

The achievement goal orientation of disadvantaged Black Physical Sciences students from South Africa

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The present study attempted to identify the achievement goal orientation of grade 12 Physical Sciences students from disadvantaged communities, and thereafter explain goal orientation by investigating its interaction with teacher, school and parent goal emphasis. The research adopted a mixed methods design involving first a quantitative survey of 300 students from 6 schools using an achievement goal questionnaire developed by Vedder-Weiss and Fortus (2010), followed by interviews with 12 students that served to explicate the trends revealed from the survey. A finding of this study was that disadvantaged Black students have a much stronger performance goal orientation in comparison to a mastery goal orientation. It was also revealed that students perceive the teacher, school and their parent to emphasize such a goal orientation.

Introduction

Poor motivation towards science learning amongst others has been identified as a factor affecting performance in science amongst Black students in South Africa (Mji & Makgato, 2006). This is hardly surprising in view of the deficits in both human and physical resources encountered by Black students in the subject. Research in science education has focused largely on cognition, and there is a need to turn our attention to affective constructs such as student motivation (Schunk, Pintrich & Meece, 2008). Studies have revealed that students' motivation towards science learning declines throughout their years at school (e.g., Galton, 2009). The purpose of this study was to investigate, using the lens of achievement goal orientation the motivation of South African Physical Sciences students from disadvantaged communities in their final year of schooling.

Achievement goal orientation

Motivation to achieve in school can be understood in terms of the different goals students bring to a situation (Ames, 1992). These goals provide students with a sense of direction and a reason to engage in an activity (Pintrich, 2000). A key construct in achievement goal theory is the goal orientation, and this refers to why and how students engage in academic activities (Vedder-Weiss & Fortus, 2010). The theory specifies two main goal orientations. With a mastery goal, the focus of attention is on the intrinsic value of learning (Meece, Herman & McCombs, 2003) with an orientation towards developing new skills, understanding the work, improving one's competence and a sense of mastery based on self-referenced standards (Ames, 1992). Students who adopt mastery goals are tend to persist in the face of difficulty, seek challenging tasks, and have high intrinsic motivation (Ames, 1992). The second orientation according to this theory is a performance-approach goal, where the student's main

concern is the outward showing of competence (Ames, 1992). Especially important to a performance orientation is public recognition that one has done better than others or performed in a superior manner (Meece, Herman & McCombs, 2003).

The benefit of examining goal orientations is that we become better informed on the reasons why students achieve in academic settings (Anderman, Austin, & Johnson, 2001). This information can provide guidelines on how learning environments need to change so that learning can be optimized (Stipek, 2002).

Influences on achievement goal orientation

Achievement goal theory highlights environmental characteristics that may foster different orientations (Mucherah, 2008). These include teacher-related classroom factors, school culture and parental influence. Epstein (1989) identified six classroom factors that affect motivation: task design, distribution of authority, recognition of students, grouping arrangements, evaluation practices, and time allocation. School-wide characteristics can be referred to as “school culture” (Vedder-Weiss & Fortus, 2010) and it has been suggested that they may play a central role in fostering or de-emphasizing students’ mastery goals, beyond the influence of a certain teacher (Kaplan & Maehr, 1997). Barth (2002) defines school culture as a complex pattern of norms, attitudes, beliefs, behaviour, values, ceremonies, traditions and myths which is deeply embedded in each aspect of the school. Studies have indicated that parents influence their children’s motivation for learning in science (e.g., Breakwell & Beardsell, 1992). There is evidence to suggest that students who receive much support and encouragement from their parents tend to adopt mastery goals and demonstrate more persistence and effort when faced with difficult and challenging learning tasks (Hokoda & Fincham, 1995).

Against this background, the following research questions are formulated:

1. What is the achievement goal orientation of disadvantaged Black Physical Sciences students?
2. Is there an interaction between student perceptions of teachers’, schools’ and parents’ goals emphasis for science learning and their achievement goal orientation?

Method

This study adopted a ‘sequential explanatory mixed methods’ design (Creswell, 2002). An achievement goal questionnaire developed by Vedder-Weiss and Fortus (2010) was administered to 300 grade 12 Physical Sciences students from 6 township schools. In South Africa, the term township usually refers to underdeveloped urban living areas that, from the late 19th century until the end of Apartheid, were reserved for non-Whites (Black Africans, Coloureds and Indians). The questionnaire is comprised of items which have been developed to test student perception of the two goal orientations in science achievement already described and constructs relating to teacher, parent and school goal emphasis (refer to supplementary file for constructs and items). The items were statements to which students had to respond on a 5-point Likert scale that ranged from 1 (not true at all) to 5 (very true). The internal reliabilities of constructs to which items were related were evaluated by calculating Cronbach’s alpha for each scale. Items that interfered with the reliability were deleted. Eventually, the Cronbach alpha exceeded 0.7 for all constructs.

The questionnaire data was analyzed by computing scores on the above achievement goal constructs (scales). Correlation analysis was used to describe the strength and direction of the relation between the constructs. Interviews were then conducted with 12 students exhibiting an extreme goal orientation. The interview served to probe students on possible factors influencing their goal orientation.

Findings

The findings from the analysis of the questionnaire survey were integrated with the findings from the student interviews into a coherent whole. The interview data explained some of the findings which emerged from the questionnaire analysis. This integration of quantitative and qualitative data supported the production of assertions (Gallagher & Tobin, 1991) on the achievement goal orientation of students. These assertions are presented next.

Table 1 presents descriptive statistics on the analysis of the 300 student questionnaires

Table 1: Mean and standard deviation for achievement goal constructs

	M	SD
Student mastery goal orientation	2.35	1.06
Student performance goal orientation	4.23	0.81
Student perception of teacher mastery goal emphasis	2.8	0.96
Student perception of teacher performance goal emphasis	4.18	1.21
Student perception of school mastery goal emphasis	2.6	1.13
Student perception of school performance goal emphasis	3.98	0.87
Student perception of parent mastery goal emphasis	2.1	0.93
Student perception of parent performance goal emphasis	3.92	1.13

Note: The above scales range from 1 to 5

Assertion 1: Disadvantaged Black Physical Sciences learners perceive that they have a stronger performance goal orientation than a mastery goal orientation.

The results depicted in Table 1 indicate students from disadvantaged communities have a stronger performance goal orientation than a mastery goal orientation.

The above result suggests that students are strongly motivated by achieving good marks in assessment tasks and getting recognition for performing better than their peers. For example, in responding to the item “In our science class, it’s important not to do worse than other students” that related to performance goals orientation, the means score was 4.4. All 12 students interviewed exhibited a strong performance goal orientation. In the interviews the students were questioned on what motivated them in science learning. The following interview responses underscore the performance goal orientation of students:

I want to do very well in science to get high marks. I try hard to get this and do all my work every time.

When I study for a test I go over all the work from start to finish. I memorize all the definitions so that I must not lose any marks.

I must get good marks to show my classmates who is good. I want to prove it with the high marks in science.

In contrast, the much lower mean score for the mastery goal orientation shows that student achievement goal is weakly driven by the intrinsic value of learning science, namely the development of conceptual understanding in science, and science process skills. This is further evidenced by student responses to the item “An important reason why I do my science class work is because I like to learn new things” where the mean score was 2.8. Eight of the twelve interviewed student responded “not true” to this statement in the questionnaire. When asked to elaborate upon this response, they indicated that they willingly complied in doing their classwork whenever the teacher informed them that it was for assessment purposes, while on other occasions they did not attach the same importance to the task. They were quite candid in advancing that the objective of learning science by doing the classwork set by the teacher was secondary to their primary goal of getting a high mark for the task. The following responses attest to this observation:

Sometimes I do enjoy the classwork set by my teacher, but I always hope to get some good mark for this. The mark shows me if I am doing good and learning a lot.

We can always do the work, but we must show something for it. I can do well in learning by having the mark for it.

The influences accounting for these findings on the achievement goal orientation of students were then investigated, and the next assertion relates to this.

Assertion 2: The performance goal orientation of learners is related to the goals emphasis of teachers, the school and parent as perceived by learners.

A correlation analysis was performed to examine how student goal orientation was related to teacher goal emphasis, school goal emphasis and parent goal emphasis.

It was evident from this analysis that there is a strong, positive correlation between student performance goal orientation and teacher performance goal emphasis ($r = .66, p < 0.05$). This relationship was explored further in the interviews. The students alluded to the emphasis placed by the teacher on getting high marks on assessment tasks and instilling competitiveness amongst learners. This is evident in the following excerpts from the interviews:

I need to do well because my teacher compares our marks to each other. Those getting the good marks are praised.

I feel so good when I get a higher mark than the others because the teacher is very happy. He even singles us out and lets us do whatever we want for some time.

I get scared to get a bad mark. My teacher gets upset and shouts us insults. I feel like I must always do better than the others.

It is clear from the above responses that these students are motivated to achieve in science by their desire to appease the teacher who attaches great importance to performance in the subject. There is also a suggestion from the last response of the student's performance avoid goals emphasis where the learner adopts a performance goal orientation to avoid being discriminated due to poor performance. The significance of the strong correlation between the performance goal orientation of learners and the perceived performance goal emphasis of teachers is reinforced by the large extent to which teachers are perceived to emphasise a performance goal in their classroom (student perception of teacher performance goal

emphasis, $M = 4.18$, $SD = 1.21$) (Table 1). This perception by students appears to be shaped by classroom factors such as evaluation practices, the authority of the teacher and grouping arrangements. All twelve interviewed students indicated that the assessment tasks given were predominantly summative and comprised of tests and examinations. Assessment feedback on academic performance appeared to be judgemental rather than being continuous and formative. When asked to describe any activities that did not count for marks, they could only recall a regional science expo that some learners participated in. Assessment was therefore geared towards a performance goal emphasis.

In exploring a link between the classroom distribution of authority and the goal orientation of students, they were asked to describe a typical science lesson. It was inferred from their responses that the lessons are heavily teacher-directed with students being given only limited opportunities to explore their own ideas through stimulating activities. The following interview responses elaborate upon this:

We spend most of the lesson listening to our teacher and then take down notes. I thought science was supposed to be fun like in the primary school. Here we just sit and have to write a test. We must listen carefully so we know how to answer the test questions.

We are always doing a lot of work. This is my second science notebook. Mr Mkhize (*the teacher*) gives a lot of notes from the board. We study it hard to try and pass, but I am struggling. Sometimes we can ask questions, but we have to keep pace at all times.

The classroom seating arrangement supported a teacher controlled environment. Based on the description given by the interviewed students it was clear that they would normally be seated in rows facing the teacher. When questioned on why they believed the teachers seated them in this fashion, they referred to this being the most effective way for them to all listen to the teacher and follow his explanations so that they could do well in tests and examinations. This is clearly evident in the following interview excerpt:

We face the board most of the time because the teacher is there. He wants us to be always looking front to concentrate on the lesson. We must listen to him so we don't miss out on anything to come out in the test.

This is best for us all to be looking at him all the time. We cannot turn around to discuss anything unless he tells us.

It is therefore evident the classroom factors support a performance goal orientation where they are motivated by the imperatives of getting a good mark in science.

An analysis of the student perception of the schools' achievement goal emphasis revealed that they strongly believe that the school attaches more importance to a performance goal ($M = 3.98$, $SD = 0.87$) than a mastery goal ($M = 2.6$, $SD = 1.13$) (Table 1).

The strong positive correlation between student performance goal orientation and the schools' performance goal emphasis as perceived by students ($r = 0.63$, $p < 0.05$) reflects an association between these two construct. When learners who displayed a strong performance goal orientation were asked to explain their orientation, they made reference to how the few learners who performed well in tests and examinations received high praise and were given special recognition. This was evidenced in the following responses:

At this school the top learners are treated like heroes. It is all about getting the highest mark. The awards ceremony is a big thing and the principal sometimes goes over the top and saying we must all do the same.

We are made to look stupid in front of the achievers. I am good at sport but they don't worry about that now. It is now all about passing your school work

They also spoke of the school principal who closely monitors their progress throughout the year. When asked to explain why they thought the school principal placed such a strong emphasis on them doing well, the students alluded to how the management of the school was under pressure from the provincial department of education for them to do well in science. In the responses below the students refer to their school as being one that has been identified by the department of education for support due to a poor performance in the previous year's national grade 12 examination.

Mr Jabu (*the principal*) must make sure we can pass. I see officials from the department coming all the time. They are always coming and checking our books. Mr Jabu will lose his job if we fail at the end of this year.

It was also evident that when students underperformed, much pressure was brought to bear upon them by the management of the school. In such cases students were "summoned" to the principal's office and sometimes parents were invited to discuss their child's progress. This is clear from the following response:

If you are not making it in grade 11 you can be made to leave. Sometimes they even ask you to register as a private student. You can also expect your parent to be called.

Furthermore, the strong negative correlation between student performance goal orientation and student perception of the schools' mastery goal orientation ($r = -.61, p < 0.05$) shows that the high levels of student performance goal orientation was associated with lower levels of the schools' mastery goals orientation. This negative correlation is largely explained by the schools emphasis on test and examination performance at the expense of the intrinsic value of science learning characterised by the development of understanding, skills and the enjoyment of science.

The correlation analysis shows a strong positive correlation between student performance goal orientation and students' perception of parent performance emphasis ($r = .61, p < 0.05$). This indicates a strong relationship between these two constructs, with high levels of student performance goal orientation associated with high levels of parent performance emphasis. Students also perceive that their parents have placed a much heavier emphasis on performance ($M = 3.92, SD = 1.13$) than on mastery goals ($M = 2.1, SD = 0.93$) (Table 1). The interviewed students referred to how parents believed that by them getting high marks in science, it would lead to self-advancement by improving the prospects of them getting a good job. This is apparent from the following excerpts:

My parent sees good marks in subjects like science and maths as creating opportunities for me to further myself. They believe your future is secured through high marks and doing well in the exams. They always remind me on this.

I can say that my dad is really hoping for me to do better than the other children. He always says it is a tough world out there and I must show at school that I am better than the others. He thinks a good symbol in science will give me a bright future.

When asked about whether their parents wanted them to enjoy the learning of science, the students indicated that their parents attached less importance to enjoyment of the subject and more on them getting good marks in the subject. This is underscored by the following interview excerpt:

I am sure they want me to like and enjoy doing science, but at the end of the day it must be about scoring high marks. Enjoying science doesn't count for them.

The interviewed students also commented on how when they performed poorly at science their parents reprimanded them for this by denying them recreational privileges such as attending soccer matches and going to the movies.

Discussion

A finding of this study was that disadvantaged Black students have a much stronger performance goal orientation in comparison to a mastery goal orientation. This finding is not surprising given the focus on high-stakes summative assessment in the form of tests and examinations in the South African education system. According to Harlen and Deakin Crick (2003) the assessment activities used in the classroom convey important information to students about its value, and hence have an influence on their achievement goals (Ames, 1992). The importance students attach to getting good marks, especially in comparison to peers was also underlined in a systematic review of research on the impact of high-stakes tests on aspects of students' motivation for learning (Harlen & Deakin Crick, 2003).

Research on learning in relation to the goal orientation of students points out that mastery goals in science learning has a positive relation with desired learning characteristics and therefore should be encouraged and fostered by parents, teachers, and schools (Patrick & Yoon, 2004). Against this, the finding of this study does raise concerns regarding the dominant performance goal orientation of students and their weak mastery goal orientation. Despite disadvantaged students being motivated to perform well and achieve high marks in science, the dismal grade 12 results in the national Physical Sciences examination does suggest that a performance goal orientation of learners may not be ideal.

The results of this study show that students perceive their teachers to have a strong performance goal emphasis. This finding correlates well with other studies that have pointed towards the establishment of classroom environment established by the teacher as being a significant determinant of student attitude and goal orientation (Myers & Fouts, 1992; Simpson & Oliver, 1990). The implication of this finding is that there is a greater need for research to identify those aspects of science teaching that make school science engaging for students.

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