

## ASSESSING NAMIBIAN STUDENTS' SCIENTIFIC EPISTEMIC BELIEFS

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There has been a shift of learning goals in recent years, from content knowledge to emphasising the epistemic aspect of scientific inquiry needed to help students develop 21<sup>st</sup> century skills. Students need to develop sophisticated scientific epistemic beliefs in order to understand the nature of scientific knowledge and how such knowledge is constructed (Gu & Belland, 2015). This study aimed to investigate Namibian senior secondary school (grade 11 and 12) students' scientific epistemic beliefs in relation to their achievement in science, gender, grade and socioeconomic status using paper and pencil instruments. The study examined three research questions: 1) Is the reliability of the adapted scientific epistemic beliefs questionnaire appropriate with the Namibian sample? 2) Does the data confirm the four-dimension hypothesised model? 3) Do students' scientific epistemic beliefs relate to their achievement in science, gender, grade and socioeconomic status? The study was correlational with a sample of 944 (45% male; 55% female) grade 11 and 12 students with the mean age  $M=17.9$ ,  $SD=1.4$ . The study adapted the scientific epistemic beliefs questionnaire developed by Conley, Pintrich, Vekiri & Harrison (2004). The adaptation entailed the removal of items that were deemed repetitive in an effort to shorten the questionnaire and reduce redundancy suspected in the original questionnaire. Wordy items were rephrased and one new item added. The self-reporting Likert scale questionnaire comprised of four dimensions of beliefs: source (science knowledge comes from authority or experts); certainty (science knowledge has only one answer); development (science knowledge is evolving and changing); and justification of scientific knowledge (science knowledge should be based on evidence from different experiments and observations). The adapted instrument had good reliability with the Cronbach's alpha of subscales ranging from .80 to .83 and the overall reliability of .70. Model fit analysis yielded good statistical fit with Chi-square ratio to degrees of freedom=2.71, RMSEA=.043, CFI=.95, TLI=.94, SRMR=.032. The overall regression model was significant  $F_{(4, 939)}=8.218$ ,  $p<.001$ ,  $R^2=.034$ . However, only two dimensions, namely certainty ( $\beta=.154$ ,  $p<.001$ ) and justification ( $\beta=.100$ ,  $p<.05$ ) were statistically significantly related to achievement in science. The study found that there was statistically significant difference in beliefs about source in terms of gender and grade, and about certainty in terms of grade. No difference was found in the other two dimensions of beliefs in terms of gender, grade or socioeconomic status. The results show that the questionnaire works well with the Namibian sample given the good model fit for the data and reliability, though not all the four dimensions of beliefs were related to achievement in science. This questionnaire is suitable for use in cross-sectional studies to assess changes in students' scientific epistemic beliefs over time.