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Would Science Background Be a Factor in Parents Helping Students Establish a Match between School Science and Home Activities?

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Abstract This study was designed to investigate parental influence as a factor in helping students establish a match between science concepts learn in schools and the activities they carry out daily at home. Studies have revealed that tension that exists between these two experiences is one of the major factors of poor performance of students in science. One hundred and ten male and female (48 and 62) parents, 67 with science background and 43 without, constituted the sample. A self-constructed, validated questionnaire consisting of four parts, that sought parents' responses on what home activities they engaged their children in, what science concepts they taught through them, readiness and barriers to their involvement, was used to generate data. The results show that both categories of parents saw science as very important for science and technological advancement. They did not see the engagement of their children in household chores, as a hindrance, rather an opportunity to get involved, as such is a vital ingredient to children's success. However, there are limitations to their involvement. Lack of literacy and proficiency in science and not being able to see the relationship between school science and home activities are some of them. It is recommended that every school child should be exposed to ample science courses, even when such child has other options, since he or she will grow to become a parent in future. Teachers too should try as much as possible to relate science teaching to what the child does daily at home.

Keywords Parental Background, Science Concepts, Home Activities

1. Introduction

The tension existing between the school science and home activities is one important reason, out of many, why students' performance in science is getting poorer by day. How often do we hear from children when they come from the school "aunty (school mistress) did not teach us this way" "What uncle (school teacher) said is different from what you are saying mummy" There are instances when science as presented in school bears no relevance with daily activities carried out at home by the children. Oriaifo (1997) and Oloruntegbe (2004) noted such cases of undesirable tension or gap and attributed them to factors like inappropriate science delivery (Oriaifo 1997), misconception or alternative conception (Driver 1981; Garnett & Treagust 1990; Asim 2002) and distance between the language of science and home language (Okebukola 2002). These factors work in concert to distance the school from home and render science learning difficult for children.

It is a common knowledge that majority of chemistry and physics concepts are abstract in nature. Hence students find them difficult to understand. However these difficulties could be removed if students are made to see the relationship between what they learn in science classroom or in the laboratory and what they do daily at home. Majority of the concepts listed as being difficult such as; kinetic theory, (Abraham et al., 1992; Stavy, 1995; Taylor & Coll, 1997); chemical change and reactivity, (Zoller, 1990; Abraham et al, 1992); solution chemistry, (Ravialo, 2001; Goodwin, 2002; Pinarbas & Caupolat, 2003; Calik et al, 2005, 2006), intermolecular forces, (Treagust, 1988; Tan & Treagust, 1998, Baker & Millar, 2000), and many others could easily be studied directly or indirectly in the kitchen, Hence, home and community activities become a useful consolidating factor in promoting students understanding of these and many other science concepts. How can students establish a strong relationship between these two discrete but complementary experiences if the parents at home are not forthcoming in lending helping hands? And the teachers too are not citing relevant home examples in teaching at school?

A substantial number of researches have acknowledged the importance of parents, teachers and peers in the achievement of students in schools. Reports have it that: academic interest and competencies in science and mathematics in children often begin at home, (Smith & Hausafus,

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1997); parental involvement is a vital ingredient in a child's education and science, (Holmes, 2006; House & Gerber, 2006); parental socio economic status is a major predictor of cognitive achievement (Bugental & Johnston, 2000; Mapp, 2004; Roehlkepartain, 2007); and that students with involved parents no matter what their income and background are more likely to earn higher grades and test scores, and enroll in higher-level programme. Such students will possess better social skills and show improved behaviour and adapt well to school, (Epstein & Sanders, 2000, Henderson & Mapp, 2002). Reports further have it that whether children attend public or private schools, they benefit when parents become involved in their education, (Hampton, 1997); the influence of parental involvement is significant for secondary school children; and that the positive effect parental involvement hold for both White and minority children (Williams 2008). The apparent significance of parents' behaviour and their beliefs in their children's school success have led intervention programme to target parental involvement as a key to improving academic success of the children.

Prominent among these intervention programmes are: Kansas Parent Information Resource Center, (KPIRC); National Standard for Parent Involvement, (NSPI); National Coalition for Parent Involvement in Education, (NCPIE); Family Friendly School/Foresight Learning; Harvard Family Research Project and many others The goals of these programmes include: to provide a seamless system of support, resources, and training to families with children from birth through high school; to build capacity of parents to become an integral part of their children's educational success; to help families establish home environment to support children as students; to design effective forms of school-to-home and home-to-school communications about programs and child's success; and to provide information/ideas to families on helping students at home with homework and other curriculum-related activities.

Study also has it that though parents are overwhelmingly interested in their children's science education and understand its importance, yet (American) performances in sciences does not meet most parental expectations (U.S. Department of Education, 2004). The situation about lag in students' science performance may not be applicable to a particular setting alone, because many parents have not been able to rise up to expectation of providing help to their children at home so as to consolidate school learning, especially in the sciences. How can parents be of more use to their children in helping to establish relationship between school science and home activities? Can enhanced educational background of parents promote the relationship and improved children performance in science? Would parents with science background be of more help than those without? Do students engage in home activities through which hey can consolidate school learning? Providing answers to these questions is the focus of this paper.

Characteristically, high educational background, like high socio economic background, has enhanced indices such as high standard of living, high income and the ability to hire and pay for services such as cooking, cleansing and gardening. Students from such high parental educational background homes are left to face their studies in schools or at homes without distraction. The situation is not so with the uneducated and unskilled parents. With the meager income many of such parents cannot afford the luxury of hiring helpers. They have to combine the household cores with the daily paid jobs. The children are not only involved in these domestic activities, in some cases, as it is in the third world; they contribute substantially to the family income either by selling in the market or working in the garden after the school or at weekends and holidays. Deprived, as these environments may be in modern facilities they could be rich in, and promote indigenous and cultural activities through which children could learn meaningful science concepts.

If parents with high educational background are also science oriented, they might be able to offer better and more appropriate assistance or ask more appropriate questions whenever their children are participating in household chores like cooking in the kitchen than those without science background. Obviously simple scientific experiments can be conducted in the kitchen. However, because students learn in a pleasant and comforting atmosphere, learning in kitchen is not considered fashionable as the experiences in science classroom and laboratory. Difficult chemistry concepts such as radiation, convention, conduction, energy and chemistry of carbohydrates, solution chemistry and hardness in water may seem overwhelming to many students, yet to explore and appreciate these scientific concepts during our preparation of food may actually be fun and exciting adventure. Unfortunately many students and parents alike do not appreciate these activities beyond getting food ready on the table, or getting the plates washed and the environment tidied up.

2. Objective of the Study

The major problem prompting this investigation is poor performance of students in skills and cognitive achievement in science and the attendant dwindling enrollment into science and science based disciplines in Universities and Polytechnics. Lewis (1987) observed that the young ones are turning away from science. This is in spite of the current global race for science and technological advancement. One factor that culminated into the trend observed above is the tension created inadvertently between school and home science. Students no longer see science as a real life experience. The inability to relate these two complementary experiences makes chemistry to be difficult for students to understand, hence poor performance and dwindling interest. More focus area of investigation is the influence of parents with or without science background on students' ability to relate these experiences. The objective of the study is to investigate the influence of parents with science background and those without science background on the ability of their children to relate science learned in school to real life ex-

perience at home. Four research questions were raised in order to achieve the objective stated above. They are:

1. Would the parental educational background be a factor in students' ability to establish relationship between school science and home activities?
2. Would parents with science background be able to offer a better and more appropriate help to students in establishing relationship between the two experiences?
3. Would parents be willing to engage and help their children learn science through home activities?
4. Are there barriers to parents' willingness to help their children learn science through home activities?
5. Answers were provided to these questions in this study.

3. Method

The research designs employed in this study is causal comparative and survey. The experiences of measure already exist. It is either the parents have been helping the students appropriately or not. It is a survey research because the entire population of parents having children in schools cannot be covered.

One hundred and ten parents, 62 females and 48 males, having children in secondary schools selected from Ikare, an urban center, in Ondo State of Nigeria constituted the sample. Sixty-seven of the one hundred and ten are of science backgrounds while forty three are with background in social and management sciences, arts and humanities. They were drawn using stratified and purposive sampling. The population of Ikare town is under a million people, with majority of them engaging in farming, small-scale industry and trading. The few others are schoolteachers, health workers and local government workers.

A self-constructed validated structured questionnaire and was used for data collection. The questionnaire consisted of four parts. The first section deals with the education and home background of the parents. Responses were sought on such variables as: the number of children, courses the children offer in schools, the type of schools they attend, whether they go to schools from homes or stay in the hostel. The second section deals with whether parents engage their children in home activities, what home activities, and what science concepts and skills they tell or teach the children when they engage in these activities. Respondents were to tick the activities, the skills and the concepts taught through them. In the third section, parents were asked to agree or disagree with the ten reasons provided why parents engage or do not engage their children in home activities. In the fourth section, parents were to agree or disagree with another ten reasons provided why they cannot help their children to learn science from home activities. Data collected were presented in tables.

4. Results

The results of data analysis are presented in tables as shown below.

Preliminary analysis

Table 1. Distribution of children per parent

Number of Children	1	2	3	4	5	6	Grand Total
Parents with	24	15	15	37	15	4	110
Total No of Children in Family with	24	30	45	148	75	24	346

From the table it can be seen that 4 children per parent or family seems to be the choice of many parents. They are 37 in that group. There are 24 families with one child each. Having one child n a family is the practice in Africa. The situation obtained here might be due to the age of he marriage. In other words, those that have one child per family are likely to be newly wedded ones.

Table 2. Distribution of the 346 children into school levels

School Level	Primary	Secondary	Tertiary	Others (below or out of schools
No of Children	77	144	60	65

It can be seen from the table that the bulk of the children of the parents sampled are in the secondary schools. The age of the parents and the families is likely to be a factor for this distribution. The ages of those that have their children in secondary schools are in 35-50 brackets. They are not likely to be newly wedded families.

Table 3. Distribution of the secondary and tertiary children into courses

Course	Science and Science based	Social and Management Science	Arts and Humanities	Total
No of Children	172	26	6	204

It can be seen from the table that majority of the parents, even those of other disciplines than science, have their children in science or science based careers. This is a good one for a nation that is aspiring for science and technological breakthrough. If this trend continues Nigeria would not only be able to maintain ratio 70 to 30 Science to Arts enrollment into high institutions of learning, (FGN 2004), She might be working towards evolving scientific literate society and be on the path of science and technological development.

Table 4. Distribution of School Children into Accommodation Type

Types of Accommodation	Go to Schools from Home	Stay in Hostels	Others	Total
No of Children	194	56	31	281

Majority of the children go to schools from homes. They are likely to have been involved in household chores with parents at home.

The next section of the results deals with providing answers to the research questions

Table 5. Home Activities and Associated Science Concepts and Skills That Parents Cited They Mention or Teach Their Children at Home

Home Activities	Associated Science Concepts and Skills	Frequency of Mention By Parents with	
		Science	Non-Science
Lightening stove and burning	Measurement of volumes (kerosene)	41	27
	Chemical change	21	17
	Combustion	14	20
	Incomplete combustion	11	9
	Gases	16	12
	Hydrocarbon (kerosene)	6	8
	Carbon dioxide	13	11
	Carbon monoxide	8	8
	Conduction of heat	12	14
	Radiation	10	4
Boiling of water	Change of state	28	12
	Boiling and boiling point	33	27
	Evaporation and condensation	28	14
	Equilibrium between water and vapour	12	8
	Vapour pressure, saturated vapour pressure	12	10
	Increasing/deceasing energies of particles	10	8
Freezing	Freezing and freezing point	27	23
	Melting and melting point	26	24
	Contraction and expansion	20	18
Dissolving substances	Solute	20	4
	Solvent	32	16
	Solution	35	27
	Mixtures and compounds	28	22
	Residue and suspension	19	15
	Colloidal solution	9	7
	Miscible and immiscible liquids	6	4
	Universal solvent	18	12
Washing	Soap lather	30	24
	Hard and soft water	40	26
Drying	Evaporation	34	34
	Surface area	18	16
	Volume/surface area	16	6
	Radiation	18	10
Spraying (insecticides or perfumes)	Estimating distance	16	16
	Diffusion	30	8
	Gas volume	14	8
	Gas molecules	16	14
	Intermolecular space	10	4
	Intermolecular force of attraction	6	2
	Entropy	4	4
	Compressibility	8	6
	Density	16	16
Operating electrical appliances	Forms of energy	24	22
	Conversion of energy	32	21
	Oscillation	19	11
	Rotation and revolution	18	6
		22	12

Research Questions

1. Would the parental educational background be a factor in students' ability to establish relationship between school science and home activities?

2. Would parents with science background be able to offer a better and more appropriate help to students in establishing relationship between the two experiences?

Answers to research questions 1 and 2 were inferred from Table 5.

It can be seen from the table that more than half of the parents responded only to very common concepts and skills like measuring volume, boiling and boiling point, solution, hard and soft water, and evaporation. Despite the fact that the respondents are educated some of them skipped concepts. The most probably explanation is that they are not familiar with them. The uneducated parents would not have done better. It can be inferred here that parental education is a factor in helping children learn science at home.

It can also be observed from the table that parents with science background responded more to majority of the concepts than the non-science parents. There are some items like radiation, solute, miscible and immiscible liquids, intermolecular space, intermolecular force of attraction and oscillation that the non-educated parents responded less to. That they are even able to do respond to the items at all might be attributed to the rudiments of science they acquired in early education. Science oriented educated parents were of greater assistance to their children than the non-educated parents.

Research Question 2

Would parents be willing to engage and help their children learn science through home activities? Answer to this question was provided on Table 6.

From the above table it can be seen hat science and non-science parents agree on the same points, like engaging children in household chores enabled them (children) to develop skills, consolidate school learning of science concepts and afford parents the opportunity to get involved in children learning. They all disagreed on the same points.

Research Question 3

Are there barriers to parents' willingness to help their children learn science through home activities? Answer to this question is contained in Table 7.

It can be seen from the table that both science parents and non-science ones agreed to some extent that time is not a barrier. They both saw science as very important and that what the children learn in schools and what the teachers teach them is not enough. Parents have to be involved by letting them (the children) see science in whatever they do at home. . However, those that agreed that lack of literacy and proficiency in science and parents not being able to see the relationship between school science and household chores were more than those that disagreed. This means that parents have to be good in science before they can be of much use in helping their children.

Table 6. Reasons Why Parents do or do not Engage Their Children in Home Activities

Reasons	Science		Non-Science	
	Agree	Disagree	Agree	Disagree
Prevent children from concentrating on school work	8	59	8	32
The children are not slaves	18	30	20	16
Will enable them to develop skills	54	2	36	2
Will enable them consolidate on school learning	36	20	32	8
Will hinder them from doing well n schools	2	54	2	36
Parents who could not hire house helps engage their children in household chores	4	52	4	36
Important science concepts can be learnt when children are engaged	52	8	30	10
It will afford parents opportunity to help the children	44	10	36	4
Students who are good at household chores are poor in school	6	52	0	40
Parents should help their children in their school work	50	8	40	2

Table 7. Barriers to Parental Involvement in Children's School Learning

Barriers	Science		Non-Science	
	Agree	Disagree	Agree	Disagree
No enough time	18	38	10	24
Because parents are not good in science	37	23	28	6
Do not know the way to help	27	29	24	8
Parents are limited in literacy and proficiency in science	32	24	27	5
Parents fear or dislike science	36	22	22	12
Many parents do not see relationship between school science and home activities	35	23	22	12
What children learn in schools is enough	6	54	2	34
What teachers teach them is enough work	8	50	6	30
Many parents think that their children will laugh at hem if they dabble into science area	12	44	18	16
Science is not important	0	58	0	43

5. Discussion

Engaging children in chores has been reported to be a potential source for children's learning (Guarcello, Lyon & Rosati; 2005). It is also a fact that children achieve more in academic work when parents get involved in their learning particularly at home level (Epstein & Sanders, 2000; Henderson & Mapps, 2005 & Hampton, 1999). Many of the parents that participated in this study tend to agree with this fact in spite of the differences in their level of education, socio-economic status and proficiency in science. They did not see anything wrong in engaging their children in chores and getting involved in their learning but lack of proficiency in science was a major hindrance to whatever help they wish to render. As a result they could not help the children relate science learned at school to phenomena in the home. One would think that students distracted in a way from concentrating on school work by their numerous home-based chores would find compensation in learning from chores and hence have improved academic achievement. Oloruntegbe and Ikpe (2010) observed that children from low socio-economic background who were often engaged in chores and other activities like gardening and selling in the market could neither establish useful relationship between nor consolidate school science and home activities. This might be so for lack of proficiency in science as observed with many of the parents investigated in this study. Parents covered in this study have a large number of children from four to six as reported on table 1. The children who are mainly in primary and secondary levels (table 2) were often engaged in home activities for the purpose of bringing in additional income. Parents with science background as seen on table 5 were able to associate more frequently science concepts with home activities and hence able to help their children learn science better than those without science background. They could afford and spend more time helping their children in whatever activities they are engaged in a home.

6. Conclusions

That many parents, in spite of or either because of their background, want their children to offer science and science related courses is evident from the results of this study. They (the parents) saw science as very important especially in this era of science and technological advancement. They did not see the engagement of their children in household chores as a hindrance to their achievement. Rather they saw their involvement at home a vital ingredient to their success. However, there are limitations to their involvement. Lack of literacy and proficiency in science is a major barrier. Not being able to see the relationship between school science and home activities is another important one. It is therefore recommended that every school child should be exposed to some science courses even when such child has other options since he or she will grow to become parent in future. Teachers too should try as much as possible to relate science teaching to what the child does daily at home.

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