The Original Text***

King, P. M. & Kitchener, K. S. (1994). *Developing reflective judgment: Understanding and promoting intellectual growth and critical thinking in adolescents and adults*. San Francisco: Jossey-Bass.

King, P. M., & Kitchener, K. S. (1994). The development of reflective thinking in the college years: The mixed results. *New Directions for Higher Education*, 84, 25-42.

This article is a summary of their longer work. The authors include statements that students would make at the various stages, cite from other examples of their own research, and then suggest questions that instructors can use to promote reflective thinking in students.

Brabeck, M. M. (1994). A review of *Developing Reflective Judgment: Understanding and Promoting Intellectual Growth and Critical Thinking in Adolescents and Adults*. *Journal of Adult Development*, 1, 4, 261-263. doi: 10.1007/BF02277586

This review of the King and Kitchener's publication goes beyond a simple summary to endorse what the reflective judgment offers college administrators, faculty, and researchers. It also discusses the instruments used to evaluate reflective judgment so as to give researchers who are interested in the theory some sense of how to use it.

Love, P. G., & Guthrie, V. L. (1999). King and Kitchener's reflective judgment model. *New Directions for Student Services*, 88, 41-51. doi:10.1002/ss.8804

This is a comprehensive summary of the key elements of the reflective judgment model.

King, P. M., & Kitchener, K. S. (2004). Reflective judgment: Theory and research on the development of epistemic assumptions through adulthood. *Educational Psychologist*, 39(1), 5–18. doi:10.1207/s15326985ep3901\_2

King and Kitchener describe some concepts integral to understanding the reflective judgment model (RJM): complex reasoning in late adolescents and adults, epistemology, and judgments about controversial (ill-structured) issues. This article describes the theoretical groundings that have shaped the development of the reflective judgment model with emphasis on the research instruments used to apply the theory. The developers of the RJM go on to provide suggestions for evaluating reflective thinking.

#### ***Synopses of the Three Branches After Perry***

West, E. J. (2004). Perry's legacy: Models of epistemological development. *Journal of Adult Development*, 11(2), 61-70. doi: 10.1023/B:JADE.0000024540.12150.69

West's article offers a comprehensive synopsis of how the three branches of thought are interrelated and the implications of teacher-student relations. West goes on to add yet another dimension of analysis by evaluating the complexities of the stages of each theory. This article is recommended for readers with some familiarity with all of the theories.

## **Applications of Perry in Different Contexts**

Below are works that apply Perry's scheme in different contexts, arranged alphabetically.

### **General Applications in Education Settings**

Love, P. G., & Guthrie, V. L. (2011). Understanding and applying cognitive development theory. *New directions for Student Services*. Hoboken: John Wiley & Sons.

Marra, R., & Palmer, B. (2004). Encouraging intellectual growth: Senior college student profiles. *Journal of Adult Development*, 11(2), 111-122. doi: 10.1023/B:JADE.0000024544.50818.1f

### **Anthropology**

McDonald, M. (2003). Dueling with dualists: Encouraging intellectual growth in the introductory level anthropology course. *Teaching Anthropology: Society for Anthropology in Community Colleges Notes*, 10(1), 27–30. doi:10.1525/tea.2003.10.1.27

### **Biology**

Katung, M., Johnstone, A. H., & Downie, J. R. (1999). Monitoring attitude change in students to teaching and learning in a university setting: A study using Perry's developmental model. *Teaching in Higher Education*, 4, 43-59. doi: 10.1080/1356251990040103

### **Career Development**

Knefelkamp, L. L., & Slepitzka, R. (1976). A cognitive-developmental model of career development: An adaptation of the Perry scheme. *Counseling Psychologist*, 6(3), 53–58. doi: 10.1177/001100007600600310

### **Chemistry**

Finster, D. C. (1989). Developmental instruction Part 1: Perry's model of intellectual development, *Journal of Chemical Education*, 8(66), 659-661. doi:10.1021/ed066p659

Finster, D. C. (1991). Developmental instruction Part 2: Application of the Perry model to general chemistry. *Journal of Chemical Education*, 9(68), 752–756. doi:10.1021/ed068p752

Lavis, C. C. (2005). *Evaluating intellectual development of horticultural students: The impact of two teaching approaches using Perry's scheme of intellectual development as measured by the learning environment preference*. (Doctoral dissertation, Kansas State University).

### **College Student Classroom Participation**

Myers, S. A. (2010). Using the Perry scheme to explore college student classroom participation. *Communication Research Reports*, 27(2), 123-130. doi: 10.1080/08824091003738016

### **Counseling**

Widick, C. (1977). The Perry scheme: A foundation for developmental practice. *The Counseling Psychologist*, 6(4), 35-38. doi:10.1177/001100007700600415

Widick C., Knefelkamp, L. L., & Parker, C. (1975). The counselor as a developmental instructor. *Counselor Education and Supervision*, 14(4), 286-296. doi:10.1002/j.1556-6978.1975.tb00882.x

### **Cross-Cultural Applications**

Zhang, L.-F. (1999). A comparison of US and Chinese university students' cognitive development: The cross-cultural applicability of Perry's theory. *The Journal of Psychology*, 133(4), 425-439. doi: 10.1080/00223989909599753

Zhang, L.-F., & Watkins, D. (2001). Cognitive development and student approaches to learning: An investigation of Perry's theory with Chinese and U.S. university students. *Higher Education*, 41, 239-261. doi: 10.1023/A:1004151226395

### **Economics**

Thoma, G. A. (1993). The Perry framework and tactics for teaching critical thinking in economics. *Journal of Economic Education*, 24, 128 – 136. doi:10.1080/00220485.1993.10844786

## **Education**

Akerson, V. L., Buzzelli, C. A., & Donnelly, L. A. (2008). Early childhood teachers' views of nature of science: The influence of intellectual levels, cultural values, and explicit reflective teaching. *Journal of Research in Science Teaching, 45*(6), 748-770. doi: 10.1002/tea.20236

## **Engineering**

Ahmad, N., Yusof, K. M., Kosnin, A. M., & Daniel, S. K. M. (2012). Comparison between two models of engineering students' intellectual development. *Procedia - Social and Behavioral Sciences, 56*(2), 617-626. doi:10.1016/j.sbspro.2012.09.696

Felder, R. M., & Brent, R. (2004). The intellectual development of science and engineering students. Part 1: Models and challenges. *Journal of Engineering Education, 93*(4), 269-277. doi:10.1002/j.2168-9830.2004.tb00816.x

Felder, R. M., & Brent, R. (2004). The intellectual development of science and engineering students. Part 2: Teaching to promote growth. *Journal of Engineering Education, 93*(4), 279-291. doi:10.1002/j.2168-9830.2004.tb00817.x

Irish, R. (1999). Engineering thinking: Using Benjamin Bloom and William Perry to design assignments. *Language and Learning Across the Disciplines, 3*(2), 83-102.

Marra, R. M., Palmer, B., & Litzinger, T. A. (2000). The effects of a first-year engineering design course of student intellectual development as measured by the Perry scheme. *Journal of Engineering Education, 89*(1), 39-45. doi:10.1002/j.2168-9830.2000.tb00492.x

Pavelich, M. J., & Moore, W. S. (1996). Measuring the effect of experiential education using the Perry model. *Journal of Engineering Education, 85*(4), 287-292. doi:10.1002/j.2168-9830.1996.tb00247.x

Zhu, J., & Cox, M. F. (2015). Epistemological development profiles of Chinese engineering doctoral students in U.S. institutions: An application of Perry's theory. *Journal of Engineering Education, 104*(3), 345-362. doi: 10.1002/jee.20080

## **English**

Kloss R. J. (1994). A nudge is best: Helping students through the Perry scheme of intellectual development. *College Teaching, 42*(4), 151-158. doi: 10.1080/87567555.1994.9926847

## **Gender and Student Affairs**

Bock, M. T. (1999). Baxter Magolda's epistemological reflection model. In P. G. Love & V. L. Guthrie (Eds.), *Understanding and applying cognitive development theory* (pp. 29-40). San Francisco: Jossey-Bass.

or

Bock, M. T. (1999). Baxter Magolda's epistemological reflection model. *New Directions for Student Services, 88*, 29-40. doi:10.1002/ss.8803

## **Gifted High School Students**

Thomas, J. (2008). Reviving Perry: An analysis of epistemological change by gender and ethnicity among gifted high school students. *Gifted Child Quarterly, 52*(1), 87-98. doi: 10.1177/0016986207311422

## **Information Literacy**

Jackson, R. (2007). Cognitive development: The missing link in teaching information literacy skills. *Reference & User Services Quarterly, 46*(4), 28-32.

Jackson, R. (2008). Information literacy and its relationship to cognitive development and reflective judgment. *New Directions for Teaching and Learning, 114*, 47-61. doi: 10.1002/tl.316

Whitmire, E. (2003). Epistemological beliefs and the information-seeking behavior of undergraduates. *Library & Information Science Research, 25*(2), 127-142. doi:10.1016/S0740-8188(03)00003-3

### **Interior Design**

Carmel-Gilfilen, C., & Portillo, M. (2010). Creating mature thinkers in interior design: Pathways of intellectual development. *Journal of Interior design*, 35(3), 1-20. doi: 10.1111/j.1939-1668.2010.01043.x

Karlson, R. W. (2014). Perry's scheme of intellectual and ethical development influence on Duckworth's short grit score in interior design students (Order No. 1585588). Available from ProQuest Dissertations & Theses Global. (1667750475). Retrieved from <http://ezproxy.lib.ucalgary.ca/login?url=http://search.proquest.com/docview/1667750475?accountid=9838>

### **Mathematics**

Copes, L. (1982). The Perry development scheme: A metaphor for learning and teaching mathematics. *For the Learning of Mathematics*, 3(1), 38-44.

### **Medicine**

Gogan, C. M., & Davis, E. L. (1997). An assessment of the intellectual development of dental students. *Journal of Dental Education*, 61(10), 781-786.

### **Music**

de l'Etoile, S. K. (2008). Applying Perry's scheme of intellectual and ethical development in the college years to undergraduate music therapy education. *Music Therapy Perspectives*, 26(2), 110-116. doi: 10.1093/mtp/26.2.110

### **Natural Sciences**

Clarkeburn, H.M., Downie, J.R., Gray, C., and Matthew, R.G.S. (2003). Measuring ethical development in life sciences students: a study using Perry's developmental model. *Studies in Higher Education*, 28(4), 443-456. doi:10.1080/0307507032000122288

Markwell, J., & Courtney, S. (2006). Cognitive development and the complexities of the undergraduate learner in the science classroom. *Biochemistry and Molecular Biology Education*, 34(4), 267-271. doi: 10.1002/bmb.2006.49403404262

Nelson, C. (1999). On the persistence of unicorns: the trade-off between content and critical thinking revisited. In B. A. Pescosolido & R. Aminzade (Eds.), *The Social Worlds of Higher Education: Handbook for Teaching in a New Century* (pp. 168-184). Thousand Oaks, CA: Pine Forge Press.

### **Nursing**

Thomas, P. A. (1990). *Cognitive development in a traditional and nontraditional nursing student population* (Order No. 9032094). Available from ProQuest Dissertations & Theses Global. (303845731). Retrieved from <http://ezproxy.lib.ucalgary.ca/login?url=http://search.proquest.com/docview/303845731?accountid=9838>

### **Philosophy**

Rapaport, W. J. (1982). Unsolvable problems and philosophical progress. *American Philosophical Quarterly*, 19(4), 289-298. Retrieved from <http://www.jstor.org/stable/20013970>

### **Psychology**

Johnson, D. D. (1994). Dualistic, multiplistic, and relativistic thinking as it relates to a psychology major. *Honors Theses*, 202.

Zhang, L. (2002). Thinking styles and cognitive development. *The Journal of Genetic Psychology*, 163(2), 179-195. doi: 10.1080/00221320209598676

### **Studying Abroad**

McKeown, J. S. (2009). *The first time effect: The impact of study abroad on college student intellectual development*. Albany, NY: SUNY Press.

Palmer, N. W. (2015). Inverting the object of study: Recalibrating the frame of reference in study abroad experiences. *Teaching Theology & Religion*, 18(1), 63-72. doi: 10.1111/teth.12264

### **Theology**

Henze, M. E. (2006). Re-examining and refining Perry: Epistemological development from a Christian perspective. *Christian Education Journal*, 3(2), 260-277.

Locklin, R. B. (2013). Teaching with complicating views: Beyond the survey, behind the pro and con. *Teaching Theology & Religion*, 16(3), 201-220. doi: 10.1111/teth.12043

### **Writing**

Burnham, C. C. (1986). Teaching with a purpose: The Perry scheme and the teaching of writing. *Rhetoric Review*, 4, 152-158. doi:10.1080/07350198609359117

Hays, J. N. (1987). Models of intellectual development and writing: A Response to Myra Kogen et al. *Journal of Basic Writing*, 6(1), 11.

Martinez, J. G., & Martinez, N. C. (1987). Reconsidering cognition and the basic writer: A response to Myra Kogen. *Journal of Basic Writing*, 6(2), 79-82. Retrieved from <http://www.jstor.org/stable/43443485>

Shapiro, N. S. (1985). Rhetorical maturity and Perry's model of intellectual development: A study of college students' writing and thinking. Washington, D.C.: Educational Resources Information Center ERIC.