

THE ISSUE OF PSYCHOLOGICAL CALIBRATION BETWEEN STUDENTS' SELF-PERCEPTION AND THEIR ACTUAL PERFORMANCE

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Abstract

The prediction of occurrence of events in one's existence is facilitated by their thoughts; creating the means for exercising control over those things that affect their daily lives (Bandura, 1986). Calibration gauges the degree to which learners can subjectively make a judgment about their ability to perform a task and subsequently be able to make an accurate assessment of how they performed after the task has been concluded. Theoretically, Winne (2001) posits that inaccurately calibrated learners cannot self-regulate productively. This paper review the construct of academic calibration from its conceptual development and its relation to the concept of self-efficacy. The paper outlines significant researchers that support and offer empirical documentation about the construct of academic calibration.

Keywords: Calibration, Self-Efficacy, Metacognition, Self-Regulation, Self-perception

Introduction

Bandura (1986) posits that a major function of thought is to enable people to predict the occurrence of events and to create the means for exercising control over those things that affect their daily lives. This literature review will address the construct of academic calibration. It will conceptually define calibration from the perspective of metacognition and self-regulation. The paper will proceed to discuss the significance of academic calibration. Subsequently, the paper will describe how academic calibration is measured in the cognitive science model, but will focus more on how it is measured in the social cognitive approach. The paper will then progress to consider academic achievement calibration in terms of perceived self-efficacy and self-concept. Finally, the paper will point out how culture mediates academic calibration and also how it manifests across different groups of students in respect to self-efficacy.

Achievement Calibrators: Definition and Conceptual Development

The capability to make a fairly accurate judgment or prediction of one's future performance has been described conceptually as a metacognitive process. Metacognition as a construct was originally derived from Flavel's (1979, as cited in Pintrich et al, 2000) seminal work, which focused on the different types of memory and cognition strategies that learners have at their disposal in order to acquire and process information and knowledge (Pintrich, Wolters & Bexter, 2000).

Additionally, Pintrich, et al (2000) in their work theoretically combined the concept of metacognition with the construct of self-regulation, articulating self-regulation as a learning process by which learners acquire, monitor, and regulate their acquisition and utilization of knowledge. Research indicates that metacognitive processes such as calibration and self-assessment are positively correlated to achievement (McMillian and Hearn, 2009).

According to Pintrich et al (2000), the combination of self-regulation with conceptualization of metacognition involves three interconnected but conceptually different components: that is, metacognitive knowledge, metacognitive judgment or monitoring, and self-regulation and control. In metacognitive knowledge, learners utilize declarative knowledge, procedural knowledge and conditional knowledge in their knowledge cognition and strategies to acquire and process information. In this first component of

metacognitive knowledge according to Pintrich et al, being familiar with the task and its context are crucial in order for learners to have a thorough comprehension of the new information.

In respect to metacognitive judgment and monitoring, a learner is expected to predict the level of task difficulty, which is how easy learning the information will be. It involves monitoring comprehension, which is an accurate assessment of one's learning. This actually helps the learner accurately assess that the information is really known. The third component of metacognition is self-regulation and control, which refers to how learners are engaged in four different processes of learning. These processes are as follows: learners plan their learning activation by efficient use of time and goal setting; carefully pick and use learning strategies; distribute resources for learning; and exercise volitional control to modulate their affect, motivation and social interactions.

Thus calibration can be described as a metacognitive assessment that attempts to accurately predict how well individuals will approximate their performance in a particular task prior to engaging in the task, or after completion of the task. Chen (2003) summarized that achievement calibration is the degree of consistency between learners' judgment of their competence to perform a task and their actual performance on the task.

The Significance of Achievement Calibration

Theoretically, Winne (2001) posits that inaccurately calibrated learners cannot self-regulate productively, because overconfident learners wrongly believe that they do not need to address and correct deficiency in their metacognitive knowledge and have insufficient motivation to adjust their study strategies. Overconfident learners are more likely to neglect effortful learning strategies under the false assumption that effort is not required or necessary, and as such will be demotivated to make any changes in their learning process. Conversely, learners who are under-confident about their actual metacognitive knowledge will overcompensate in their learning strategies because they have inaccurately assessed that their learning strategies are ineffective. In fact, Winne and Perry (2000) pointed out that for under-confident learners, the adjustment of their learning strategies may result in no academic benefit since their achievement is already exceeding the required benchmark of the task in focus. In some occasions Winne and Perry (2000) suggested that any further adjustment done by the under-confident learner may create unnecessary metacognitive overload; as such self-regulation may damage progress towards learning goals.

This is precisely why Bandura (1997) posits that slight overconfidence in one's self efficacy calibration is beneficial for being psychologically adaptive. This is due to the potential benefit of overconfidence on effort and persistence, because what might first appear to be poor calibration in the form of overconfidence can be re-conceptualized as a set of optimistic self-evaluation that may give an individual the impetus to accept and tackle challenges. Nevertheless, Bandura and some other calibration researchers (e.g., Pajares & Kranzler, 1995; Winne, 2001) admonish against an overinflated confidence, proposing that unrealistic over-confidence is most likely to make a student engage in self-handicapping academic behavior.

Basic Measurement of Calibration

As pointed out earlier, calibration gauges the degree to which learners can subjectively make a judgment about their ability to perform a task and subsequently be able to make an accurate assessment of how they performed after the task has been concluded. One is said to have good calibration in any given domain if his or her confidence level for any particular task in the domain matches well with subsequent performance. By contrast, poor calibration reflects definite variance between judgment and evaluation of one's competence and his or her actual performance (Pajares & Kranzler, 1995).

There are basically two types of calibration dimensions, as is reflected in various researches. *Prediction* calibration measures the accuracy of one's self efficacy judgment made before attempting a task (e.g. Chen, 2002). *Postdiction* calibration is a form of collaboration measurement that allows an individual to make a judgment or confidence reading after completing a task (e.g. Lin & Zabucky, 1998).

In the cognitive sciences the approach to calibration research is described as probabilistic. It is the feeling of knowing whether one is making an accurate judgment. These probabilistic researchers ask participants to rate their feelings of confidence for their answers to several multiple-choice questions (for example, I am 90% confident that the answer I gave was correct). Subsequently, a participant's postdiction

confidence ratings are matched up to the percentage of the right answers given by the participant. These results in a calculation which allows researchers to develop a calibration curve for each participant based on the relative difficulty of the tasks (Lichtenstein et al, 1982; Schraw, 1995).

In his extensive reviews of studies completed under the framework of probabilistic cognitive assessment approach, O'Connor (1989) posited that adults' prediction and postdiction calibration is associated to the context of the task, the familiarity with test requirements, and the adequacy of the feedback on the results of previous related tasks. He noted that confidence ratings from even inexperienced adult participants were usually reliable based on the reported test-retest and split-half correlation coefficient. The rating ranged from $r = .72$ to $r = .85$ in most of the experimental calibration studies.

The postdiction methodology is a common method in the probabilistic cognitive assessment approach and it is also used in some social cognitive research. However, the social cognitive approach to calibration research is more tilted toward the prediction calibration measurement method (e.g. Chen & Zimmerman, 2007; Pajares & Kranzler, 1995). The social cognitive approach of prediction calibration studies is more related to self-efficacy judgment and performance on comparable tasks. The social cognitive theory method for determining calibration takes into consideration differences between accuracy and bias (Schraw, 1995). For example, using common scales where scores range from 0 to 5 (e.g. Chen) and one's bias on a task is the signed difference of the performance score and the perceived sense of self efficacy rating on the task ($\text{Bias} = \text{self-efficacy} - \text{performance}$). A positive bias score suggests overconfidence on the particular task, whereas bias score of zero (0) indicates absolute calibration and negative bias suggests under-confidence.

Pajares and Graham (1999) calculate accuracy by deducting the magnitude of bias scores from the maximum possible performance score on an item ($\text{Accuracy} = \text{Maximum Performance Score} - \text{Bias}$). As such the range of the accuracy value will be between zero (0) and the maximum performance score; in other words, better calibration on an item will carry greater values.

Academic achievement calibration in terms of perceived self-efficacy and self-concept

Research has demonstrated positive correlation between both academic self-efficacy and academic self-concept to various cognitive, affective and behavioral desired student outcomes. These include persistence (Pajares, 1997), intrinsic motivation (Bandura, 1997), the adoption of task and achievement goals (Bong, 2001), low anxiety levels (Skaalvik & Rankin, 1996) and academic achievement (Pintrich & Schunk, 1996).

Bong and Skaalvik (2003) in their attempt to conceptually and operationally distinguish academic self-efficacy from academic self-concept posited that academic self-concept is self-perceived ability within a given academic area. By contrast, academic self-efficacy is self-perceived confidence to successfully perform a particular academic task; in most cases this academic task is domain-specific. Therefore, academic self-concept is attributed to one's act of knowing and their awareness about themselves and academic achievement context, while academic self-efficacy is attributed to one's judgment that they can confidently execute a given academic task. However, Bong and Skaalvik (2003) postulate that academic self-efficacy and academic self-concept appear to have similar outcomes on student motivation, affect and achievement.

In social cognitive research, self-efficacy is considered as an important moderating mechanism that is present in the metacognitive process. This is because persons' self-beliefs in their abilities act as a filter between their past experience and the resulting advancement of their abilities within a context of knowledge. Furthermore, it was observed that an individual's perceived efficacy beliefs can influence the choices they make; it will mediate the kind of action they will engage in. Therefore, it causes them to pursue tasks in which they assess themselves to be competent and confident, while avoiding the ones they aren't competent in doing (Pajares & Schunk, 2001).

In their study using path analysis to determine mathematics performance of 350 undergraduate students in Georgia, Pajares and Miller (1994) showed there is a cognitive perception dimension in both self-efficacy and self-concept, in respect to individual capabilities in a domain. Nevertheless, empirically self-efficacy had a stronger main effect on performance compared to the moderate indirect effects of self-

concept on performance. The sensitivity of calibration measure to assessment composition is specifically relevant because as Pajares and Miller (1997) stated, "improved calibration is in part a function of self-efficacy assessment, and the assessment itself becomes a useful intervention to help students with this metacognitive capability" (p. 216).

According to Dunning, Heath and Suls, (2004), mis-calibration of one's self-concept may be due to the fact that the individual has an information deficit, has misinterpreted feedback from others, or has incomplete knowledge of one's competence. Sometimes these individuals are exclusively focused on their own competence, without paying attention to the competence and performance of others that can be used as a basis of comparison.

In summary, positive self-concept or a perceived sense of efficacy that is manifest in the form of overconfidence may result in poor performance or achievement. This is because accuracy and self-perception are crucial to prepare an individual in help-seeking and self-advocacy (Stone and May, 2002).

Academic Calibration across Different Groups of Students in Respect to Self-Efficacy

As noted earlier, the importance of calibration lies in individuals' skill in assessing their capabilities or abilities and their ultimate performance. It is important because people in general and students in particular tend to either be overconfident or under-confident in their self-evaluation. Accordingly, Pajares and Miller (1997) advocated that it would be beneficial to understand the valuable role the study of calibration plays in academic achievement, stating, "It may be more important to develop instruction techniques and intervention strategies to improve students calibration than to attempt to raise their already overconfident beliefs." (p. 216)

Thus improved calibration should facilitate a better understanding of what learners or students know and differentiate it from what they do not. This is a metacognitive development that will facilitate the appropriate use of cognitive strategies during problem-solving processes.

In the next two sub-sections the construct of calibration will be explored first, cross-cultural differences in terms of calibration accuracy. The second sub-section will address academic calibration across different groups of Students.

Cross-cultural differences

There have been several researchers in educational psychology who have been advocating the need for cross cultural studies that will test the external validity and generalizability of achievement and motivational theories (e.g., Heine, 2004; Klassen, 2004; Pajares, 2000). This is because psychological theories are in most cases reconstructed from a framework that is unexamined and satiated with cultural assumptions (Triandis, 1996).

Cross-cultural research has basically classified countries and cultural groups according to the degree that they reflect individualism and collectivism. Oyserman, Coon and Kimmelmeier (2002 as cited in Klassen, 2004) carried out a comprehensive meta-analysis in cross-cultural differences in which they showed that European-Americans were substantially more individualistic in their worldview than other participants from Hong Kong, China, Japan, Korea, India, Poland, Singapore and Taiwan. Furthermore, in respect to collectivist worldview the European-American participants reflected significantly lesser collectivist disposition than participants from Hong Kong, Japan, China, India, Israel, Indonesia, Algeria, Taiwan, Brazil, and Mexico. Similarly, for the within-group differences in United States it was found European-Americans were higher in individualism and lower in collectivism than Asian-Americans.

Addressing the issue of academic collaboration, Chen and Zimmerman (2007) showed in their research the mediational role of these cross-cultural differences and how culture plays a salient role. In their study they found that in the United States seventh graders reported much higher mathematics self-efficacy beliefs than their Taiwanese counterparts in similar mathematics task. Similarly, the U.S. students had poorer calibration towards the direction of overconfidence, whereas Taiwanese students were more accurate in their calibration of their self-efficacy and their actual performance, although in the direction of under-confidence.

As this relates to cultural difference, with particular reference to individualist and collectivist societies, it is important to note most research indicates that students from collectivist societies are more

likely to rate their efficacy beliefs lower than do students from individualistic societies (Chen & Zimmerman, 2007; Eaton & Dembo, 1997; Oettingen, 1995). However, when calibrating between assessments of capability and actual performance in most cases students from collectivist societies had a more accurate and predictive judgment of their efficacy beliefs and their subsequent performance (Chen & Zimmerman, 2007; Eaton & Dembo, 1997; Oettingen, 1995). As such it can be concluded that collectivist oriented students are academically better calibrated than students with individualistic orientation.

Other group differences in self-efficacy calibration

This sub-section will address gender, verbal ability, developmental and learning disability differences in self-efficacy calibration. There is a potential gender difference in self-efficacy calibration in academic tasks. In his study of differences in mathematic self-efficacy between boys and girls in middle school, Chen (2003) found that boys have the tendency to rate their self-efficacy above their performance. On the other hand, girls made better self-efficacy judgment with more accurate calibration. Pajares and Kranzler (1995) likewise supported this finding with their study that compared boys and girls in middle school. The girls had more accurate calibration between their perceived self-efficacy judgment and their actual performance than the boys.

In reading education, for a form of calibration termed meta-comprehension accuracy, Maki, Shields, Wheeler, and Zacchilli (2005) investigated absolute and relative meta-comprehension accuracy as a function of verbal ability in college students. In the study participants were made to read hard texts, revised texts, or a mixed set of texts. The study suggested that students with lower verbal abilities have less accurate calibration in the direction of overconfidence in their predictions of future performance, whereas students with higher verbal abilities were more accurately calibrated in the direction of under-confidence in judging past performance.

Looking at calibration accuracy from a developmental dimension Cole, Martin, Peeke, Seroczynski and Fier (1999) suggest that age is a significant factor for children in overestimating or underestimating their academic competencies. In their study they found that first and second graders initially exhibit relatively accurate calibration. However children after third grade tend to be influenced by the teacher's judgment and in most cases underestimated their competence and abilities. Likewise, Schunk and Pajares (2002) posits that when children transition to adolescence, the accuracy of their self-efficacy judgment improves because adolescents are conscious about their abilities and are able to accurately judge the demands of a task and also make social comparisons. In a comprehensive literature review article on the self-efficacy beliefs of students with learning disabilities, Klassen (2002) suggested that students with learning disabilities overestimate their efficacy to complete writing tasks and are optimistically mis-calibrated.

Conclusion

In this review the intent was to synthesize the construct of self-efficacy in relation to the concept of calibration. The paper outlines important researchers that support and provide empirical documentation about the construct of academic calibration, defined as persons' perceived sense of efficacy and their metacognitive judgment regulated accurately with their actual performance and achievement. This theoretical analysis and the empirical evidence have far-reaching implications especially with regards to academic motivation of learners and students. If learners know what they know, they will efficiently utilize their metacognitive skills and apply the right strategies to promote academic achievement.

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