Teachers' Classroom Management Practices: Predictors of Students' Interest in Physics

Messiah Abeku Morgan[1], Godwin Kwame Aboagye, PhD[2]

[1]*SDA College of Education, Asokore-Koforiua, Department of Science Education, Ghana*

[2]*Department of Science Education, Faculty of Science and Technology Education, College of Education Studies, University of Cape Coast, Cape Coast, Ghana*

***Abstract*: The literature has consistently lamented a decline in students' interest in studying physics. However, key among the factors linked to students' interest in a particular subject is the teacher's classroom management practices. The purpose of this study was to explore predictors of students' interest in physics among 10 teacher classroom management practices. The overarching design employed in this study was the cross-sectional survey design. Even though, survey was the main design for this study, elements of correlation were also employed. Questionnaires were used to collect data. The population of this study was made up of Form Three and Two students who offer physics as elective in public senior high schools (SHS) in the Eastern region of Ghana. Simple random sampling technique was used to select 377 students to participate in this study. It was found that, generally, there was a moderate correlation between students' perceived teacher classroom management practices and their interest in physics (TSIP). Task orientation in physics (TO), cooperation, involvement, and investigation were found to be significant predictors of students' interest in physics. It is therefore recommended that physics teachers should pay more attention to task orientation, students' involvement and investigation so as to help develop students' interest in physics.**

***Key Words*: Classroom management practices, Investigation, Involvement, Students' interest in physics, Task orientation**

I. INTRODUCTION

Background of the Study

The literature has consistently lamented a decline in students' interest in studying physics (Buabeng, Osei-Anto & Ampiah, 2014; Oon & subramaniam, 2013). Studying students' interest in a subject is important since interest influence subject achievement and career choice and is in turn influenced by the classroom management practices of teachers. Even though Physics topics and concepts form part of the integrated science taught at the foundational levels (Primary and Junior High Schools) of the education system of Ghana as part of the attempt to produce scientifically literate citizenry and also to lay a strong foundation for future courses, programmes and careers in physics (NACCA: MoE, 2019), studies have reported a decline in the level of students' interest in studying for higher degrees in Physics and its related programmes (Buabeng, et al., 2014; Oon & Subramaniam, 2013).

The seemingly low interest in physics has been attributed to a number of factors. Whereas some researchers seem to blame the situation on the students, others place it right at the doorstep of teachers (Kiruki & Orodho, 2015; Buabeng et al., 2014). The negative attitudes and perception students have, the failure of physics teachers to address the issues right from the basic school level, basic school science teachers' probable negative perceptions and inability to demonstrate the right attitude toward the subject (Kiruki & Orodho, 2015) are some of the factors reported in literature. Buabeng et al. (2014) for example, attribute the problem to poor physics inadequate teaching and management strategies exhibited by teachers in the teaching and learning processes. Others, have identified teachers' personality and attitude to teaching the subject as a factor contributing to poor performance, low enrolment in physics and decline in students' interest in physics (Adesoji; Odubunmi & Balogun, as cited in Kiruki & Orodho, 2015). Instructors' beliefs influence management practices whereas students' perceptions, goals and motivation influence learning strategies (Guerra & Wubbena, 2017). Investigation into factors influencing teaching and learning of physics will provide very relevant information to improve teaching and learning of physics. It is against this backdrop that this study sought to investigate Senior High School students' perception on teachers' classroom management practices and its predictability on their interest in physics.

Statement of the Problem

Interest is considered as the medium and also the goal of educational processes (Djudin, 2018). According to Djudin (2018), students will learn physics better, and subsequently, choose physics intentionally if they are interested in it. Djudin also noted that there has been a persistent decline of students' interest in physics over the last two decades in many countries. Issues of lack of interest and unwillingness to pursue further degree in physics appears to be a global phenomenon (Oon & Subramaniam, 2013; Buabeng, et al., 2014). Oon and Subramaniam (2013) have for instance noted in a study in Singapore that even though there is a general interest in school physics, most of the students are unwilling to pursue the subject to the tertiary. Such previous studies, however, did not consider the role of students' perception of classroom management of teachers on their interest in Physics.

Some research works identifies factors both within and without the classroom as affecting achievement and interest of student. That is, the terminal result of schooling is dependent on what actually transpires in the classroom. Interest has however been linked to academic achievements, such that a low interest in physics could lead to a low academic achievement (Renninger & Hidi, 2016). However, Ghanaian Senior High School students' performance in physics over the years has been generally and consistently poor or marginal in WAEC examinations (Buabeng et al., 2014). Data collected on SHS students' performance in physics has proven to be abysmal. The trend in performance in Eastern region also shows an overall failure rate of 33.2% (1766 out of 5306) in 2018. Similarly, in 2019, the overall failure rate was 24.5% (only 158 (4.5%) candidates obtained grade A1, 291 (8.2%) obtained Grade B2 and overall failure rate of 24.5% (WAEC, 2019). Additionally, Chief Examiner's Report from WAEC on SHS physics presented a marginal or poor performance of candidates in physics (WAEC, 2013; 2014; 2015, 2017, 2018).

Generally, not much work has been reported on the linkage of students' interest in physics and classroom management practices of physics teachers in Ghana. What then is the state of the physics classroom, as perceived by students, within the context of modern-day learner-centered education? It would be interesting, therefore, to investigate whether factors relating to teachers' classroom management practices could predict students' interest in physics.

Purpose of the study

The purpose of this study was to explore teachers' classroom management practices as predictors of students' interest in physics. Specifically, the study sought to:

1. Explore students' perception of physics teachers' classroom management practices.
2. Investigate the predictability of teachers' classroom management practices on students' interest in physics.

Research Questions

The following research questions guided the study:

1. What are students' perceptions of physics teachers' classroom management practices?
2. Which measures of teachers' classroom management practices could predict students' interest in physics?

Research Hypothesis

H_0: There is no significant relationship between teacher classroom management practices and students' interest in physics.
H_1: There is statistically significant relationship between teacher classroom management practices and students' interest in physics.

II. LITERATURE REVIEW

Conceptual Framework

In this study, the physics classroom management practices (CMP) are conceptualised to consist of ten sub-dimensions (WIHIC scale) (Skordi & Fraser, 2019) of which four (task orientation, involvement, investigation and cooperation) are significant predictors as depicted in Fig. 1.

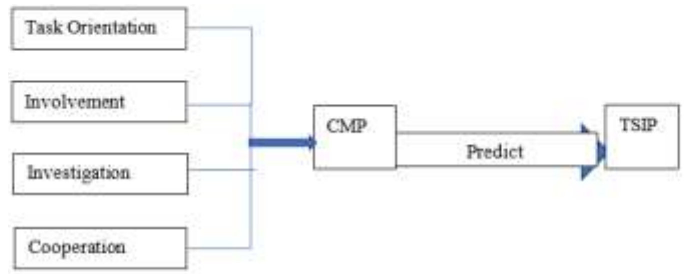

Figure 1: Conceptual model of the study

These dimensions describe the various activities undertaken by the teachers in order to maintain an environment suitable for effective teaching and learning to occur (Korpershoek, Harms, De-Boer, Kuijk & Doolaard, 2014). The practices individually and collectively were expected to predict students' interest in physics. On the other hand, students' interest in physics (SIP) is considered a unifying concept, though has factors such as foundational physics interest, general school physics interest and career and future study interest, as noted by Morgan (2021). This suggests that when there is effective management of the classroom, effective teaching and learning occurs and students' interest is enhanced.

Physics Teachers' Role in Effective Education

The teacher has an important role to play in the general aim of education. The worldwide essence of education is to help learners to operationalise their potentials for the development of self and society (Korpershoek et al., 2014). Arguably, education is a prerequisite for meaningful and sustained national and global economy (Jellens, Bobek & Horvat, 2020). It is a process meant to develop the individual and assist the person to transfer the acquired knowledge from schools to real life scenarios in an attempt to solve future problems and develop strategies necessary to equip them to cope with future challenges (NaCCA, 2019). The physics teacher's role in this general aim of education (i.e., all-round holistic development of the learner) to make the learner a better individual cannot be overemphasized. The teachers' strategic position and role in the implementation of the school curriculum as managers of the instructional activities makes them the backbone or the soul of the educational system (Kiruki & Orodho, 2015). The responsibility of the physics teacher therefore is to organise and manage all interactions and activities effectively in the physics classroom to achieve set targets. One of such targets is the development of interest in a subject, course or programme of study (NaCCA, 2019). The range of activities the teacher undertakes in an attempt to achieve this is generally referred to as classroom management practices (Korpershoek et al., 2014). This suggests that when there is effective management of the classroom, effective physics teaching and learning occurs and students' interest in physics is enhanced.

It is worthy of note that the right kind of classroom management practices adopted by physics teachers could go a long way to impact well on knowledge acquisition, higher achievements and development of interest (Oon & Subramamian, 2013). It has been revealed that one of the most significant factors impacting on students' preference for science subjects, such as physics, is the teacher (Egeberg & McConney, 2019). However, one practice that is reported in literature to be dominant in physics classroom is the behaviourists approach to teaching (Oon & Subramamian, 2013). Even though this is true for Singaporean schools as well, Oon and Subramaaniam have observed that students' interest in physics is still high because of the effective use of management practices such as inclusion of internet resources, simulations, demonstrations and PowerPoint presentations in the teaching and learning process. This suggests that even if all is not well in a particular classroom and school setting, the right choices of management practices made by the teacher could result in very positive results in students' achievement and interest in physics. It is in this light that the physics teachers' classroom management practices are been studied '*vis a vis*' students' interest in physics.

Classroom Management Practices

Evertson and Weinstein (2006) defined classroom management as "the actions teachers take to create an environment that supports and facilitates both academic and social-emotional learning" (pp. 4-5). Classroom management transcends discipline to lay more emphasis on the creation of an environment that is serene, quite engaging, well organized and refined for the students as well as the teachers (Korpershoek et al., 2014). When classroom management strategies are effectively executed, teachers minimise the behaviours that impede learning for students so as to maximize the actions that promote teaching and learning and a surge in students' interest. Effective classroom management relies on the establishment of progressive and favourable class environment which encompasses effective teacher-student relationship and creates the way for the teacher to engage her students in learning. Studies have found that the techniques employed by the teacher in classroom management (CM) play a significant role in ensuring effective education. A competent teacher is expected to possess the capacity to link subject content to practical life (NaCCA, 2019; National Teaching Standards, 2019; Mandal, 2018). Ensuring the motivation of the students and been able to maintain their attention directed on educational and learning activities is another important aspect of classroom management. Students usually whine about the dullness of a subject more than its difficulty (Sang, Jyh-Chong, Ching, Yan, & Chin-ChungLiang, 2018). It is, however, clear that the interestingness or dullness of the course is related to teachers' skills in classroom management. Sang et al. (2018) maintains that dullness results from the falling-out between what is expected from the teachers and what they apply in life.

Classroom management remains a teacher's most substantial practice in a remarkable class environment. It should be noted that, no consequential teaching and learning can occur in a mismanaged classroom and that mismanagement in the classroom leads to an unproductive learning environment (Chalak & Fallah, 2019). Classroom management, as a process, is geared towards satisfying the goals of the educational system, the curriculum, the school, the lesson, the teacher and of the students; to provide student motivation and to achieve an educational goal. One of such goals in the senior secondary physics education is the development of interest as an attempt to better inculcate in the learners the willingness or desire to engage now and reengage with the subject in the future (NaCCA, 2019).

One determining factor in classroom management is the teacher-student relationship quality. This can be achieved when the relation and communication the teacher and student is good. This entails openness, transparency, and founded on mutual trust and appreciation (young adult ethos). It also calls on the teacher to dwell on the student's peculiar assets, interests and skills as well as their differences. Finally, there is the need to satisfy the needs of both teacher and student. Valuable research has been conducted on classroom management strategies whose findings provide very relevant insight into classroom management research. It is deduced from these that effective class managers used different strategies in accordance with different characteristics of students, but ineffective managers did not vary their strategies in accordance to the differing characters of students (George, 2017). It is, therefore, recommended that teachers need to develop their personal and professional skills so as to address the varying needs of students (differentiation and equity).

The mastery of effective classroom management should be a fundamental tool for all teachers. This implies that effective teachers should be masters of a wide range of CMP. It is therefore expected of teacher training and in-service training programmes to make available a repertoire of contemporary tested and proven CMP to teachers and would-be teachers, from which they can select and apply relevant strategies when necessary. Daily practice in education changes rapidly with a shift from teacher-centered towards student-centered approaches, laying emphasis on students' cooperative learning (Korpershoek et al., 2014), technology inclusion in classrooms, such as, using projectors, interactive whiteboards, laptops, mobile phones, and tablets, (Schussler, Poole, Whitlock, & Evertson cited in Korpershoek et al., 2014). These places high demand on the teachers' classroom management skills to facilitate learning. Despite the importance and the high demand placed on the modern teachers' skill in classroom management and the numerous works done on classroom environment, very little is known about teachers' management practice in the physics classroom in Ghanaian secondary schools.

Obviously, classroom management is made up of several interrelated and complicated dimensions of which the teacher, as the class manager, is required to marshal (Korpershoek et al., 2014). Studies have identified some of these dimensions to be techniques teachers employ that enhance student belongingness (consisting of student involvement, cohesiveness and cooperation) (Laal, Naseri, Laal & Kermanshahi, 2013); promotes students' equity; provides support to the students (teacher support) (Sansanwal, 2019) attend to the students in a differentiated manner-as individuals rather than as a group (Differentiation); and orient them on task (task orientation) (Hulleman, Schrager, Bodmann, & Harackiewicz, 2010). In addition, the techniques employed by the teacher should also encourage IT involvement (computer usage); promote students' aspirations as young adults (young adult ethos) and finally inspire student investigation (Asamoah & Aboagye, 2019).

Student differentiation

Differentiated instruction is based on the understanding that learners have their individual uniqueness pertaining to learning needs, learning styles interest and skills (Ruhan & Yasar, 2010 cited in Kahu, Nelson & Picton, 2017). For instance, Research has found that some learners find practical texts more appealing, others feel theory is interesting and still others prefer creative activities (Kahu, Nelson & Picton, 2017). Physics teachers need to recognise that there is a multifaceted and complicated network of relations present in the classroom and also note that as the dynamics of the students and the classes change, so must the managerial decisions and implementations (Korpershoek et al., 2014). That is, quality physics education requires that learners' individual differences, interest and skills are taken into consideration and differentiated instruction does just that, to provide opportunity appropriate for the learner differences (Ruhan & Yasar, 2010 cited in Kahu, Nelson & Picton, 2017). According to Njagi (2015), failure to implement differentiated classroom management practices in some classrooms has resulted in a sizeable number of students reporting poor achievement, while another sizeable number is unable to operate at their optimum best. Though Njagi (2015) reports significant difference in achievement between students exposed to differentiated instruction and those exposed to conventional instruction (without elements of differentiation) however, the impact of differentiated learning on students' interest is not well reported.

Task orientation

This dimension considers how well learners are engaged in their readiness attend to the set task in the subject area under consideration, in this case physics. This is more or less a predisposition on the part of the learner towards achievement of specific objective or goal or set targets (Supervía, Bordás & Lorente, 2020; Hulleman et al., 2010) that makes a student pay particular attention to the object of interest, always poised to achieve certain feet in the study area. Task orientation has also been conceived as "learning situations in which the learners navigate their own learning process, so that neither learning paths nor results can be known in advance" (Andersen, 2019, p.6). In the classroom, two task orientation can be identified: teacher task orientation and student task orientation ((Hulleman et al., 2010). The former has to do with the amount of time the teacher actually spend on teaching. It also has to do with knowledge teachers have concerning planning, delivering and evaluating instruction. The first step in task orientation is to capture students' attention and the next step is to maintain their attention and to raise their interest in the task. The most effective way to do this is to begin the lesson with a question. The selected learning task should always appeal to the learners to surrender their undivided attention and devoid of all distractions and has the innate ability to arouse students' curiosity and interest. If the teacher is able to achieve these then the latter (students' task orientation) is inevitable (Hulleman et al., 2010).

Students' involvement

Involvement could be framed as the physical and psychological effort put out concerning the academic encounters (Sidelinger, 2010). Involved students basically talk and are willing to talk in class: discuss ideas, respond to teachers questioning and ask the teacher questions, give their opinions and explain their ideas to the teacher and to other students as well. Students' willingness to engage in assignments outside the classroom could also be considered as involvement. Sidelinger has cited other sources that student involvement is found to have various impacts on learning. It brings about to better attainment of knowledge and skill development. Students who are involved exhibit higher levels of cognitive skills and knowledge gain and positive personal growth; they are more ready and determined to learn and succeed and tends to persist in school. Despite these observed advantages the influence of student involvement on students' subject interest has not been reported. This work intends to fill that gap in literature by relating the two variables statistically.

In his study of student involvement Sidelinger (2010) found that the characteristics of students and how instructors communicate influence student involvement. His study used voluntary participation of 346 undergraduates in a communication course. It was revealed that teacher clarity did not influence 'in-class involvement' but 'out-of-class involvement' of students. Students get involved for different reasons. It may be to seek information or get clarification or to be able to contribute during class discourse. Some for participatory learning or simply for enjoyment. Sidelinger (2010) therefore explained this finding thus when teachers are so clear, well organized and explicit there will be no need for students to seek information by asking questions in class. However, students will be better positioned to follow the teachers' comments to attend to work outside classroom. Sidelinger further cites not well formulated ideas, lack of knowledge about topic under discussion, inability to complete assignments and likelihood of appearing unintelligent among peers as some reasons for non-involvement among students. Sidelinger's (2010) study also did not relate student involvement with students' interest. Student involvement points to the fact that learning is taking place within the class. (Richmond & Gorham, 1992 cited in Sidelinger, 2010). Additionally, according to Weaver and Qi (2005 as cited in

Sidelinger, 2010) students who are actively engaged in the teaching and learning process record much success in their academics. Hence, it is imperative that teachers look for means to connect learners with the academic material by being innovative especially for learners who are not so excited about the material. The National Survey on Student Engagement (NSSE, 2007) has prescribed the use of high impact activities which has the potential to get students to work attentively on meaningful task as a means to get learners involved in classroom discourse. In essence, high-impact activities requires that learners frequently get the opportunity to interact with the teaching staff as well as their colleagues practically (NSSE, 2007). Most importantly, it is both important and very possible to get learners to be involved. The result is that learners become interested in the subject and are successful in school.

Earlier research by Kickul and Kickul (2006) indicates that learners are more proactive when they are made to feel important. This feeling of importance emerges as they are assigned roles to play or given responsibilities. Responsibilities such being a 'class leader' helps them to develop a sense proactivity (Kammeyer-Mueller & Wanberg, 2000 cited in Kickul & Kickul, 2006). Hence, whenever possible, instructors need to help students develop a sense of proactivity and an internal academic locus of control.

Student cooperation

Student cooperation as used in this study measures the extent of teamwork among physics students. The terminology enjoins students to work in groups when doing assignments, project works and on other class activities, during which time they share books and other learning resources, learn from each other in order to achieve class goals. Some authors prefer to refer to this process as collaborative learning (CL) and others refer to it as cooperative learning (CoL) (Laal, et al., 2013). Collaborative learning happens whenever students help each other. It inculcates in students, tolerance, respect for each other's views, abilities and contributions. In their literature review on CL and its potential advantages (Laal, et al., 2013). Laal et al. categorised the benefits of student cooperation into four broad areas as social, psychological, academic and assessment benefits. The social benefits include development of social interactions and increase in positive social behaviours (e.g., honour, friendliness and hatred for violence). Increase in self-esteem and improvement in problem-solving skills and high-level thinking constitute psychological and academic benefits respectively. Finally, collaborative learning techniques use alternate assessment strategies.

Students' investigation

The term investigation as used in this study explains students acts of inquiry into scientific concepts and ideas aimed at obtaining evidence for scientific statements, testing their own ideas, to answer the teacher's questions, questions emanating from class discussions as well as questions that puzzle them, solve problems and to explain statements, diagrams and graphs (Asamoah & Aboagye, 2019). It involves in school as well as out-of-school extended practical activities carried by the students and it may also be done in groups or individually, under the supervision of the teacher or self-regulated by the students. These extended practical activities are investigative in nature and in which students have choice in the kind of apparatus and methods used and the freedom to interpret their findings.

It has also been observed that when a teacher's knowledge in a particular physics topic is low, the teacher fails to conduct experiment or practical sessions, avoids students' questions, and uses no analogies or examples (Kiruki & Orodho, 2015). However, students develop interest in the subject when they themselves perform experiments to investigate the natural phenomena, they also become excited when they discover the natural laws which they previously were not aware of, this result in students developing interest the subject (Asamoah & Aboagye, 2019; Kiruki & Orodho, 2015). Experimentation helps the students to analyze, discuss and share participatory experience (Asamoah & Aboagye, 2019). Physics teachers should therefore create the needed opportunities for students to conduct investigations into scientific phenomena concepts that baffles them and, theories or laws they have challenges with. Through these investigations, students get curious to know more about their new experiences. By so doing they learn more and eventually develop subject favourable attitudes towards the subject (Asamoah & Aboagye, 2019; Kiruki & Orodho, 2015).

Learning science in Ghanaian senior high school level should be seen as an act of making the existing scientific knowledge your own and not as a discovery of new and unknown ideas (NaCCA, 2019). However, it should lay the needed foundation and inculcate in students the curiosity, and equip them with the necessary scientific skills needed for discovery and construction of new scientific ideas in the near future. This is in line with the two main broad worldwide reasons for science education which are to help the students gain as much scientific knowledge needed to function in a modern society (scientific literacy) and prepare them as the future human resource (scientists) base for the world of science and technology (science enterprise) (NaCCA, 2019). Investigation, as used in this, also refers to any teaching and learning activity that requires students to manipulate and observe the material or object under study so as to come to meaningful conclusion about the characteristics of the object and to explain known facts concerning the object. Literature identifies two kinds of practical work done in pre-tertiary institutions; practical work which is aimed at developing students' scientific knowledge and practical work that seeks to develop students' knowledge of scientific enquiry (Asamoah & Aboagye, 2019). The latter is however uncommon in SHS classrooms. The role played by investigation in the teaching and learning of science content is to aid in the understanding of the scientific concepts: helps to identify objects and phenomena, learn facts and concepts, establish relationships that exist, and to learn theories and model.

Student cohesiveness

Carron (1982 cited in Hysa, 2016) defines cohesion as "a dynamic process which is reflected in the tendency for the group to stick together and remain united in the pursuit of its goals and objectives" (p.125). It is observed that one major reason students do not attain higher productivities in group work is due to the absence of group cohesiveness (Anwar, 2016). The literature has reported some relationship of cohesiveness with performance, achievement, motivation and satisfaction in general have been looked at by several researchers (Anwar, 2016) but not on its effect students' interest in a subject such as physics. Group cohesiveness is found to be positively related to group performance (Forsyth, 2010 cited in Anwar, 2016) and satisfaction (Hellriegel & Slocum, 2011 cited in Anwar, 2016). Anwar (2016) has linked cohesiveness to interest of individuals in the group, demonstrating that performance, cohesion, interest and group success are interrelated. This underscores the importance of studying students' cohesiveness as a dimension of physics teachers' classroom practices alongside students' interest in physics.

Student equity

According to the OECD (2012) equity in education means factors such as personal or social circumstances (ethnic origin, family background or gender should not be impediments to achieving educational potential and that all learners attain set minimum level of skills. This implies the teacher must ensure fairness and inclusivity in the classroom. In the absence of these exhibited clearly in the classroom learners' failure to persist in school, lower achievement or high rate of drop out in the subject or course. The OECD reports that 20% of young adults drop out of school before completing upper secondary school due to absence of fairness and inclusion. This also means that lack of equity can have a negative influence on students' interest, as it has already been established that interest leads to persistence. Once again, research has established that high performance leads to interest and *vice versa*. However, research work that directly links student equity with interest, especially in physics, is lacking.

Computer usage

Another area worthy of research in physics classroom is computer use in the teaching and learning process. Computer usage in the classroom comes in various forms and descriptions. computer-aided instruction (CAI), computer-aided learning (CAL) and computer-assisted instruction (CAI) are some of the common descriptions. Others include computer-based learning (CBL), computer-based instruction (CBI) and computer-enhanced learning (CEL) (Suleman, Hussain, Naseer, Din & Igbal, 2017). Suleman, et al. (2017) opines that among all the modes listed CAI stands out as the most fruitful and advantageous instructional method in heightening interest, enhancing students' capacity to retain information, inspiring mentality, and improving the students' performance.

CAI refers to essentially any kind of computer use in instructional situations encompassing drill and practice, database development, instructional exercises, instructional management, programming, simulations, supplementary exercises, by means of any appropriate application such as excel, power point or word processor (Suleman et al., 2017). CAI is both that CAI is learner-centered and activity oriented. It has enormous benefits to both the teacher and the student. Computer use in the classroom creates the environment that foster individualized learning; it facilitates teaching in large-scale classroom; and it enhances straightforward teaching when applied to teaching difficult concepts and practical lessons. Also, the availability of computer simulations aids in data collection at the laboratory and simultaneously help in its display and analysis (Suleman et al., 2017).

In a study on the use of ICT tools and their effect on teaching and learning, Cigdemoglu and Akay (2016) reported both students' and instructors' opinion. Students self-reported that that ICT involvement in their classroom activities have the potential to make them more successful. They are also of the view that when instructors use such tools, as against a traditional classroom setting, the classroom become more stimulating and their interest enhanced. In addition, the instructors assert that such tools make learning and instruction more organized, prompts to search them to select best tools for students, and make course materials readily accessible to students. That is, the benefits of ICT involvement in physics teaching are not only limited to the learners but the teachers as well. Teachers can easily access information and quickly transfer them to the students using ICT tools whereas students' assignments can be returned through emails and other learning management systems (LMS) (Guzel, 2011).

Despite the enormous advantages computer use in the classroom has been, its application in the Ghanaian physics classroom is questionable. This is alluded to in the research report by Ciandgdemoglu and Akay (2016), in which instructors have stated that although there are number of factors impeding the whole utilization of ICT tools, they agree that traditional chalk and talk method of teaching is old fashioned and ineffective in these days. Unavailable of the ICT tools is often cited as the main reason teachers fail to incorporate them into teaching and learning process (Asamoah & Aboagye, 2019; Aina, 2013). However, it should be noted that easy accessibility of computers does not guarantee its usage by teachers (Johnson, Jacovina, Russell, & Soto, 2016; Guzel, 2011). To Guzel (2011), lack of information and inadequate education on the use of these tools remains the two main challenge of ICT integration in education. Ciandgdemoglu and Akay (2016), have however cited lack of motivation among faculty members and instructors' inability to properly evaluate the impact of ICT tools to enhance students' learning as two main obstacles to ICT integration in the classroom.

Young adult ethos

Young adult ethos is also referred to as young adult need satisfaction or young adult aspirations (Kunter, Baumert & Koller, 2007). There are no available literature on young adult ethos in Physics. However, Orkibil and Ronen (2017) have theorised, generally, that young adults' subjective well-being and satisfaction may be mediated by their basic psychological needs for competence, relatedness and autonomy. Self-determination theory has also posited that students' basic psychological needs for competence, relatedness and autonomy are important for students' motivation, development, effective functioning, and good health (Milyavskaya & Koestner, 2011 cited in Orkibil & Ronen, 2017). Orkibil and Ronen (2017) observed that students with high self-control skills generally had higher school related need satisfaction and also reported better academic achievements and better relationships with peers. However, despite the stated significance of young adult ethos, its relationship with students' interest in physics has not been reported in literature.

Teacher support

Teacher support is referred to by some authors as instructor support (Sansanwal, 2019). It generally concerns certain activities such as acts of care, guidance and questioning that the teacher engages in to help the student through a subject or topic. It forms part of the broad subject of teacher-student relationship which is also a significant part of classroom environment. According to Sansanwal, teacher support comes in different forms such as general classroom practices, teacher practices, contextual support and teacher learner relationships. This study looks at teacher support as a summation of all these perspectives and contexts: questioning, care, help, concern e.t.c.

Over the past decade studies have been done on teacher support and its relationship with student learning variables such as motivation. Joan and Loretz (cited in Sansanwal, 2019) studied teacher support in light of both cognitive and social help offered by the teacher. They came to the conclusion that social and cognitive acknowledgement of the teacher helps learners to be motivated and focused. Chionh and Fraser (2009 cited in Sansanwal, 2019) also used the WIHIC for Geography and Mathenatics survey instrument to study Singapore grade ten students. They found that high instructor support produced students who had more favourable attitudes and high self-esteem.

Teacher support has also been found to relate to other classroom environment variables such as task orientation and involvement (Sansanwal, 2019). Sansanwal studied the relationship between teacher support and task orientation involving 119 master students taking a course in methodology using 'What is Happening in the Class (WIHIC) scale'. The quantitative study showed that teacher support was strongly correlated with task orientation ($t=.23$. at $p \leq .05$).

Students' Interest in Physics

Students generally will choose physics if they find the subject interesting (DeWitt, Archer, & Moote, 2019). However, studies have reported that the number of students who pursue physics, has decreased significantly (Kiruki & Orodho, 2015). The apparent low interest in the is blamable on both students and teachers (Kiruki & Orodho, 2015; Buabeng et al., 2014). Students' negative attitude, physics teachers' failure address low interest issues from the basic school level and the basic school science teachers' own negative perceptions and inability to demonstrate the right attitude toward the subject (Kiruki & Orodho, 2015) are some of the factors reported in literature. Buabeng et al. (2014) on the other hand, have attributed the problem to poor physics teaching/tuition or inadequate teaching strategies exhibited by teachers and the learning processes.

The Concept of Interest

According to Aggrawal (2014), interest is considered to be a compelling dictator and motivator in the teaching and learning process and also a feeling that signals a person to respond spontaneously to an activity. The implications are that when students' interest in physics is provoked, they tend to learn, pay attention, recall, conceive of and read more promptly. Oon and Subramaniam (2013) agree that interest is what makes a person prefer one type of activity to another and is closely associated with attitudes, values, and other forms of human predilection. Interest therefore propels and stimulate attention. A conscious effort to stimulate the student's interest in physics is very essential component of physics education. This is due to the fact that the magnitude of a student's interest determines their attentiveness, set targets, academic self-regulating abilities, achievements and levels of learning (Renninger & Hidi, 2016). The responsibility of the teacher is therefore to organise and manage all interactions and activities effectively in the classroom (Korpershoek et al., 2014).

Relevance of Stimulating Students' Interest

A conscious effort to stimulate the student's interest is very essential component of education. This is due to the fact that the level of a person's interest influences his/her attention, goals, ability to self-regulate, their study strategies, and levels of learning and achievements (Renninger & Hidi 2016). This therefore calls for implementation of appropriate classroom management practices that are geared towards the development of students' interest in physics (Morgan, 2021). Key among the factors linked to students' interest in a particular subject is the teacher's classroom management practices (Egeberg & McConney, 2019). The teachers' behavior is seen to influence the students' behaviour and the students' behavior in turn influence teacher output. A number of studies have indicated that the teacher's role in influencing effective education is very crucial and that it is virtually impossible for actual teaching and learning to happen in a classroom that is poorly managed (Van de Grift, Van der Waal, Torenbeek, 2011; Egeberg & McConney, 2019; Korpershoek et al., 2014)

III. RESEARCH METHODS

The overarching design employed in this study was the cross-sectional survey design since the aim of the study was to collect information on how Senior High School students' perception of teachers' classroom management practices could predict their interest in physics (Creswel & Creswel, 2017). Even though, survey was the main design for this study, elements of correlation were also employed to investigate whether a relationship existed between teachers' classroom management practices as the independent variable and students' interest in physics as the dependent variable. The study was carried out in the Eastern region of Ghana. The population of this study was made up of all Form three students who offer physics as elective in public senior high schools (SHS) in the Eastern region of Ghana. Form three students were used because at the time of data collection, they have interacted more with their physics teachers to be able to determine how the physics teachers' classroom practices influence their interest in studying physics. Multistage sampling technique was used to select students to participate in this study. This study used students from 26 schools from Eastern region of Ghana. The region was conveniently sampled because of COVID-19 restrictions at the time of data collection and also the students have similar characteristic as students from schools in other regions. The 26 Senior High Schools, who offer physics as elective, were selected from 26 districts in the Eastern region of Ghana. To arrive at the actual number of participants, a proportionate sampling technique was employed based on the number of students studying physics in each school selected. The sample was made up 377 physics students of which 38.8% were females and 61.2% were males. This was a reflection of the gender characteristics of the entire population.

The main instruments for data collection were questionnaires. Two questionnaires, Students' Interest in Physics (SIP) and Teacher Classroom Management Practices (TCMP). The SIP questionnaire was broadly divided into two sections. The first section dealt with demographic data about students' sex, school type and programme of study whereas for the second part, students were asked to respond to twenty-three (23) items measuring their interest in physics. Finally, the second part of the TCMP, was made of 80 items that sought students' perceptions about their teachers' classroom management practices. The 23 items on the interest scale (TSIP) were developed by the researcher after extensive review of related literature on students' interest in studying a subject in school. It followed a five-point Likert scale with ratings ranging from 1-5 as follows: always disagree-1, rarely agree-2, sometimes agree-3, often agree-4 and always agree-5 for positive statements. The study adopted the TCMP from the *What is Happening in this Class* (WIHIC) instrument. Items on the TCMP scale were made up of 10 sub-scales consisting of 8 items each. These were computed into scales and were named as teacher support, student cohesiveness, student involvement, equity, student investigation, young adult ethos, differentiation, cooperation, task orientation, and computer usage. The WIHIC scale developed by Dorman, Aldridge and Fraser (2006) is a well-established and widely-used questionnaire in classroom environment research. The score point ranged from 1-5 as follows; Almost Never -1, seldom-2, Sometimes-3, Often-4, and Almost Always-5. Table 2 shows scale descriptions and a sample item for each scale. The WIHIC instrument, according to Dorman, Aldridge and Fraser (2006), is reported to have very good psychometric properties with very good internal consistency, reliabilities and sound factorial validity for its sub-scales. Reliability coefficients of .94 and .92 were obtained for the overall teacher classroom management scale (TCMP) and student interest in physics scale (SIP) respectively.

IV. RESULTS AND DISCUSSION

Students' Perception of Physics Teachers' Implementation of Classroom Management Practices

Research question one sought to investigate students' perception of physics teachers' classroom management practices in their classrooms. To answer research question one, means and standard deviations were calculated first for the perceived CMPs (Table 1).

Table 1: Descriptive statistics of classroom management practices (N=377)

Perceived CMP	Mean	Std. Deviation
Task orientation	3.94	.72
Cohesion	3.70	.67
Cooperation	3.59	.75
Equity	3.55	.87
Young adult ethos	3.40	.77
Investigation	3.15	.83
Teacher support	3.07	.81
Involvement	3.04	.76
Differentiation	2.71	.75
Computer usage	2.02	.91
Valid N (listwise)		

To interpret the mean scores of students on the ten classroom management practices, a standard as shown in Table 2 was developed based on the range of the five-point Likert scale. Based on this, three levels were observed. These levels were CMPs seldomly observed, CMPs sometimes observed and CMPs often observed.

Table 2: Format for interpreting CMP prevalent levels

Level	Range	Description
1	1.01 to 1.80	Almost never
2	1.81 to 2.60	Seldom
3	2.61 to 3.40	Sometimes
4	3.41 to 4.20	Often
5	4.21 to 5.00	Very often

Often observed classroom management practices

There were a number of more positive observations. It is observed that the most common CMP of the physics teachers in the areas covered by this study according to the respondents was task orientation (Toact) [M=3.94, SD=.72]. It is followed respectively by student cohesiveness (Scact) [M=3.70, SD=.67]; student cooperation (Scoact) [M= 3.59, SD=.75]; and student equity (SEact) [M= 3.55, SD=.87] [M=3.40, SD=.77] in that order, all with means above M=3.40.

Sometimes observed classroom management practices

The next common but only sometimes observed practices were respectively student differentiation (SDact) [M=2.71, SD=.75], young adult ethos (YAEact) [M=3.40, SD=.77]; student involvement (SIact) [M=3.04, SD=.76]; teacher support (Tsact) [M=3.07, SD=.81]; and student investigation (SIvact) [M=3.15, SD=.83].

Management Practice seldomly observed Computer (ICT) usage

Computer usage (SCUact) [M=2.02, SD=.01] was seldom observed in the physics classroom. This results, as observed from Table 1, supports the fact that the inclusion of ICT is not common but only seldomly practiced in the physics classroom by the teachers.

Relationship between Students' Interest in Physics and Classroom Management Practices

To completely answer research question two, two steps were followed. First, the relationship between TSIP and CMPs was explored to find out what kind of relationship existed between the dependent and independent variables using Spearman's rho. This was then followed by a multiple regression analysis of the ten CMP dimensions against TSIP. Basically, there was a positive moderate significant correlation between students' physics interest and total classroom management practice (Actual) [r_s=.35, n=415, p=.001] (as observed from Table 3) with CMP explaining nearly respectable 12.5% of the variance in TSIP scale. The coefficient of determination (R^2 = .125) shows that classroom management practice contributes 12.5 % to the variation in students' interest in physics. This according to Igwe (2017), this is a respectable percentage as far as the research on interest and management practices are concerned. Hence, there was a statistically significant relationship between teachers' classroom management practices and student's interest in physics. The null hypothesis is therefore rejected.

Table 3: Relationship between TSIP and CMP using Spearman's rho

			TCMPper
Spearman's rho	TSIP	Correlation Coefficient	.353**
		Sig. (2-tailed)	.001
		N	377

In addition, majority of the CMP dimensions showed some level of positive correlation with interest (TSIP) which were all significant at p=.01 (2-tailed) (see Table 4). There was a moderate positive correlation between interest and student involvement [r_s=.38, n=377, p<.001]; task orientation [r_s =.35, n=377, p<.001]; and student investigation [r_s=.34, n=377, p<.001]. The relationship was, however, small for teacher support [r_s=.26, n=377, p<.001]; student equity [r_s=.26, n=415, p<.001]; young adult ethos [r_s=.23, n=377, p<.001]; and computer usage [r_s=.16, n=377, p=.001].

Table 4: Correlating interest with the 10 CMP factors (N=377)

TSIP	CMP	Spearman's rho	P value
	Task orientation	.352*	.001
	Student involvement	.378*	.001
	Student Investigation	.339*	.001
	Student Equity	.257*	.001
	Teacher support	.256*	.001
	Young Adult Ethos	.225*	.001
	Student Computer Usage	.157*	.001
	Student Cooperation	.112	.022
	Student Differentiation	.120	.014
	Student cohesiveness	.084	.087

* Correlation is significant at the 0.01 level (2-tailed).

Only student differentiation [r_s=.12, n=377, p>.01]; student cooperation [r_s=.11, n= 377, p=.02] and student cohesiveness [r_s=.08, n=377, p=.09] showed a very small positive non-significant relationship. By calculating the coefficient of determination for each sub-scale that showed significant relationship, it could be seen that student involvement explained 14.3% of the total variance of the respondents scores in TSIP; task orientation explained about 12.4%; 11.3% by student investigation; student equity explained nearly 6.8%; 6.7% by teacher support; 5.1% by young adult ethos and 2.4% by computer usage.

Effective CMP Predictors of students' interest in physics

A standard multiple regression method was used to explore potential predictors of students' interest in physics (TSIP) among the other factors. From Table 5 the model consisting of four variables of CMP predicted 23.2% of the variance in TSIP, F(4, 375)=31.00, p=.001.

Table 5: Model summary of significant TSIP predictors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.482[a]	.232	.225	.73056	.232	30.996	4	410	.001

Predictors: (Constant), SI, SCo, SI, TO
Dependent variable: TSIP

Six factors (TS, SC, SE, SD, SCU and YAE) were left out of the final SPSS regression model, given that either their contribution as predictors were non-significant or because they share a lot of variances with other CMP variables. Hence, with respect to the relationship between the independent variables and TSIP, Teacher orientation (t=5.29), Student involvement (t=5.00,), Student cooperation (t=-4.08), and Investigation (t=3.22) significant at (p<.0001) predicted students' interest in school physics as shown in Table 31, while teacher support (TS); student differentiation (SD); young adult ethos (YAE); student cohesiveness (SCo); computer usage (SCU) and student equity (TSE) did not. The four factors were very good predictors of students' interest in physics, since they accounted for 23.2% of variance in students' interest in physics (significant at .01).

As shown in Table 6, the most substantial predictor is task orientation in physics (TO) (B=.285, t= 5.29, p=.000) which independently account for 5.24% of the total variance of TSIP. It is followed, respectively, by the following factors: Involvement (SI): (B=.26, t=5.00, p=.000) (4.62%); student cooperation (SCo): (B=-.22, t=-4.08, p=.000) (3.10%); student investigation (SIv): (B=.17, t= .3.22, p<.001) (1.93%). Table 6 also, indicate that the final model which include task orientation, student involvement, student cooperation and student investigation F(4, 372) = 31.00, p<.000 accounted for respectable 23.2% (R^2 =.232) of the total explained variance in the students' physics interest (TSIP).

Table 6: Results of regression equation model

Model		Unstandardized Coefficients		T	p
		B	Std. Error		
1	(Constant)	1.603	.222	7.228	.001
	TO	.326	.062	5.287	.001
	SIv	.173	.054	3.220	.001
	SI	.287	.058	4.975	.001
	SCo	-.242	.059	-4.075	.001

The regression equation (mathematical model) for the prediction of the students' interest in physics according to the results of the regression analysis is given as:

TSIP = 1.60 + .33 task orientation + .29 involvement + .17 Investigation - .24 cooperation.

This observation from Table 32 and the descriptive statistics of TSIP predictors (Table 33), implies that if we could increase task orientation scores by a unit standard deviation (.72) then the perceived interest scores would likely increase by .83 standard deviation units. If we multiply this value (.83) by .76 (standard deviation value of SI) by .75 (standard deviation value of SCo) and .83 (standard deviation value of SIv), we would get (.83x.76x.75x.83) =.39. Similarly, a unit SD increase in SI (.76) will result in an overall increase in TSIP scores by .83x.72x.75x.83=.37: a unit standard deviation increase in SIv would likely result in an overall increase in TSIP score by .83x.76x.72x.75=.34; and finally, a unit SD increase in SCo would likely result in overall decrease in TSIP scores by .83x.76x.72x.83=.38.

V. DISCUSSIONS

The results presented in Table 1 shows that that learners are very well oriented concerning tasks (M=3.94, SD=.72) which are set out for them in the physics classroom. The students perceived that they so much know the goals of their physics classes, know what is expected of them in the class, the amount of work they have to do and therefore pay attention and work towards the accomplishment of set goals. This might have contributed to students' high interest in physics (Hulleman, et al., 2010).

It also came to light that there is a great deal of cohesion (M=3.70, SD=.67) among learners in the physics class. Students perceived that they work well with each other, help one another due to an overall friendly atmosphere as they like themselves. This is deemed to enable students persist in the physics classroom and eventually develop interest (Hysa, 2016). This high level of cohesiveness is also seen to yield greater levels of cooperation (M= 3.59, SD=.75) (Anwar, 2016). This is exhibited often in students working together on assignments, projects and other class activities and also in sharing books and other learning resources. Finally, another practice that was often perceived in the physics classroom was student equity (M= 3.55, SD=.87). This suggests that the teachers often treated all learners equally; giving equal attention, encouragement, positive reinforcements to individual learners irrespective of gender differences, age, learning style or type of learner (high or low achiever). Equity is highly linked with persistence and interest (OECD, 2012).

Young adult ethos (M=3.40, SD=.77) was sometimes perceived in the physics classroom. The implications are that teachers sometimes treat the students as young adults, regarding them as reliable, grown-ups and matured thereby sometimes giving them responsibilities and offering them opportunity to be independent (Kunter, Baumert & Koller, 2007; Orkibil & Ronen, 2017).

Results from Table 1 also portrays that, the students, generally, are not often well differentiated (M=2.71, SD=.75) by the teachers with regards to the selection of content, assignments and so on. Fast as well as slow learners will have almost the same amount of time to complete a task whereas high achievers and low achievers are given the same content, using same methodology and approach to facilitate learning. There is also less differentiation with respect to modes of learning: visual, auditory and or tactile learners are engaged using the same instructional style as deem fit by the teacher. Meanwhile research has found that learners are diverse in many ways and require different approaches to instruction: practical texts, theory or creative activities (Kahu, Nelson & Picton, 2017). Differentiated instruction could aid learners with varied educational needs and studying styles to master the same academic content (Singh, 2014).

Also, students perceived that they are averagely or fairly involved (M=3.04, SD=.76) in the classroom discourse. Learners were sometimes but not often able to ask the teacher questions and freely share their opinion during class discussions. Students have to be highly involved in the classroom discourse as this helps to make them become more proactive (Kickul & Kickul, 2006), more academically successful and eventually develop a lasting interest in the subject (Sidelinger, 2010). Students also perceived that they sometimes receive support (M=3.07, SD=.81) from their teachers. The physics teachers sometimes take personal interest in their students, their problems and feelings about the subject and assigned task, move about the class to interact with individual students and to offer personalized assistance to those who may need it. This helps to motivate students to become focused and develop interest in physics (Chionh & Fraser, 2009 as cited in Sansanwal, 2019). Chionh and Fraser also agrees that high instructor support produced students who had more favourable attitudes towards the subject.

In addition, students sometimes do have the opportunity to investigate concepts (M=3.15, SD=.83) that are presented to them in the classroom. This enables them to clear their doubts, overcome challenging concepts and to answer questions that puzzle them. In addition, students are able to test their ideas about scientific concepts and to solve problems. These practices, should rather be more often and a regular part of the physics classroom discourse (Asamoah & Aboagye, 2019). Finally, Table 1 also showed that the students' perceived the involvement of ICT or computers in their physics classroom seldomly. This implies that students are hardly made to use computer to type assignments, email their work to the teachers, to ask the teacher questions or to find out information about the course. They also hardly use the computer to read lesson notes prepared by the teacher, find out information about how their work will be assessed, to take part in online discussions and to search for information from the internet. This finding may be due to three identifiable reasons. Firstly, the absence or inadequate supply of ICT tools, especially computers, in the various senior high schools studied. Secondly, teachers may also not be well vexed in the use of ICT tools and finally lack or absence of stable power supply (Aina, 2013).

The finding on the relationship between teachers' classroom management practices and students' interest in physics (r=.35) (Table 3) is in agreement with Igwe's (2017) finding that teachers' classroom management practice correlates well (R^2 = .065) with students' interest. The implication of this observation is that teachers' management practices could predict the students' general interest in studying physics, career choices as well as choice of physics for further studies. This is very much so for the kind of support they receive from their teachers, the extent to which they are involved in class activities and opportunities for investigations they are exposed to and how well they are oriented on task (Igwe, 2017).

The observation implies that physics teachers' concentration on the use of task orientation, involvement and investigation could raise the interest levels of their students in physics. In accordance with Sidelinger's (2010) assertion involved students will talk and are willing to talk in class: discuss ideas, respond to teachers questioning and ask the teacher questions, give their opinions and explain their ideas to the teacher and to other students as well. Students' willingness to engage in assignments outside the classroom could also be considered as involvement. These are all signs exhibited by students who are interested in a subject. It is also in agreement with the findings of Hulleman, et al. (2010) that when students are well oriented on task, the selected learning task always appeal to the learners to surrender their undivided attention and that task orientation has the innate ability to arouse students' curiosity and interest. Though not expected it is not surprising that a unit increase in cooperation could result in a possible reduction in students' interest in physics. This can be attributed to the fact that the cooperation dimension measures students' ability to function in a team rather than as individuals (Laal et al., 2013). However, since TSIP measured students' solitary interest in physics before its aggregation, over emphasis on cooperation could have adverse influence on interest as observed since the benefits of cooperation does not necessarily or directly relate to interest (Laal et al., 2013).

VI. CONCLUSIONS

First of all, students' perceptions of physics teachers' classroom management practices were explored. It came to light that; students perceived some classroom management practices more common than others. This implies that some classroom management practices were more prevalent in senior high school physics classrooms and among physics teachers of Eastern Region of Ghana studied. This also means that the physics teachers consciously or unconsciously perceive some classroom management practices more important than others. Also, it may mean that teachers do not have the necessary resources or training to employ certain practices in their classroom. For example, the fact that computer usage was not very common in the classrooms studied may support this assertion as suggested by (Aina, 2013).

It was also observed that there was a positive significant relationship between classroom management practices and students' interest in physics. The possible implication of this finding is that conscious efforts on the part of physics teachers to employ certain specific classroom management practices could increase students' interest in physics. However, since correlation does not necessarily imply causality, regression analysis was used to explore possible predictors of students' interest in physics among the ten (10) CMPs studied. The regression analysis result showed that four CMPs (task orientation, cooperation, involvement and investigation) were very good predictors of students' interest. This observation means that not all classroom management practices were relevant to the students studied as far as their interest in physics was concerned. Hence, if teachers are interested in the development of interest among their students, they need to concentrate on task orientation, provide opportunities for scientific investigations and usually involve students in classroom activities whiles minimising the degree of cooperation among students. Though investigation and involvement were significant predictors, they were only sometimes observed in the physics classrooms studied. Hence, in order to increase students' interest in physics, instead of teachers concentrating on other CMPs such as cohesiveness and equity, emphasis should rather be laid on involvement and investigation which are better predictors of students' interest in physics. Based on these findings it is therefore recommended that:

1. For the development of interest, physics teachers should pay much attention to classroom management practices such as task orientation, student involvement and investigation.
2. Physics teachers should limit the degree of students' cooperation in physics classrooms, assignments and other assigned tasks.
3. Teachers should involve ICT resources in the teaching and learning of physics since it correlates well with students' interest in physics but was only seldomly perceived.

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