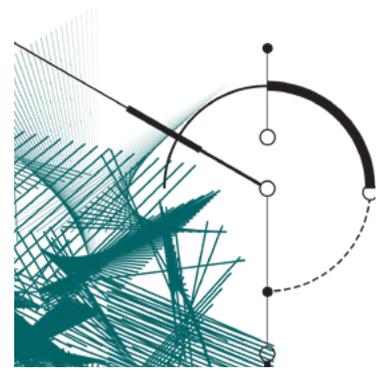


Notes in Brief

Bias is part of the human condition and becoming aware of how to avoid bias will help to ensure greater accuracy in the work of assessment. In this paper the authors discuss three different theoretical frameworks that can be applied when assessing student work for cognitive skills such as critical thinking and problem solving. Each of the frameworks highlights the importance of underlying response structure, rather than specific perspective expressed, in evaluating the quality of the response. The authors provide examples of how focusing on the structure of the response within each framework will help those assessing student work to minimize bias in their scoring and discuss how recent developments in higher education necessitate more work in this area.



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Minimizing Bias When Assessing Student Work

The work of faculty, assessment professionals, and scholarship of teaching and learning (SOTL) researchers often requires assessing the qualitative, open-ended work of students and in some way codifying it by outcome criteria into meaningful levels to determine how well students are meeting the outcomes. This could be part of grading for a course, doing course-embedded program assessment, or assessing student products from across departments and disciplines as occurs with scoring for general education assessment or for research purposes. Most often, some kind of rubric is used to assist with this coding or scoring of materials. The rubric could represent levels of outcome criteria that are part of a grade for an assignment, program outcomes, institutional-wide standards, or the demonstration of specific skills or beliefs. In all cases, the possibility exists that the scorer may be influenced by the perspective or point of view of the writer. The writer's perspective will further affect the content emphasized and source materials used. When this perspective does not match the perspective of the scorer and emphasizes different content and source materials than the scorer would, there exists a chance of bias resulting in scoring that is based not only on the outcome criteria being assessed but also on the perspective of the writer.

As psychologists who are involved in assessment and interested in cognitive skills and intellectual development, the authors have realized that bias has the potential to affect assessment at all levels. Often cited in this regard is what social psychologists refer to as confirmation bias, the human tendency to agree with and assess as more valid those facts and opinions that are consistent with one's own beliefs (Nickerson, 1998). Furthermore, social psychologists have demonstrated that humans have the tendency to exhibit attitudinal bias, even without awareness, for a number of distinctions including race, gender, age, and nationality (e.g., Greenwald & Krieger, 2006). Research also supports that under some conditions negative emotions can increase implicit bias (Dasgupta, DeSteno, Williams, & Hunsinger, 2009). In short, bias happens. Moreover, it is difficult to recognize, especially in oneself.

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We argue that the potential for bias is a concern when assessing student work and that when it does occur scorers are often not aware that the bias is operating.

We argue that the potential for bias is a concern when assessing student work and that when it does occur scorers are often not aware that the bias is operating. We present two common experiences that illustrate the point, both of which have been observed by the authors on multiple occasions, and we suspect by many readers as well. The first is a situation that occurs in grading. It is common for students, particularly first- and second-year students, to have a strong reaction to some topics that are presented in class even when they are presented in a fair and balanced manner (e.g., environmental issues, racism or sexism, religion). In these situations, some students will use an assignment to loudly voice an opinion that they perceive to be going against that of the instructor by countering a major perspective that was part of the class. When done well this approach can demonstrate critical thinking skills; even when it is not done well it is crucial that the instructor stays focused on the quality of the argument and is not biased by the student's perspective. In some cases, the student may have even misinterpreted the points being made by the instructor but the emotional tenor of the work suggests the student's perspective is deeply held. In these situations, it becomes even more important that the instructor is not exhibiting bias. However, just being aware of the need to remain unbiased does not provide instructors with tools or guidance for helping them to do so.

The second example is one that may be seen in program or institutional assessment and in research when two or more independent scorers read and score the same student sample and come together to reconcile their scores. In this situation, it is not uncommon for the scores to be very similar until the scorers encounter work on a controversial topic wherein the student's perspective is either completely consistent or completely opposite that of one of the scorers. Typically, when confronted with the extreme difference in scoring with a partner for which there is usual agreement, the discrepant scorer will then re-read the student product and recognize that the scoring was too generous or too harsh.

Importance to Current State of Higher Education

The issue addressed in this article is how to minimize bias when assessing student work for outcomes related to thinking skills (e.g., problem solving, critical thinking) which are not relevant to the student's perspective. Implementing systematic strategies to avoid bias has become even more crucial in the current climate where tension between groups with opposing viewpoints is high and "liberal lean" is being identified as a problem in higher education (e.g., Abrams, 2017). Two important changes in higher education highlight the need for more work on bias.

First, higher education serves and will continue to serve an increasingly diverse student population (e.g., Bok, 2013; McGee, 2015). As Bok (2013) notes, the current audience for higher education has expanded in the last 40 years to include a much greater variety of students including more older, low-income, and international students and more students who are working full time. McGee (2015) refers to demographic, economic, and cultural transitions that indicate in the future even more students will be first-generation, low-income, or students of color and particularly Hispanic or Latino/a. Discussing the potential for bias when assessing student work can help raise awareness among faculty scorers about the ways in which perspectives traditionally underrepresented in higher education could get discounted.

Second, higher education has recently suffered a loss of respect among some groups. For example, based on a recent study from the Pew Research Center (July 2017), the majority of Republicans view the effects of colleges and universities to be negative and part of this negativity seems to be related to differences in ideology. Focusing on potential bias could help to address this concern.

Relevant Theoretical Frameworks

In this paper, the authors demonstrate how three theoretical frameworks can help avoid bias when assessing student products for intellectual competencies such as critical thinking and problem solving: 1) Cognitive Structures in Developmental Theories, 2) Knowledge Structures, and 3) Argument Structures. Each framework provides some

specific insights into strategies for minimizing bias and the authors provide examples of how those strategies can be applied to assessment. Although this article focuses specifically on the assessment of cognitive and intellectual skills such as critical thinking and problem solving, some of the strategies discussed here could be applied to other skills as well (e.g., communication skills).

Cognitive Structures in Developmental Theories

Developmental theories that can be helpful to addressing bias in assessment include those that focus on intellectual development such as Perry (1968/1970) and others who built on his work (Baxter Magolda, 1992; King & Kitchener, 1994), moral/ethical development (Kohlberg, 1964; Rest, 1979), and development of intercultural sensitivity (Bennett, 1993). These theories share a common underlying structure comprised of stages that move from simplistic to increasingly complex ways of knowing, thinking, and perceiving.

Developmental theories. Perry's (1968/1970) scheme of intellectual and ethical development describes the evolution of college students' conceptions of the nature of knowledge and truth and how they come to reason in an increasingly complex manner. Nine positions or stages trace the student's journey from Dualism (all knowledge is known, right and wrong answers exist for everything), through Multiplicity (diversity of opinion and uncertainty with respect to knowledge become legitimate and more extensive), into Contextual Relativism (all knowledge is contextual, students perceive themselves as makers of meaning), and finally, Commitment within Relativism (Commitments, as affirmations of self, must be made in a relativistic world).

Kohlberg's (1964) theory illustrates the development of moral reasoning across six stages that are grouped in pairs to form three broad levels. Pre-conventional reasoning defines right and wrong based on obedience to authority, punishment and reward, and cooperation that benefits oneself. Conventional reasoning involves reciprocity, approval of others, and the rule of law to protect the social order. Post-conventional reasoning recognizes multiple ways of arranging a stable social order, acknowledges the existence of basic human rights, applies procedures for establishing systems of social cooperation, and appeals to abstract principles that a rational, fair-minded society would choose to govern its moral system.

Bennett (1993) extended Perry's scheme of intellectual development to describe changes in how people construe cultural difference. His developmental model of inter-cultural sensitivity includes six stages where the first three reflect ethnocentric perspectives and the last three reflect ethnorelative perspectives. In Denial people do not recognize that cultural differences even exist. In Defense others who are culturally different are categorized as "them" in contrast to "us." In Minimization superficial cultural differences are acknowledged but do not matter because all people are human. In Acceptance people are aware of their own culture as one of many and they may enjoy exploring cultural differences. In Adaptation they apply their knowledge of different cultures to shift intentionally from one frame of reference to another and modify behavior appropriately. Finally, Integration involves contextually interpreting a variety of cultural frames of reference, some of which are in conflict with each other and may not be fully reconciled.

Structure. All of these theories are in the cognitive developmental family and share some common assumptions, including the fundamental idea that there is an underlying structural organization to how one interprets the world and understands and solves problems. These cognitive structures function as filter systems to organize experience and thought. Structural organization leads to another assumption of this family of theories: cognitive development is a process that is content-free. That is, because development is defined as the increase in complexity of the cognitive structures used by an individual to interpret and order the outside world, then it can be conceptualized as an on-going process and not a fixed-content outcome. Therefore, what matters with respect to development is not what or how much an individual experiences but how the individual thinks about,

The issue addressed in this article is how to minimize bias when assessing student work for outcomes related to thinking skills (e.g., problem solving, critical thinking) which are not relevant to the student's perspective.

interprets, and orders his or her experience in qualitatively different ways. In his original publication Perry (1968/1970) emphasizes that development “takes place in the forms in which a person perceives his world rather than in the particulars of ‘content’ of his attitudes and concerns. The advantage in mapping development in the forms of seeing, knowing, and caring lies precisely in their transcendence over content” (p. ix).

With respect to avoiding bias when assessing student work, a strategy implied by cognitive developmental theories like Perry, Kohlberg, and Bennett would be to assess how a student’s reasoning evolves from black-and-white thinking to recognizing multiple viewpoints and understanding the role of context in framing critical analysis and problem solving.

The content/process issue is addressed repeatedly throughout the literature on cognitive developmental theory. Learning is viewed as the acquisition of increasingly abstract concepts and occurs independent from the content or specific nature of the concepts involved. The stages in Kohlberg’s (1964) model of moral development are based on the assumption that content and process are distinct from each other. Indeed, in his original dilemma whether a person agreed or disagreed that Heinz should steal the drug to save his wife was irrelevant; only the underlying structure of moral reasoning mattered. As Rest (1979) explains, “Each stage is described in terms of formal structures of reasoning, not in terms of the content of judgments and values generated” (p. xi). It should be noted that an underlying assumption of the cognitive developmental approach is that an increase in cognitive complexity implies more adequate and mature reasoning. For example, when confronted with an ethical dilemma, a more complex reasoner would consider such issues as the consequences of one’s behavior and the effects on others while a more simplistic reasoner would primarily be concerned with simple reward and punishment.

Strategies. With respect to avoiding bias when assessing student work, a strategy implied by cognitive developmental theories like Perry, Kohlberg, and Bennett would be to assess how a student’s reasoning evolves from black-and-white thinking to recognizing multiple viewpoints and understanding the role of context in framing critical analysis and problem solving. The AAC&U Problem Solving Rubric (Association of American Colleges and Universities, 2009b) reflects a similar underlying structure and acknowledgment of the role of context. Contrasting examples are illustrated in the Define Problem criterion where the lowest level reads, “Demonstrates a limited ability in identifying a problem statement or related contextual factors” versus the highest level, “Demonstrates the ability to construct a clear and insightful problem statement with evidence of all relevant contextual factors.” The Problem Solving Analysis Protocol (P-SAP) poses a problem or issue that students analyze by responding to a series of questions (Steinke & Fitch, 2003). The P-SAP has been revised over the years; the most recent version can be found at <http://departments.central.edu/psychology/faculty/psap/>. The P-SAP can be used to assess the underlying structure of student analysis to the extent that students frame the problem and potential solutions simplistically or from a limited perspective, versus analyzing it in a more complex manner from various perspectives. For example, in response to an issue about parents being blamed for how their kids turn out, students’ analyses of the problem could vary in complexity from low (example 1) to high (example 2):

Example 1. Kids might think they have bad parents.

Example 2. Peers and media often have a stronger influence in children’s lives than their parents because children often spend more time with their friends and listening to music, watching television, and playing video games. School has a very strong impact on children’s behavior as well because teachers and other students often treat each person differently or a classroom may be categorized as a whole and individual differences aren’t recognized.

When assessing students’ responses on the P-SAP, another strategy implied by two of these cognitive developmental theories is to assess how a student’s analysis of the problem shifts from a focus on individual, personal factors (as in Kohlberg’s Pre-conventional reasoning or Bennett’s Ethnocentrism) to include broader systemic factors (Kohlberg’s Conventional reasoning) and finally to integrated individual and systemic factors (Kohlberg’s Post-conventional reasoning and Bennett’s Ethnorelativism). Three examples below illustrate these differences in the underlying cognitive structure of students’ interpretations and analyses; students responded to a P-SAP prompt asking for potential solutions to the problem of reliance on standardized tests as the most important measure of student success.

Example 1. People could look more at the student's performance throughout the year.

Example 2. Research needs to be done in order to find out the best way to measure success.

Example 3. Schools need standardized tests that accommodate all learning styles, a variety of interests, and a variety of testing styles. Plus teaching and learning occur at local levels and they do vary city to city, state to state. Standardized tests need to take into account specific emphasis schools and teachers place on certain subjects and create local testing that matches local teaching and then set up a national guideline of materials to be covered.

The first example posits a solution based solely on the individual student. The second implies that there is a best method for measuring success and proposes research as the way to discover it, a solution focused entirely on the system. The third example integrates both individual (learning styles, interests) and systemic factors (local variations in teaching by school, city, and state; national guidelines for materials) when addressing solutions. Using the framework of developmental theories, the latter response is a more cognitively complex analysis of solutions to the problem posed.

Knowledge Structures

The second theoretical framework that provides direction in coding was developed by cognitive scientists to describe how knowledge is organized and processed (e.g., Graesser & Clark, 1985; Schank, 1986; Schank & Abelson, 1977). Classic work by Schank and Abelson (1977) identified the importance of knowledge structures in the form of scripts to human understanding and planning. This work also drew attention to the important role of goals in comprehension and the need to identify different types of goals. Graesser & Clark's Generic Knowledge Structure (GKS) approach was developed to further explain text comprehension including the causal and superordinate goal inferences used to provide coherence to a text. For our purposes, an important aspect of this family of theories is how they are used to identify types of knowledge, relationships between nodes of knowledge/meaning units, and inferences made in order to connect knowledge. This focus on the abstract knowledge structure rather than the knowledge content is what makes the application of this theoretical framework useful to minimizing bias when assessing student work. For example, Graesser & Clark identify four different types of knowledge nodes (i.e., state, event, goal, and style) with arcs representing the structural relationships between nodes (i.e., consequence, reason, outcome, initiate). These structures contribute to response coherence.

Strategies. With respect to avoiding bias when assessing student work, a strategy implied by the knowledge structure approach is to focus on the structural coherence of the student's explanatory response. Schank (1986) suggests explanations are types of knowledge structures enacted when a pre-existing knowledge structure is not available. In the search to find a relevant knowledge structure that might work for the explanation, the respondent calls up relevant knowledge structures and puts them together in a coherent pattern to provide an explanation. Paying attention to types of knowledge and types of relationships between knowledge nodes allows the scorer to focus on the coherence of the knowledge structure itself. When applied to coding students' responses, scorers can focus on the coherence of student knowledge nodes connected with arcs and held together with inferences into a logical causal or goal structure. For example, one of the descriptors for scoring a response on the highest level of complexity in the P-SAP rubric is, "at least two different factors explained/elaborated and situated in context with causal connections either between or within the factors." Similarly, the highest level of the last criterion in the AAC&U Critical Thinking Rubric (Association of American Colleges and Universities, 2009a) is, "Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order." These descriptors highlight the connections between nodes of knowledge or the need to develop a coherent knowledge structure.

The P-SAP can be used to assess the underlying structure of student analysis to the extent that students frame the problem and potential solutions simplistically or from a limited perspective, versus analyzing it in a more complex manner from various perspectives.

Four different example responses from the same P-SAP prompt illustrate differences in complexity of causal structures and coherence of explanations. All respondents are being asked to explain the cause of parents being blamed for how their kids turn out.

Example 1. Other people in communities tend to cause this problem. When students misbehave in school, act out in the community, etc. parents get the blame and get looked down on. People think obviously the parents must have done something wrong.

Example 2. Most people believe that the parents have the greatest effect on children, but while they do have a big role, they are not the only role in the development of that child. While the parents may have some influence, they may not be the whole problem with how the child “turns out.”

Example 3. I think society instantaneously blames the parents and dismisses themselves or peers because “origin” and background is a huge means of defining status and character/personality, thus we look to this first to blame. It only makes sense, at first, to think of the effects of parents.

Example 4. Parents have become the targets of blame for the way children turn out because it is easy to blame parents. Parents become a scapegoat because no one else wants to be at fault and throughout history people have always seen parents as being responsible for their child’s behavior. It is simple to blame parents and it is complex to blame a number of factors, so parents usually get blamed.

Sometimes it is not a matter of the student citing what “they” said but acknowledging that the other view will have something to say that must be considered. For example, in the P-SAP Locus rubric, greater elaboration of a single perspective, including a recognition of the need to gather more information, is an indicator that the individual is moving higher up on the scale toward the ability to clearly articulate an elaboration of two different perspectives.

While each response addresses the prompt, in the first two examples the statements that make up the responses are not connected causally to form a coherent explanation. In the third and fourth examples, however, the responses include clear causal connections between different propositional content. The coherence of the explanation can be seen in the pattern that emerges from the successful integration of different nodes of knowledge (i.e., origin as indication of character leads to looking at parents first; ease of identifying parental role throughout history leads to avoiding complex answers).

Argument Structures

The last theoretical framework that provides direction is one that was not developed by psychologists to capture intellectual development or knowledge structures but rather one that was developed by English professors Graff and Birkenstein (2014) to identify argument structures that help students enter the world of academic discourse through their writing. We include the “they say / I say” framework (along with its associated templates) because, as the authors assert, it “represents the deep, underlying structure, the internal DNA as it were, of all effective argument” (p. xix). From a psychologist’s viewpoint, the authors are claiming that the template reflects an internal cognitive structure for effective argumentation that could easily be identified as a component of critical thinking, much like causal knowledge structures discussed previously in this paper.

Strategies. With respect to avoiding bias when assessing student work, a strategy implied by this framework is to take out the content altogether and determine whether the structure of an argument exists; if so, then evaluate the quality and complexity of the argument structure itself. Although there was no original connection to the work of Graff and Birkenstein (2014), the development of the P-SAP protocol and rubric reflects this same framework. As noted previously, the rubric reflects the importance of students recognizing both systemic and individual aspects of a problem at the highest levels of complexity. This recognition is often revealed through a dialogue in which the student accepts parts of some views but not all, a version of the “they say / I say” template. An example demonstrates how the P-SAP encourages this dialogue in a response to a question about the solution to increased reliance on standardized tests in education: “Do away with tests all together, *that is what some people may think. I think that* standardized tests are important, but not what a child’s educational standing should be solely based on.” Awareness of the structure of the argument, independent of content, will help to ensure that scoring is not affected by

a scorer's agreement or disagreement with the content. The above has a clear "they say / I say" framework in the italicized portions, independent of content. In fact, the content could be switched and it would have the same level of cognitive complexity as in the following example: "Standardized tests are important, but should not be the sole basis of a child's educational standing *is what some people think. I think* that we should do away with standardized tests altogether."

Sometimes it is not a matter of the student citing what "they" said but acknowledging that the other view will have something to say that must be considered. For example, in the P-SAP Locus rubric, greater elaboration of a single perspective, including a recognition of the need to gather more information, is an indicator that the individual is moving higher up on the scale toward the ability to clearly articulate an elaboration of two different perspectives. When "they say" is acknowledged separate from "I say" the scorer should be looking for either an understanding of the importance of getting the "they say" right or a demonstration by the author of the ability to fully articulate the other view. As Graff and Birkenstein (2014) argue, "When a writer fails to provide enough summary or to engage in a rigorous or serious enough summary, he or she often falls prey to what we call 'the closest cliché syndrome,' in which what gets summarized is not the view the author in question has actually expressed but a familiar cliché that the writer *mistakes* for the author's view" (p. 33). In combination with the strategies discussed earlier, becoming more aware of the structure and quality of the argument, regardless of content, will help to minimize bias when assessing student work.

Faculty awareness of the importance of structure may be heightened by incorporating discussion of these frameworks into faculty development at the program or institutional level, especially prior to the scoring of student work.

Conclusion and Implications for Future Work

In this paper we have demonstrated how three different theoretical frameworks can be applied to the assessment of student work to help minimize bias. The frameworks are not meant to be exhaustive and much more could be done to demonstrate how each of the three presented here can be applied to assessing student work. The intent of this paper is to increase awareness of how a focus on structure can help to minimize bias. In doing so, the authors are not arguing that content is unimportant. To the contrary, content is crucial for evaluating the coherence of the structure. However, within a coherent structure, the perspective and resultant content of the respondent may not be relevant to the scoring of student work when evaluating thinking skills such as problem solving and critical thinking.

Student awareness of the importance of structure may be heightened by sharing these theoretical frameworks and the strategies implied by them with students at the course level. Sharing the frameworks would also help students develop cognitive skills for critical thinking and problem solving. Indeed, Graff and Birkenstein (2014) explicitly recommend teaching students how to use the "they say / I say" template as a strategy for helping them learn how to develop effective arguments. With respect to Perry's (1968/1970) scheme, the value for sharing this framework with students comes less from teaching them about the developmental stages than from helping them learn how to use questions that prompt growth from one stage to the next and challenge them to think and problem solve in more complex ways. Questions such as, "Are there other ways to define this problem?" could challenge a student in Dualism toward Multiplicity, or "What evidence would support your analysis of this problem?" or "What strengths and limitations does your proposed solution have that might not apply everywhere?" could prompt the shift from Multiplicity into Contextual Relativism. Doing so has the potential to develop students' critical thinking and problem-solving skills regardless of their specific perspective on the issue.

Faculty awareness of the importance of structure may be heightened by incorporating discussion of these frameworks into faculty development at the program or institutional level, especially prior to the scoring of student work. Incorporating these frameworks into training sessions to prepare for scoring can also have the added benefit of increasing inter-rater reliability. Moreover, Perry's scheme has implications for the design of courses, pedagogy, curriculum, and assessment (Knefelkamp, 1974; Moore, 2000). Training faculty about these stages of intellectual and ethical development can raise their awareness

of the underlying structure of students' reasoning about complex issues and, ideally, help them avoid getting distracted by the specific perspective expressed that might differ from their own.

Beyond these specific insights, there are some broader implications for increasing awareness of bias when assessing student work and reasons for furthering research in this area. One of the major challenges for higher education is how to welcome all voices and all perspectives whether or not they are expressed in the traditional language of the academy. This point was highlighted in the landmark work on Women's Ways of Knowing (Belenky, Clinchy, Goldberger, & Tarule, 1986) that increased awareness of how gender can influence intellectual development. Ross (2016) argues that communication mismatch theory helps to explain why so many "new majority" college students (e.g., low income, immigrant, first-generation) do not complete college or do not perform to their full potential. This theory states that how a person uses spoken and written language, as well as the attitudes and body language exhibited, will unconsciously be interpreted differently when experienced by someone who is not of the same background or culture as the communicator, and that this misinterpretation may have unintended consequences. According to Ross, the resultant misunderstanding or miscommunication is often never consciously acknowledged or analyzed but can have a major impact on how well higher education supports new majority students. Our claim is that it can also impact how biased we are when assessing student work. Encouraging faculty to acknowledge the bias inherent in any perspective and to actively find ways to maintain high academic standards while countering that bias may encourage more diverse thinking in higher education to the benefit of all.

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