The social Influence on Students' Interest and engagement with Science Studies in Tanzanian Secondary Schools

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Abstract

The development of interest and engagement in science studies among junior learners is shaped by many factors within their learning environment, one of them being the social influence. However, in practice it has not been clear how such influence shapes learners' interests and engagement in science studies. This study examined the social influences and their impact on students' interest and engagement in science. The study was mainly a qualitative research involving teachers, parents, and students. The findings revealed that students' interests and engagement in science studies were mainly shaped by multi-influences from different social groups including: peers, family members, senior students, subject teachers, and career advisors/counsellors. The findings suggest that there is a need to monitor and control the available social influences on leaners' interests in science because not all influences seemed to be positive, as some of them are negatively influencing the learners' interests, persistence, and engagement in science.

Keywords: students' interest; persistence; engagement; science studies

1. Introduction

1.1 Background of the problem

The social influences as used in this paper are the outcomes of the interaction between different social groups and the students in their schooling process. In the context of this paper the term social influence is identified from different society groups which in the context of most societies it involves parents, peers, adoptive and stepparents, and primary caregivers (e.g., grandmother, aunt, brother), elders, role models, and other influential people (Epstein, 1995).

The influence of the society on students' learning therefore remains to be a crucial aspect shaping learner's interest in science (Overstreet, Devine, Bevans, & Efreom, 2005). The research evidence shows that when the society is involved in children's learning, the outcome is that children achieve greater success as learners, regardless of socioeconomic status, ethnicity and racial background (Henderson, Mapp 2002; Pate & Andrews 2006). According to Cotton and Wikelund (2001) the more intensely the social groupings are involved in their children learning, the more confident and engaged their children as learners they are likely

to become. This kind of involvement appears to create a more positive impact on learners' achievement and interest in learning.

While there is an extensive research regarding the role of the society on student's academic achievement; its influence on students' interest and engagement in science has received little examination, a situation which makes this paper relevant. Also the growing demand for having a well-established science literate community increases the need for concerted effort to address how interest and engagement in science studies can be developed and supported. This requirement appears to present a critical challenge of reexamining various social influences and determining their roles towards encouraging and supporting learner's science learning both at home and school.

Enhancement of students' interests, persistence and engagement in science studies is not a new topic to most countries in the world. Despite such world attention towards developing students' interest and engagement in science studies, the effort to clearly articulate the agenda seems to be not successful because learners' interest and engagement in learning happens to be complex and multifactor controlled (Driver, 1989). This paper is therefore developed to address how these influences contribute towards learners' interest in science studies. Hixson (2006), Epstein (1995), and Epstein, Sanders, Simon, Salinas, Jansorn, and Van Voorhis, (2002) argue that it is necessary to identify and address all long-lasting influences that shape the students engagement and interest in learning as they have strong influences on children's' learning behaviours. The study is therefore focused on addressing two major aims: To identify the available social influences towards learners' engagement and interest in science studies and state how they operate, and suggesting the way forward. In particular, the researcher was interested in understanding whether the social interaction has anything to do with learners' change of behaviour towards either being interested or disinterested in science studies.

1.2 Students' interest in science studies in Tanzania. How is it a problem?

The observation from the last decade to date shows that, in Tanzania there is a massive students' drop out and students' loss of interest in science subjects at the end of form two, form four and at the end of form six towards the higher learning institutions (Hamilton, Mahera, Mateng'e & Machumu, 2010; Osaki, Hosea & Ottevanger, 2004). This disengagement appears to be attributed to the nature of support from various social groups. The nature of the social involvement in students' interest and engagement in science studies presents critical questions such as: What exactly are these social groups? How do they operate? What is their exact role towards developing students' interest, persistence and engagement in science studies? How can they be addressed? These questions call for a need to examine the nature of relationship that exists between various social groups and the students in learning science.

In this study the students' interest and engagement in science studies is viewed as one of the outcomes of social influence which seems to be poorly addressed in Tanzania in a way that little is known about the magnitude of such influence. It is very likely that unawareness about this issue might have led the country's crisis of loss of interest in science studies at early stages of learning. As such the need has increased to identify the attributes controlling the learners' interest and engagement in science studies. This initiative is likely to improve the students' contribution in their own learning, enable the learner to challenge persistent

stereotypes about science studies and enable learners to make decisions to engage in science studies without giving a chance for other influences to decide on what is good for them.

This study therefore is built on the premise that understanding, and being able to control and manage the influences towards students' interest and engagement in science studies is important for strengthening the students' power on career choices from early ages of learning. Working blindly with unknown relationship between the society and the students' interest and engagement in science is likely to have an impact on the efforts towards increasing the workforce in science.

1.3 Conceptualising the social influence on students' interests in science

The concept of social influence has been assessed by the aspects of social norms and normative beliefs in both the theory of reasoned action and theory of planned behavior by Ajzein (1985) where by individuals' elaborative thoughts on subjective norms are identified by perceptions on whether they are expected by their friends, family and the society to perform the recommended behavior or not (Ibarra & Andrews, 1993). Social influence is measured by evaluation of various social groups. For example, in my experience as a science educator, I have noticed that in most of times *the subjective norms from peer group* include thoughts such as, "I and my friends are disinterested in learning science studies," or "I feel ashamed of talking about science in front of a group of friends who don't take it". The *subjective norms from family* include thoughts such as, "All my family members are lawyers, and it seems natural to start putting an effort to become a lawyer," or "My parents were really mad at me when I opted to learn science". The *subjective norms from society or culture* include thoughts such as, "It seems as if everyone is against science," and "So we just assume everyone is a non-scientist."

While most models are conceptualized within individual cognitive space, the theory of planned behaviour considers social influence such as social norm and normative belief, based on collectivistic culture-related variables (Ajzen & Fishbein, 2004). Usually an individual's behaviour towards learning and the persistence in it is very much dependent on the social networks and organization as influenced by peer groups, family members, and school and workplace environment. As such the social influence has been another very new powerful influence on students' behaviours towards learning and persistence in it (Fishbein & Ajzen, 2011)}. This social pressure that is exerted on a learner to either do something or not to do certain things is sometimes referred to 'a subjective norm'.

In the context of this study, the social groups are identified as having something to do with students' interest in science subject. Examples of these groups include learners' peers, senior students, parents, and other relatives. Omari (1995) observed that good performance as an element of interest development is achieved only if there are among other things, supportive and positive inputs from peer and other social groups. In this regard, the pressures from social group are likely to have something to do with the learner's decision to engage in a task.

Traditionally, social involvement in education explains the contribution of the society to their children's home-based activities (helping with home-work, encouraging learner to read, and promoting school attendance) and school-based activities (attending parent-teachers' association meetings, parent-teacher conferences, and participating in fund raising activities). Hixson (2006) identifies that the society involvement in learners' education is often cited as one of the most important ways to improve public schools. This is to say that the social involvement in students' education appears to have an enormous impact on the student's attitude, interest, attendance, and academic achievement and it promotes better cooperation between community and school. It also allows parents, learners, caregivers and teachers to combine efforts to help the learners succeed in their learning (Barber & Bergman, 2002).

Similarly, Epstein (1995) found that the social influences cannot work alone to influence school outcomes, unless a student is willing to learn, take interest, and participate fully in academic activities before they can benefit from school. Fan and Chen (2001) cemented the Epstein's ideas in that social pressures exerted towards learners not only shape the students' interest and engagement in learning but also act as critical factors for the students' performance. While this relationship is stated to be not clear in Tanzania, this study intends to investigate how the social pressures influence learners' interest to opt, learn, and persist in science studies.

The discussion about social influence on students learning remains to be most important in the following ways:

- Leads to improved educational performance (Epstein et al., 2002; Fan & Chen, 2001; Van Voorhis, 2003).
- Fosters better student classroom behaviour (Fan & Chen, 2001).
- Contributes to greater feelings of ownership and commitment to supporting the school's mission (Jackson & Davis, 2000; 2003).
- Increases support of schools (Fan & Chen, 2001).
- Improves school attendance (Epstein et al., 2002).
- Creates a better understanding of roles and relationships between and among the parent-student-school triad (Epstein et al., 1997; 2002).
- Improves student emotional well-being (Epstein, 2005).
- Determines the successful achievement of learning expectations for students, parents, and teachers (Epstein, 1995).

The analysis of these literatures shows that there are several ways in which the social influence can have its role on leaners' education. These are: *Behaviourally* the society can be involved in activities such as attending school functions and volunteering at the school; *cognitively* the society can be involved in providing an exposure of children to the stimulating activities and materials, such as reading books or visiting cultural institutions; and *personally* the society can be involved in communicating positively about the value of school and its related matters.

2. The Methodology

This study was conducted in two regions in Tanzania: Iringa and Dar es Salaam. The study was a mainly a qualitative employing mainly qualitative data. It involved 10 schools, five from each region. The schools were categorized into public (government) and private owned schools. A total of 130 respondents including 40 teachers, 20 parents, and 70 students were involved to identify the social influences responsible for the students' interests and engagement in science studies in Tanzanian secondary schools. Data were collected through semi structured interviews and survey (with adult respondents), focus group discussions (with students), and document reviews. The data obtained were analysed qualitatively using thematic analysis complemented with the simple descriptive statistics. The students selected for this study included those in the last year of both junior Form Four (IV) and advanced secondary education cycles (Form VI) in Tanzania.

During data analysis the sum of responses was developed from the surveys to form several Likert items presented using tables. Therefore the Likert scale was used to get an overall measurement of learners' opinions and experiences regarding their interest and engagement in science studies. This scale consisted of five levels: 5=strongly agree; 4= agree; 3= neither; 2= disagree; and 1= strongly disagree). In this analysis the maximum score per each item was five implying strongly agreement on the idea that the social members have an influence to one's selection, persistence and engagement in science studies and the lowest score was 1 which implied opposite of the former view. Level 3 depicted being not sure with the contribution of social pressures to the decline of interest in science studies.

3. Findings

The findings in this study revealed that, apart from other factors, the social influences produced varied forces towards students' decision to engage and develop interest in science studies. The study revealed that the magnitude of influence from these social groups was not equal as it varied with how close a particular social group is to the learner. The details of the findings are discussed in the subsections that follow.

3.1 The role of social groups towards learners' interest and engagement in science studies
In the context of this study the learners' interest and engagement in science studies was defined by specific roles each category of the society played in learners' daily learning experiences. It was expected that, if there were any external influences apart from the social groupings that happened to shape students' interest to engage in science studies, then students would appreciate that their engagement in science had been influenced by such factors. However, the findings revealed that the contribution of social groups on the learners' interest and engagement in science studies was highly significant. Table 1 presents a summary about the significance of various social groups on students' interest, persistence and engagement in science studies.

Table 1: Students views on the role of social groupings in the decline science subjects.

Contribution of social groups on students' interest and engagement in science studies	Category	N	Min.	Med.	Max.	Mean	S.D
	Senior students	40	1	3	5	3.77	1.095
	Peers	30	1	3	5	4.21	0.948
	Parents	20	1	3	5	2.83	2.05
	Teachers	40	1	3	5	4.78	0.55

Table 1 shows that all the mean scores for all respondents except parents were above the median values. This suggests that most respondents agreed strongly that the social members had an influence on individual learners' interest, persistence, and engagement in science studies. The details on how each social group influenced the learners interest in science studies is explained in the subsections that follow:

3.1.1 Contribution of the senior students

During individual and group interviews, it was revealed that most of the learners who had clear ideas about what they wanted to do had been influenced by close senior students and close senior relatives. This can be demonstrated by a response from one student who, when asked about how he ended up doing what he was doing, said that:

I chose to study PCB (Physics, Chemistry, and Biology) combination because my father is a medical doctor and neither my brother nor my sister has gone to study something out of science….I donot think there could be peace if I deviated and chose to study 'Arts' combinations.

This response shows that senior students and close relatives possessed an 'insider's' view and their judgment could be trusted as they were personally known to the individual learners. Most members of this category held distinct advantages over others as they provided more stable and continuous positive influence that appears to enhance and complement what the school nurtures on students. This makes the influences from senior students and close relatives to be undeniably critical concern to be addressed in science education, if leaners' interest and engagement are to be strengthened.

3.1.2 Parental contribution

The findings from all data collection instruments showed that except parents who seemed to be highly passive (as indicated in Table 1) on influencing their children's interest in science; all other groups had significant contribution towards developing students' interest in science studies. The interview with students revealed that the parental involvement in their education was active only when they were asked to participate in school functions, paying tuition fees, and buying learning resources (such as: text books, and school uniform). To support this, one teacher from school A said: *"Parents never come to meet us and ask about their children's learning progress but sometimes I understand that they have a reason as they are overwhelmed by other family issues" (3/11/15)"*.

In the discussion with students about how parents were involved in their subject choices, one student from school B claimed that: *"mmmm! I do not know as my parents do not even know what is Chemistry or Physics, so how can they be involved?"*

During a follow up interview, most respondents revealed that majority parents lacked the learned knowledge as they did not possess necessary educational information about what their children were learning; therefore finding it difficult to determine and understand what went on in the school. Consequently, their roles were left in the hands of teachers and the school management.

It was clear from most of respondents that, while students indicated curiosity about the world of science around them, parents appeared to have lost not only their responsibilities of nurturing the curiosity of their children to learn science but also their roles of creating a positive and safe environment at home for exploration and scientific discovery. When teachers were asked about why parents were reluctant to their children's learning, the majority revealed that there was a crisis related to parental guidance, a situation which affected their crucial responsibility in their children's learning. Some of the parental responsibilities that were mentioned missing at home environment include:

- Nurturing and inspiring their children's interests and engagement in science.
- Encouraging their children to observe, ask questions, experiment, and seek their own understandings of natural and human-made phenomena.
- Fostering children's creative and critical thinking, problem solving, and resourcefulness through authentic tasks such as cooking, doing household chores, gardening, repairing a bike or other household object, planning a trip, and other everyday activities.
- Actively engaging with their children during mealtime discussions or group games requiring mental or physical skills
- Talking about books they are reading or television programs about science they have watched.
- Providing frequent opportunities for science learning at home and in the community through outdoor play, buying books, attending school meeting to listen to school problems and also discuss with some opportunities in work places.
- Joining their children in learning new things about science and technology by taking an advantage of not knowing all the answers to their children's questions, and embracing opportunities to learn science together.

When students were asked during Focus Group Discussion (FGD) about what they would like their parents to do for them continuously persist in science studies; their responses consistently echoed the need for parental support in the following learning areas:

- Parents becoming partners in our schooling process by communicating regularly with us and our teachers, school administrators, and counselors to learn more about our science learning opportunities and performances.
- Parent encouraging their participation in extracurricular opportunities focused on Science and Technology such as clubs, field trips, after-school programs, and science research competitions.

- Parents serving on a science curriculum review or policy development committees; or attending a school's open house or family science day events.
- Parents establishing high expectations for us on science learning, as well as for the school system that fosters it.
- Parents being advocates for science learning by supporting local, state, and national science education policies and investments in science resources, including school curriculum materials, laboratory equipment, and teacher and administrator professional development.
- Parents reaching out to policy makers to impress upon them the value of science and technology learning and its importance to societal future.
- Parents attending career fairs with learners by helping us to explore a broad range of career options and learn about them to effectively pursue these careers.
- Parents looking for special events and programme in the community that would enable students to meet scientists, or visit a worksite or local university where science and technology are prevalent.
- Parents encouraging them to disbelieve negative stereotypes about scientists, and help them understand that anyone can have a career in science.
- Parents modeling values that support learning, self-sufficiency, responsibility and hard working so as to develop at an early age the confidence and determination to pursue career interests in science.

Generally, the findings revealed that most of parents involved in this study had little influence on students' interest and engagement in science studies. While parents appear to be passive in this influence the other social pressure seem to have taken control of learners' interest and engagement in science studies.

3.1.3 Peers' and Teachers' contribution

The peers on this case were reported by students to play a great role in communicating and reinforcing science educational aspirations among them. Also the evidence from the FGD revealed that teachers had an influence on students' choices to engage in science, through students' classroom experiences, provision of students with conducive learning environment, influencing the students' motivation and enjoyment towards science, provision of extracurricular activities and through the provision of information about the opportunities present in the field of study.

In the discussion with individual students they revealed that in most of times teachers neither presented themselves as a direct   experts in their subjects of specialization nor advisers in science related careers, but through school meetings and classroom sessions they participated giving suggestions about where to place who and in which stream (Science or Arts). When the teachers were asked to validate this claim one of the teachers from school E said that:

"Mmmmm! of course we cannot deny that we do participate in students' selection of what to study in science or Arts combinations….however, for my opinion I think we should allow learners themselves to decide what they want to study…..you know what!....it is costs us a lot to teach people who have no interest in science just because the selection of such individuals was by mistake or by force….."

In the other pertinent of FGD session, one male student from school E insisted that:

"I have a friend of mine who had an interest in science than me, but because we have limited opportunity to choose what we like, this friend lost his professional ambitions of becoming a scientist and now he is taking music studies….what a waste of talent…who knows what he could in science"

It is clear from the student's responses that, they are not comfortable of the way the schools' management handle the issue of students' interest on certain combinations of study.

When peers were asked about what though regarding the schools' practice to decide for students on what to study; the majority of them revealed that subject teachers had too much power to decide on who studies what, in science. For them the problem was that, teachers were the most trusted individuals of all among learners as they are considered to provide career information to students, and are therefore regarded more important and/or helpful than written sources of information.

3.1.4 The contribution of the school management

Apart from the social contribution on students' interest in science studies, the FGD with students revealed that they were influenced by the school management in their choice of the subjects of interest in science.   It was identified by most of the students that their placement on a particular science combination was determined by the school. The students complained that schools were using the Form Two examination results as a reliable criterion for placing and locating students to undertake a particular science combination. One female student from school D complained that:

"Mmmm! I did not want to study science and persist in it as my future career….. I don't like it …I do not feel comfortable studying it…But I respect the school system for placing me in the science class…However   I with my family don't see any future in it…."

When the students taking science were asked about whether they planned to persist in science for life, one male student from school F reported that:

"…I plan to drop it… I feel as if this is not my path…..I think I was selected to study science by mistake…I neither blame my friends nor the school system although in one way or another they have contributed to this end…..."

Drawing from the last two quotations, it can be argued that there is a clear negative impact of the schools' management on students' interest and persistence in science studies. Unless this situation is addressed instantly, it is likely to disrupt the desire to achieve a strong and adequate science workforce in the future.

The discussion with teachers about how they looked at issue the school management deciding for students on what to study; they commonly revealed that students were just the victims of the schools management, especially in making decision about what is worthy learning.

4. Discussion

The findings have shown that the social influence has an enormous impact on students' interests and engagement in science studies. Some of these influences do have a significant contribution towards providing support and guidance for young learners beyond compulsory schooling, and shaping their views on appropriate pathways for future life (Pate & Andrews (2006). Cotton and Wikelund (2001) argue that

the social influence is essentially important in the students' schooling as their impact can be useful in building their children's appreciation and knowledge, confidence and skills in science studies. In a similar line of view, Munro and Elsom (2000) further add that young people's perceptions of local opportunities are often based on the perceptions and experiences of family and friends. This is a reason why students' interests seem to be highly controlled by the external pressure, mainly the social influences in this particular case. Cobb (2001) identifies that, from early age of development when the learners see and hear about jobs done by people who are prominent towards them such as parents, peers and other relatives, their attitudes and the behaviours adopt toward such undertaking.

The findings reveal that the social groupings are critical components for the development of the leaner. This situation calls for active involvement of these groups in science education curricular reforms. The essence of their involvement is based on the idea that these groups play vital roles in their child's education and learning. Looking at their influence on students' interest and engagement in science, it is clear that the social groups need to be welcomed as active participants in the life of the school and to be encouraged to express their views on the schooling processes. However, there is a need for effective control of their influence because not always that these social groups have positive influence. Otherwise there are several positive approaches of social influence that are echoed in the findings and which can be used to improve the social involvement in the students learning of science. These approaches are summarized in Table 2.

Table 2: The modes of social influence on students' interest and engagement in science learning

Approaches	Activities involved
Parenting	Helping families understand student's development, acquire developmentally appropriate parenting skills, set home conditions to support learning at each grade level, and help schools obtain information about students.
Communicating	Focus on keeping parents informed through such things as notices, memos, report cards, conferences about student work, and school functions.
Home mentoring	Coordination of schoolwork with work at home (e.g., goal setting, interactive homework).
Decision making	Soliciting the voice of parents in decisions about school policies and practices.
Collaboration	Acknowledging and bringing together all community entities (e.g., with the community businesses, religious organizations) with a vested interest in the education of young adolescents.
Supervision	Monitoring when students return home from school and what they do after school, overseeing time spent on homework and the extent to which children watch television.
Emphasis on social expectations	Shaping the manner and extent to which parents communicate their academic aspirations to their children

Following the fore mentioned approaches in which the social system can be useful in science schooling processes, some members such as parents seem to be inactive. Their inactivity and irresponsibility is

identified by most of the respondents as likely to lead to the failure of the learner to benefit from society's mentoring role especially in the area of making effective choices of their future careers. This situation partly explains the reason why most of the young learners recently have lost interest in science studies. It is possible that, they lacked positive support from the society for them to make informed decision in science careers; a situation which must have left them remained overwhelmed by other stereotypical ideas about science studies whose result might have pushed these students away from developing interest to study science in the future. As such, the findings calls the parental involvement in children's learning to be readdressed, if the desire to improve children's interest and engagement in science related careers is to be realized.

4.1 Learning at home

The findings identify the vital role that parents and other family members in children's learning and interest development in science. Parents appear to be placed at the fore front with a great value as the first and ongoing educators of their own children at home. They are blamed for not fulfilling their responsibilities of receiving information and supporting their children's learning at home. Findings identiy the need for the society to participate in interactive students' homework and assignments (family homework assignments) using the Interactive Homework programme which may be developed in each school. This programme would offer parents with guidelines for collaborating with their children on homework activities, as well as providing vital information about their school curricula.

4.2 Home-school partnerships

Efforts to develop interest in science studies among young learners reflect the shared role and responsibility that schools; parents and the community have in working together to educate children (Epstein et al., 2002; Parental Teacher Association, 1999). However, effective home-school partnerships that are essential to ensure children get the most out of their school seemed to do not exist just for a reason that parents are too busy with their home chores to fulfill their children's needs at home. Consequently, the students miss opportunity to enjoy the parental support, inductive discipline, and a clear communication of interest in the day-to-day deeds. The findings suggest for a clear focus on keeping parents informed about their crucial responsibilities' in their children's learning. This could be done through such things as notices, memos, report cards, conferences about student work, and school functions.

4.3 Parent Councils

The Tanzanian education structure provides a framework for ensuring that parents have the opportunity to express their views and have these taken into account on policy matters affecting the education of their children (URT, 2007). The findings reveal that, the parental opportunity to have a positive influence on their children's learning is not fully utilized, as result; children miss the advantages that result from such involvement. It is clear that an involvement of parents in students learning would provide the parents with a chance to be members of the Parents' Forum at a school, a situation which would make their views represented to the school, education authority and parents through a representative Parent Council for the

school. Interviews by teachers revealed that those positions are now held by teachers due to poor participation of the nominated parents with an excuse of those positions having no financial implications which meant wastage of time for them. This situation calls for a need to not only create awareness among parents and other social groups about the importance of their involvement in the students' learning but also developing an understanding among various social groups about their vital roles in decisions about school policies and practices.

5. Conclusion

The social influence is an important entity of the social learning environment in the school setting that seems to determine the students' interest and engagement in science studies. Additionally, the study has revealed that apart from the influence from the family members as external factors from a school (such as parents, brothers and sisters and other relatives), the institutional factors composed of the subject teachers as career advisors /counsellors, and the school-norms and rules as internal forces appeared to interfere with the students' interest and engagement in science studies. Thus, both external and internal influences seemed to explain fully their contribution shaping the interests, persistence, and engagement of students in science studies.

The other influences most mentioned by students and teachers to students' engagement in science, included: unawareness about the contributions on students' learning among certain social groups, the situation that stimulates children's interest in science studies; absence of correspondence between the image of science studies professions and what young people seek in a career (independence, self-fulfillment, varied activity); the school learning environment that does not arouse and nourish interest in science studies; the presence of real or imaginary obstacles posed by a profession or course of study to reconciling work and family life and the assumed boring nature of the science as a discipline.

Looking at some students voices it is clear that very few of them have a correct or accurate understanding of science-related professions, and many are largely unaware of the range of career opportunities opened up by science studies. Consequently, what they know often comes from personal interactions (mostly science teachers, or someone in the family), or through the media. This situation is likely to be problematic as some science teachers may not feel the need to motivate students about science being compulsory, or as important option for higher education. Therefore strengthening the students' self-motivation and information background is deemed important as it would help to create confidence, and well informed learners about science studies. In so doing students are likely to persist, and have more determined interest in science studies.

6. Recommendations

The social influences should be monitored and managed so that they do not interfere with students' interest, persistence and engagement in science studies. The society must be welcomed in the in schools' activities

and be encouraged to engage with school in their children's education. The achievement of this aspiration can be made possible when the following are done:

- Schools develop, in collaboration with family members, shared goals and missions concerning students' learning and development of scientific literacy.
- Schools develop a long-range social involvement plan in interest development in science that may be implemented as a stand-alone program or as a component in comprehensive school-based programs
- Researchers conduct a needs assessment to identify an effective guideline for the development of a balanced, comprehensive program of partnership.
- Schools develop a repertoire of strategies (e.g., interactive homework, student-led conferences) designed to increase social involvement at school and at home.
- Schools establish a working plan for maintaining respectful and productive relationships with families.

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