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How Teachers Perceive Their Classroom Environments and Student Goal Orientation: A Look into High School Biology Classrooms in Kenya

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Authors' contributions

This work was carried out in collaboration between both authors. Author WM designed the study, collected data, performed part of the statistical analyses, wrote the protocol, and the first draft of the manuscript. Author ADF managed the literature review and performed part of the analyses of the study. Both authors read and approved the final manuscript.

Research Article

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ABSTRACT

Aims: To examine teachers' and observers' perceptions of classroom climate and goal orientation in high school biology classrooms in Kenya.

Study Design: A mixed design utilizing quantitative and qualitative approach.

Place and Duration of Study: A boys' and girls' boarding high schools in Kenya, observed between May and July of 2010.

Methodology: Participants included 12 biology teachers from two same sex boarding high schools (5 females, 7 males).

Results: Tests of means and t-tests showed that male teachers perceived themselves to be supportive, $t(10) = 3.76$, $p = .01$, $d = 2.201$ and innovative, $t(10) = 2.93$, $p = .05$, $d = 1.882$. Male teachers also reported greater school and classroom performance goals. Observers reported significant differences in the classroom climate and goal orientation, where they saw the girls' classrooms to be more innovative, $t(10) = 5.10$, $p = .01$, $d = 2.125$, high in order and organization, $t(10) = 3.10$, $p = .01$, $d = 2.200$ and affiliation. They also

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found teachers in the boys' school to be more supportive, $t(10) = 2.41$, $p = .02$, $d = 1.809$.
Conclusion: Male teachers perceive themselves to be more supportive and innovative. Observers see girls' classrooms to be more innovative and well organized.

Keywords: Biology classrooms; classroom climate; goal orientation.

1. INTRODUCTION

Teachers do not choose their classrooms. However, they do have control over the kind of classroom climate they construct with their students and the kinds of instructional practices they utilize. The classroom environment shapes teachers' relationships with their students, and students' relationships with each other and with classroom concepts. Teachers often speak of a classroom's atmosphere, tone, ethos or ambience and its importance for student learning [1,2,3,4]. Typically, teachers concentrate almost exclusively on the assessment of academic achievement, and devote little attention to factors which might be related to their students' patterns of adaptive learning and performance. There is research evidence indicating classroom climate to be a factor in the types of goals students establish [5,3,6].

1.1 Classroom Climate

Although classroom environment is a somewhat subtle concept, remarkable progress has been made over the last three decades in conceptualizing, assessing and researching it [7,8,9]. This research has attempted to answer many questions of interest to educators, such as does a classroom's environment affect goal orientation? Can teachers conveniently assess the climates of their own classrooms? Questions such as these represent the thrust of the work on classroom environments over the past three decades.

Teachers play a vital role in the conceptualization of the classroom climate. They create both the social and physical environments for learning. The very nature of classes, teaching, and students makes a positive classroom climate a critical ingredient of student success [10]. Teachers who are successful in establishing effective classroom climates create more time for learning, involve more students, and help students to become self-managing [11,12]. A positive learning environment must be established and maintained throughout the year. One of the best ways teachers accomplish this goal is by having a good classroom management plan which includes ways to prevent problems from occurring, having clear rules and procedures, a physical environment that is well organized, ways in which to communicate effectively with students, and how students can interact with each other [10]. According to Doyle [10] classrooms are particular kinds of environments. They have distinctive features that influence their inhabitants no matter how the students or the desks are organized or what the teacher believes about education. Furthermore, classrooms are multidimensional, they are crowded with people, tasks, and time pressures, have people with differing goals, preferences and abilities, inhabitants must share resources, and actions can have multiple effects and influence student participation [10].

The social and physical environment of a classroom can support or interfere with student learning and well-being. Therefore, teachers carefully plan and create appropriate and effective classroom climates. There is empirical evidence that shows teachers' perceptions of classroom climate differ based on subject matter [1,7,13]. Teachers' perceptions of science classrooms have produced mixed results in terms of classroom climate, with some

studies finding teachers' perceptions of science classrooms to be high in competition and low in affiliation [14,8], whereas other studies show teachers' perceptions of science classrooms to be low in cooperation and cohesion [15,2]. However, recent research has revealed a wide variety of science classroom climates, with this diversity based on the teacher's teaching style [16,4,17].

1.2 Goal Orientation

Does a subject-specific climate influence the learning goals that teachers structure in their classrooms? Recent research on classroom climate has focused on the classroom instructional goals that teachers establish. Teachers' perceptions of the fit between their classroom environment and their goal orientation are important for the learning outcomes. A goal is an outcome or attainment an individual is striving to accomplish [18]. Goal orientation refers to a pattern of beliefs about goals related to achievement in school. Goal orientations include the reasons teachers pursue goals and the standards they use to evaluate progress toward those goals. There are four main goal orientations: mastery (learning), performance, work-avoidance, and social [19]. For the purposes of this research, only three goal orientations will be utilized. Mastery-approach goal orientation refers to the need to improve and focuses on learning, understanding, and developing competence in academic situations [20,21,22,19]. Students with a mastery goal are concerned about the task itself instead of their self-presentation compared to others. Their evaluation for goal progress is intrapersonal in that their success is based on the improvement of competence and the mastery of the material. For these students setbacks or even failures are not threatening [22].

Performance- approach goal orientation refers to both the need for improvement and a fear of failure, and a focus on demonstrating and validating one's competence [23,24]. Performance approach goal orientated individuals, are mainly concerned about their self-presentation compared to others. They use interpersonal standard to evaluate their performance in that their success is determined with other people as referents. Demonstrating competence, outperforming others and garnering favorable judgments are signs of success and meeting goals. For these students, their ability is constantly on the line. Setbacks and especially failures are threatening and suggest a lack of ability [25]. Performance approach goals may sound quite negative. Earlier research indicated performance goals generally were detrimental to learning, but current research suggests that a performance goal orientation may not be all negative. In fact some research indicates that both mastery and performance goals are associated with using active learning strategies and high self-efficacy [20,26,25]. Performance- avoidance goal orientation refers to a fear of failure and a focus on masking incompetence; in other words, performance-avoidance oriented students try to avoid being seen as incompetent [24,27]. Students with performance avoidance goals are typically characterized as having a high fear of failure and low competence expectancies [24]. Thus, they are likely to orient themselves towards the possibility of failure and are highly sensitive to information suggesting anticipated failure [24,19].

1.3 Classroom Climate and Goal Orientation

Goal theory researchers have found a relationship between teachers' goal orientation and their classroom climate [28,29,17]. Furthermore, goal theory leads us to expect that instructional practices and the nature of educational tasks and assignments that teachers design can pull for either mastery or helpless motivational patterns that have profound

influence on student achievement. In other words, the goal orientation of classrooms influences whether students will pursue learning goals (mastery orientation) or performance goals (ego orientation). Mastery goals, in the United States, are associated with achievement, better academic coping, and positive affect towards school while performance goals are associated with deterioration of performance, impaired academic coping, negative affect and disaffection from school [30,31,14,5,32,33,34,35]. However, recent research indicates that performance goals may not be bad all the time. This research indicates that both performance and mastery goals are associated with high achievement and efficacy [20,25].

Dweck and Leggett [36] defined two major kinds of goal orientations: performance goals and learning goals. Individuals with a performance goal orientation seek to maximize favorable evaluations of their ability and minimize negative evaluations of ability. Questions like, "Will I look smart?" and "Can I beat others?" reflect performance goals. In contrast, with a learning goal orientation, individuals focus on mastering tasks and increasing competence at different tasks. Questions such as "How can I do this task?" and "What will I learn?" reflect learning goals. Nicholls and his colleagues [37] described two similar achievement goal orientations; they used the terms ego-involved goals and task-involved goals, e.g. [37]. Classroom environments that were high on task involvement and innovation had students with mastery goal orientations, whereas classroom environments that were high on competition had students with performance goal orientations [38]. Teachers who embrace mastery goals are more likely to maintain positive learning environments [39,40,17].

Researchers studying goal orientation have focused primarily on academic outcomes. Recently, however, scholars have become interested in ethno racial differences. In their study of eighth grade African American and White students, Freedman, Gutman and Midgley [41] found that African American students espoused personal mastery goals and extrinsic goal orientation significantly more than did White students, suggesting cultural differences in student goal orientation. Similar studies have established an interaction between performance-approach goals and race in predicting the use of self-handicapping [42,43,21], and the role of academic self-efficacy in mediating the relations between performance-approach outcomes [17,44]. These studies indicate the importance of conducting studies in other cultures before reaching concrete conclusions.

Whereas a vast research literature exists on the influence of classroom climate on goal orientation and learning outcomes, these studies have been largely conducted in the United States and Europe. Indeed few studies have investigated the nature and influence of classroom climate and goal orientation in African cultures [45,46]. Research in the United States and Europe has established that teachers' perceptions of classroom climates and students' patterns of adaptive learning vary between urban and rural schools [47,48,49,35,50,51]. Gender and ethnic differences have also been established, suggesting a possibility of cultural differences in classroom environments and goal orientation [32,40]. However, these findings cannot be generalized to other cultures.

Teacher practices most likely reflect the values and beliefs of the larger culture they live in. Glover and Law [52] found a strong link between school culture, teacher practices, and the learning experiences of students. As revealed in the macrosystem, the uttermost level of Bronfenbrenner's model, society's cultural values, laws, customs and resources significantly affect the activities and interactions of its members [53]. For example, studies on child rearing practices reveal that even though authoritative child rearing has advantages across cultures, ethnic groups often have distinct child-rearing beliefs and practices. Some involve

variations in warmth and making demands that are adaptive when viewed in light of cultural values and family circumstances [54]. These cultural variations remind us that just like parenting practices, teacher practices such as the conceptualization of their classroom environments and goal orientation can be fully understood only in their larger ecological context.

This study investigated teachers' and observers' perceptions of the nature of classroom climates and goal orientation in biology high school classrooms in Kenya. The following research questions were addressed: How do teachers perceive the classroom climate in their biology classes? Are there school and gender differences in the teachers' perceptions of the classroom climate and goal orientation? Do teachers and observers perceive the classroom climate and goal orientation in biology classes similarly?

2. METHODOLOGY

2.1 Participants

Participants included 12 teachers who taught tenth- and eleventh-grade biology classes of two boarding high schools in Kenya. Five of the teachers were from a boys' school (2 females and 3 males) and 7 from a girls' school (3 females and 4 males). Professional experience ranged from 2 to 12 years. Both schools are national schools, admit only high ranking students -those who score 350+ out of 500 points on the eighth grade national examination [55]. Teachers in both schools are all graduates from either one of the two main teacher-training national universities in the country. (Note: Except for few cases, majority of the high schools in Kenya that admit students who pass the eighth grade national examination are same sex boarding schools. This is typical of the Kenyan education system). The average class size for both schools was 45. The size of the schools ranged from 980 to 1,120 students. Biology was chosen for this study because it is a required course for all high school students.

2.2 Procedures

Participation in this study was voluntary; research information and purpose was sent to all biology teachers in both schools requesting their participation prior to data collection. Data was collected from multiple sources using self-report and direct observation measures during the second term (May–July) of the school year.

2.2.1 Construct validity

Prior to the visit, the Classroom Climate Questionnaire (CCQ; [9,56] and Patterns of Adaptive Learning Scales (PALS; [43,42] were sent to two volunteer teachers from each of the schools where the project was conducted. The teachers (4) were asked to examine the validity of the items by pointing out any terms that might be confusing or misunderstood. The volunteer teachers were recruited via e-mail and personal phone calls. All four teachers identified two terms that may mean something different in the Kenyan context on the PALS and gave suggestions for changes. In their view, "smart" meant dressed up, and "dumb" meant hard of hearing. Therefore, "smart" was replaced with "bright" and "dumb" was replaced with "stupid". To control for possible bias, these four teachers did not participate in the final study.

2.3 Measures

2.3.1 Teacher surveys

All of the teachers completed the two surveys (CCQ and PALS). The surveys were administered in English. (Note: English is the main language of instruction in the Kenyan schools, starting in third grade.) The teachers responded to the surveys in their free time and returned them to the researcher upon completion. It took approximately 10–15 minutes to complete each survey.

2.3.2 The classroom climate questionnaire (CCQ)

This 54-item instrument adapted from the student survey [57] was developed by Trickett and Moos [9,56] to assess three underlying sets of classroom dimensions in junior high school classrooms: Relationship, Personal Growth, and System Maintenance and Change. The Relationship dimension identifies the nature and intensity of personal relationships within the environment and assesses the extent to which teachers and students are involved in the environment and support and help each other. The Personal Growth dimension assesses basic directions along which personal growth and self-enhancement tend to occur. The System Maintenance and Change dimension assesses the extent to which the environment is orderly, clear in expectations, maintains control, and is responsive to change.

Under these three dimensions are nine specific subscales (the original alphas from Trickett and Moos' study of [9] appear here): (a) Involvement (e.g., "Students put a lot of energy into what they do in this class", $\alpha = .60$); (b) Affiliation (e.g., "Students enjoy helping each other with homework in this class", $\alpha = .59$); (c) Teacher Support (e.g., "I take a personal interest in students in this class", $\alpha = .72$); (d) Task Orientation (e.g., "Students sometimes spent extra time on activities in this class", $\alpha = .36$); (e) Competition (e.g., "Some students try to see who can answer the questions first", $\alpha = .65$); (f) Order and Organization (e.g., "Activities in this class are clearly and carefully planned", $\alpha = .54$); (g) Rule Clarity (e.g., "There is a clear set of rules for students to follow", $\alpha = .49$); (h) Rule Strictness (e.g., "I make it a point of sticking to the rules I make", $\alpha = .45$); and (i) Innovation (e.g., "I like for students to try new projects", $\alpha = .39$). All items are presented in a four-step Likert continuum (e.g., never happens to often happens), with higher scores representing the high end of the scale. This survey has been used in classroom climate studies [57,3,9,56,58] and has proven to be reliable and valid. A test-retest reliability of individual scores on scales, when administered twice with a 6-week interval between occasions, ranged from .83 for Rule Clarity to .95 for Innovation [56].

Traditionally, this survey has been used to assess learning environments mostly in the United States. Therefore, there was a need to determine if the internal consistency reliabilities of the scales in the present study were comparable to the original survey. To this end, the Cronbach's alpha values were calculated for the nine subscales. Reliabilities are presented in Table 1. As seen in Table 1, most of the current study scales' reliabilities were comparable to the original survey. Rule Clarity, Rule Strictness, and Innovation had relatively high reliabilities compared to the original subscales. However, Competition ($\alpha = .36$) and Order and Organization ($\alpha = .34$) had low reliabilities. Teachers had several questions regarding these subscales that could be attributed to cultural differences. For examples, most teachers put question marks or asked the researcher to explain the meaning of the following items: (a) "A student's grade is lowered if he/she gets homework in late" (Note: Because the schools are boarding schools, homework is usually completed during class

time.); (b) “Students have to work hard for a good grade in this class”; (c) “I hardly ever have to tell students to get back in their seats”; and (d) “Students don’t interrupt when I am talking.” As several teachers commented, “Isn’t that common sense...”.

Table 1. Reliabilities for the original and the current study classroom climate subscales

| Subscale | Original | Current |
|----------------------|-----------------|----------------|
| Involvement | .60 | .86 |
| Affiliation | .59 | .58 |
| Teacher support | .72 | .63 |
| Task focus | .36 | .49 |
| Competition | .65 | .36 |
| Order & organization | .54 | .34 |
| Rule clarity | .49 | .79 |
| Rule strictness | .45 | .80 |
| Innovation | .39 | .60 |

Note. Number of items per subscale = 6.

2.3.3 Patterns of adaptive learning scales (PALS)

This 22-items survey was developed and used by Midgley et al. [42,43] to assess teachers’ perceptions of various constructs associated with students’ goal structures. It assesses mastery and performance-approach goal structures at the school and classroom levels. The School Mastery Goals scale (seven items) assesses individual teachers’ agreement that the purpose of academic work in the school is to gain mastery over content and to demonstrate student improvement (e.g., “In this school, the emphasis is on really understanding schoolwork, not just memorizing it”, $\alpha = .81$). Note: the attached Cronbach’s alpha values are from the original scale [42]. The School Performance-Approach Goals scale (six items) assesses teachers’ perception of their school’s desire for students to appear able and outperform others (e.g., “In this school, students hear a lot about the importance to getting high test scores”, $\alpha = .70$).

The Classroom Mastery Goal scale (four items) assesses teachers’ perceptions of whether the purpose and meaning of academic tasks and achievement emphasized in their classes focuses on student improvement and mastery (e.g., “In my classroom, I consider how much students have improved when I give them report card grades”, $\alpha = .69$). The Classroom Performance-Approach Goal scale (five items) assesses teachers’ perceptions of whether their classroom academic tasks focus on competition and ability (e.g., “In my classroom, I display the work of the highest achieving students as an example”, $\alpha = .69$). All items are presented in a five-point Likert-type format (strongly disagree to strongly agree), with higher scores representing the high end of the scale. The scale has been used in several studies [48]; [43]; [42] which have proven its reliability and validity. Reliabilities of the subscales in the present study were reasonable (Table 2).

Table 2. Reliabilities for the original and current study patterns of adaptive learning scales

| Scale | # of Items | Original | Current |
|-----------------------------------|------------|----------|---------|
| <u>Perceived School Goals:</u> | | | |
| Mastery | 7 | .81 | .53 |
| Performance- Approach | 6 | .70 | .51 |
| <u>Perceived Classroom Goals:</u> | | | |
| Mastery | 4 | .69 | .61 |
| Performance-Approach | 5 | .69 | .60 |

2.3.4 Classroom observations

Prior to data collection, a team of graduate students received a 2-day mandatory training of classroom observations. Several observations (ranging from 6–8) were made for each of the twelve teachers, with approximately six observations per teacher, spread over the second term (May–July) of the school year. At least two graduate students observed each classroom at the same time for all the observations used in this analysis. Observation time ranged from 40–80 minutes. Observers used two observation forms: the Classroom Climate Observation Form [57] and the Patterns of Adaptive Learning: Classroom Observation Form [43,42]. Both observation forms tapped into similar concepts as those of the teachers’ surveys. The classroom climate form was developed by the researcher and has been used in previous research with reasonable reliability [57,3], and the patterns of adaptive learning was developed and used by Midgley et al. [42,43]. They were on a four-point Likert-type format, with space provided at the bottom for observer comments. Using Cohen’s Kappa statistic, an inter-rater agreement beyond chance was established at 0.95.

3. RESULTS

3.1 Teacher Survey Data

A preliminary analysis was conducted to determine if there were differences among dependent measures by the length of teaching experience. No significant differences were found. Some of the teachers taught more than one class and grade. There were a total of twenty classes (11 from the boys’ school and 9 from the girls’ school). Some teachers taught both grades 10 and 11. Therefore, a second preliminary analysis was conducted on the teachers’ data to determine if there were differences among the dependent variables by class and grade. No class and grade differences were evident. Consequently all the classes and the two grades were combined in subsequent analyses.

Note: Cohen’s d was used to calculate effect sizes.

3.1.1 How do teachers perceive their classroom climate?

Two t-tests were conducted on the classroom climate variables to examine how teachers perceived their classrooms. The first test examined the nine classroom climate variables with school as the independent variable. No significant effects were found. The second analysis examined the classroom climate measures with gender as the independent variable. This test revealed significant effects between male and female teachers on Teacher Support, $t(10) = 3.76$, $p = .01$, $d = 2.201$ indicating that the male teachers perceived themselves as being more supportive of their students compared to the female teachers. In addition, male

teachers saw their classrooms as being more innovative compared to female teachers, $t(10) = 2.93$, $p = .05$, $d = 1.882$. There was no significant interaction effect between school and gender on classroom climate variables. See Table 3 for all the means and standard deviations for the classroom climate measures.

Table 3. Overall means and standard deviations for classroom climate for male and female teachers

| Subscales | Females | | Males | | Sig. |
|----------------------|---------|-----|-------|-----|------|
| | Mean | SD | Mean | SD | |
| Involvement | 3.17 | .66 | 3.45 | .52 | n.s |
| Affiliation | 3.43 | .32 | 3.69 | .35 | n.s |
| Teacher support | 3.17 | .24 | 3.64 | .20 | .01 |
| Task focus | 3.57 | .25 | 3.59 | .36 | n.s |
| Competition | 3.03 | .14 | 3.31 | .42 | n.s |
| Order & Organization | 3.17 | .39 | 3.31 | .24 | n.s |
| Rule clarity | 3.30 | .96 | 3.59 | .33 | n.s |
| Rule strictness | 2.70 | .83 | 3.29 | .38 | n.s |
| Innovation | 2.60 | .56 | 3.36 | .49 | .05 |

Note. Mean range: Low=1.0, High=4.0; Males: N= 7, Females: N=5

3.1.2 What are teachers perceptions of their school and classroom goal orientation?

Descriptive statistics were conducted to determine what types of goals teachers report on the PALS subscales. Overall, teachers reported greater school and classroom structured performance-approach goals. Tests of means revealed a significant difference between male and female teachers' perceptions of their school performance goals, $t(10) = 2.98$, $p = .05$, $d = 1.874$ and classroom performance goals, $t(10) = 3.12$, $p = .05$, $d = 1.964$. Compared to female teachers, male teachers perceived their school to be encouraging performance approach goals. Similarly, they perceived their classrooms to be encouraging performance approach goals. See Table 4 for all means and standard deviations. Tests of means revealed no statistical difference between the two schools. In addition, there was no significant interaction between school and gender on goal orientation.

Table 4. Overall means and standard deviations for goal orientation based on gender

| Scales | Females | | Males | | Sig. |
|--------------------------------|---------|-----|-------|-----|------|
| | Mean | SD | Mean | SD | |
| School Performance Approach | 4.13 | .36 | 4.82 | .37 | .05 |
| School Mastery goals | 4.26 | .27 | 4.29 | .61 | n.s |
| Classroom Performance Approach | 3.64 | .26 | 4.46 | .70 | .05 |
| Classroom Mastery goals | 3.45 | .62 | 3.62 | .72 | n.s |

Note. Mean range: Low=1.0, High=5.0; Males: N= 7, Females: N=5

3.2 Classroom Observations

Only observations that were made by two observers at the same time were used for analysis. After establishing an inter-rater reliability at 0.95, only one observer's ratings for all the twelve teachers were used for analysis. Seventy-two observations were analyzed, with six observations per teacher. All observations conducted by the same observer were

combined to provide multiple samples of data for each teacher which could then be averaged as a general profile of the teacher's classroom climate and goal orientation according to the subscale ratings. Descriptive statistics and independent t-tests comparing schools, gender and grades were conducted on the data.

3.2.1 What are observers' perceptions of the classroom climate in biology classes?

Preliminary analyses exploring class and grade-level differences in observers' survey reports revealed no statistically significant effects. Therefore, class and grade were not included in subsequent analyses.

From the overall descriptive statistics, observers saw classroom climates conducive to high student involvement and task focus and with highly supportive teachers. Teachers were also observed to make clear rules and to be strict in enforcing these rules. See Table 5 for all means and standard deviations.

Table 5. Overall means and standard deviations for classroom climate based on observation data

| | Overall | | Boys' School | | Girls' School | | Sig. |
|------------------------|---------|-----|--------------|-----|---------------|-----|------|
| | Mean | SD | Mean | SD | Mean | SD | |
| Task Focus | 3.63 | .27 | 3.55 | .27 | 3.70 | .24 | n.s |
| Teacher Support | 3.45 | .32 | 3.60 | .31 | 3.30 | .25 | .05 |
| Rule Strictness | 2.50 | .00 | 2.50 | .00 | 2.50 | .00 | n.s |
| Rule Clarity | 2.50 | .00 | 2.50 | .00 | 2.50 | .00 | n.s |
| Innovation | 2.22 | .52 | 1.83 | .18 | 2.60 | .31 | .01 |
| Student Involvement | 2.01 | .29 | 1.90 | .16 | 2.21 | .35 | n.s |
| Affiliation | 1.85 | .73 | 1.50 | .40 | 2.20 | .82 | .05 |
| Order and Organization | 1.55 | .53 | 1.25 | .42 | 1.85 | .47 | .01 |

Note. Mean range: Low=1.0, High=4.0; boys' school: N=5, girls' school: N=7. Values are based on 6 observations per teachers (total = 72 observations)

Tests of means were conducted to examine whether observers reported significant differences in the classroom climate between the schools and the teachers' gender. The first t-test revealed significant school differences in the classroom climate on Innovation, $t(10) = 5.10, p = .01, d = 2.125$ with the boys' school teachers' classrooms being perceived as more innovative; Order and Organization, $t(10) = 3.10, p = .01, d = 2.200$ with the girls' school teachers' classrooms being reported as more organized; Teacher Support, $t(10) = 2.32, p = .03, d = 1.988$ with the boys' school teachers being perceived by observers as more supportive of their students; Affiliation, $t(10) = 2.41, p = .02, d = 1.809$ with the girls' school classrooms being perceived as more friendly compared to the boys' school's classrooms. No significant gender differences were found.

3.2.2 What are observers' perceptions of goal orientation in biology classrooms?

Descriptive statistics conducted on the patterns of adaptive learning classroom observations showed class activities to be carefully planned. Observers noted that teachers stayed on task and covered the amount of material intended to be covered during class time, and they (teachers) also checked to see if students understood the material being covered. Rarely did observers see students being recognized for their work or emphasis being placed on trying hard and making learning fun. Observers reported few incidences where students worked in

collaborative groups. All observers marked “N/O-Not Observed” against the items examining the teacher’s authority. The items were (a) “The teacher is consistent in dealing with students who break rules”, and (b) “The teacher explains what the rules are and enforces them if necessary.” Table 6 reports all means and standard deviations.

Table 6. Overall means and standard deviations for goal orientation based on observations

| Subscales | Overall | | Boys’ School | | Girls’ School | | Sig. |
|--------------|---------|-----|--------------|-----|---------------|-----|------|
| | Mean | SD | Mean | SD | Mean | SD | |
| Task | 3.21 | .33 | 2.78 | .35 | 3.60 | .24 | .01 |
| Time | 2.50 | .14 | 2.50 | .00 | 2.50 | .19 | n.s |
| Evaluation | 2.16 | .43 | 2.11 | .27 | 2.20 | .50 | n.s |
| Social | 1.71 | .26 | 1.50 | .22 | 1.85 | .27 | .05 |
| Grouping | 1.67 | .23 | 1.00 | .34 | 1.05 | .25 | n.s |
| Help-seeking | 1.60 | .56 | 1.61 | .57 | 1.60 | .58 | n.s |
| Messages | 1.38 | .31 | 1.61 | .22 | 1.65 | .38 | n.s |
| Recognition | 1.25 | .39 | 1.22 | .45 | 1.20 | .39 | n.s |
| Authority | 1.00 | .00 | 1.00 | .00 | 1.00 | .00 | n.s |

Note. Mean range: Low=1.0, High=4.0; boys’ school: N=5, girls’ school: N=7. Values are based on 6 observations per teachers (total = 72 observations)

To examine whether the means were significantly different, tests of means were conducted with the goal orientation measures as dependent variables and school and the teacher’s gender as independent variables. The first test of analysis examined the four goal orientation measures with school as the independent variable. Significant effects were found for Task Focus, $t(10) = 4.29$, $p = .01$, $d = 2.210$ with the teachers in the girls’ school’s classrooms being perceived by observers as more task oriented. The classrooms of the teachers in the boys’ school were perceived as significantly social, $t(10) = 2.54$, $p = .02$, $d = 2.005$ compared to the girls’ classrooms. The test of means by gender did not reveal any significant effects for the goal orientation as reported by observers.

4. DISCUSSION

The aim of this study was to examine teachers’ perceptions of their classroom climate and goal orientation in high school biology classes. Teachers from the two schools did not differ significantly in their perception of their classroom climate. All the teachers saw their classes as being high in task focus, student involvement, affiliation, and order and organization. This perceived similarity could be due to the fact that the two schools are boarding, all the teachers are trained at either one of the two main teacher training universities, the curriculum is centralized across schools in the country, and all students wear uniforms [55]. For example, during the second term of the school year (the period of observations), all the tenth grade teachers in both schools were teaching about “pollination” and “human reproduction”, while all the eleventh grade teachers were teaching about “gaseous exchange” and “immunity and the immune response in humans”.

However, when the classroom climate was assessed by the teachers’ gender, a significant difference emerged. The male teachers from both schools saw themselves as being more supportive of their students compared to the female teachers. This finding was surprising. Since the two schools are boarding, students are away from their parents for nine months per year and teachers act as “surrogate parents” we expected no significant difference in the

teachers' perceptions of their support for their students. More research is needed to further explain and understand this finding. Male teachers also perceived their classroom climate to be high in innovation.

Results on goal orientation revealed all teachers perceive their schools' and classrooms' practices as more performance focused. However, male teachers reported significantly high school and classroom performance-focused practices. The fact that male teachers perceived their classrooms to be high in teacher support and innovation and also reported high performance-focused practices is contrary to the findings from [36] and [38] studies which found that classroom climates that were high in task involvement and innovation led only to mastery-focused practices and goals. It is likely that teachers' perceptions of environmental goal structures are partially influenced by their existing goal orientations. As Pintrich [33] study in the United States found, if teachers believe that there is an emphasis on competition and demonstrating ability, these beliefs should affect their own motivation and classroom practices.

The other possible reason for these teachers' inclination to performance-focused practices could be the nature of the education system in the country. The Kenyan education system is examination oriented. The centralized national examinations for twelfth graders are quite intense. Eleventh-grade students start preparing for the national examination in January, the beginning of the year. Eleventh-grade teachers spent a considerable amount of time reviewing past examination questions with their students. Bear in mind that all but two of the teachers participating in this study taught at least one eleventh grade class. Teachers whose students perform well are publicly recognized by the school and sometimes given awards. In addition, the government, through the Ministry of Education, publicly announces and publishes the top ten schools. Plus, this national examination is the single determinant to college or university [55]. It is therefore safe to say that the academic practices that these teachers report are emphasized within the societal context and also relate to their own perceptions of the academic goal orientation emphasized in the school context. As Ames [30] and Midgley et al. [29] reported, practices such as public honor rolls or special privileges based upon academic standing send important messages to teachers and students regarding what constitutes success in a given school. Likewise, the results from this study support classroom climates being a reflection of cultural contexts.

In the past, research has found that those in positions of power, in this case teachers, perceive environments they are in more positively than those not in positions of power [56,57,3]. Contrary to these findings, teachers and observers in the present study viewed the classroom climate similarly. Like the teachers, observers reported more student involvement, high teacher support, positive student-student interactions, clear classroom rules, and hardly any disruptive incidences. The observed classroom environment enabled teachers more time to devote to student learning. However, when the two schools were compared statistically on classroom climate, significant differences emerged on innovation, order and organization, teacher support, and affiliation. Observers noted that in the girls' school, the teachers were more innovative and organized, and students were friendly towards each other. On the other hand, teachers in the boys' school were observed to be more supportive of their students. This finding was quite unexpected. Further research investigating teachers' perceptions of their support for their students in same-sex schools is warranted. In addition, future research conducted with students and teachers to assess their perception of classroom climate would be helpful.

On the patterns of adaptive learning, observers just like the teachers, reported high task focus; teachers stayed on task and made sure that the amount of material to be covered was covered during the allotted class time. Teachers consistently checked to make sure their students understood the material being completed. However, significant differences regarding task focus were found between the two schools. In the girls' school, observers reported significantly more task focus in the classrooms compared to the boys' classrooms. In addition, observers noted high positive student-student interactions in the girls' school. It appears that students engage in more positive interactions in the girls' classrooms.

In both schools, observers noted that teachers rarely recognized students for their work or class participation. In the same vein, hardly any emphasis was placed on making learning fun. The only work displayed in the classrooms were science related posters, a class time table, and a schedule of after-class activities. In addition, there were few incidences of collaborative group work during class. This is interesting since science classrooms in the US and Europe have been shown to regularly have small group-based experiments [1,8]. It appears as though the teachers in this study emphasize mastery of content more than critical thinking skills and inquiry learning that is usually embedded in active student-student interactions or small groups' activities.

The teacher's authority was apparent. Students sat in rows facing the teacher, did not get out of their seats nor talk without the teacher's permission. All classrooms appeared to be well-managed with clear rules and the greatest emphasis placed on covering the material intended to be covered during class time. The overriding element was task focus regardless of the grade, gender, class, or school. It was no wonder that observers consistently checked "N/O-Not Observed" on items inquiring about the teacher's authority.

This study had some limitations. The sample of teachers included in this study was limited to 12 teachers and thus restricted higher level statistical analyses. This calls for caution in interpreting the findings. In addition, these teachers were in same-sex boarding schools, therefore, the results may not generalize to all high school biology teachers. Furthermore, this study did not collect data on the students in these teachers' classrooms to examine their perceptions of classroom climate and goal orientation. In addition, the reliabilities, particularly those of the classroom climate scale, were generally low. This could be attributed to the cultural differences where some of the items might have been interpreted differently.

5. CONCLUSION

In conclusion, the study findings from teachers and observers reveal positive classroom environments that are high on task focus and high performance-focused practices at both the classroom and school level. Previous research in the United States examining classroom climates and goal orientations has reported a positive correlation between positive classroom climates and mastery goals [30,31,38,17]. Kaplan and Maehr [32] for example, found mastery-focused practices to be associated with positive outcomes, whereas performance-focused practices were associated with negative outcomes. Importantly, these studies do not explicitly include aspects of culture or perhaps the interpretation of goal orientations by different cultures. Given that the definition of a mastery goal centers on learning, understanding, and improvement, it is likely that culturally valued activities that reflect this goal are necessary, if not sufficient, for the creation of a meaningful goal orientation. The two schools in the present study are among the top national schools in the country [55]. If the primary objective of students, teachers, and administrators is to perform better on the national examination, it is unlikely that they would focus on activities that do not

meet this end. In this study, performance-approach goals could be defined as “learning” due to the nature of Kenya’s national testing protocol. This finding supports current research in goal orientation that indicates performance goals to be associated with high achievement and self-efficacy [20,26,25].

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COMPETING INTERESTS

We, the authors have no competing interests that could potentially bias our work.

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