

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 learnt 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 wanted their children to learn the subject. They did not see the engagement of the children in household chores as a hindrance rather an opportunity to learn through them and for the parents to get involved in their children's learning; such is a vital ingredient to children's success. However, there are limitations to their involvement. Lack of proficiency in science is a major one. 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.

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 daily. How often do we hear from children when they come from the school that "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). 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 and 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 and Coll 1997), chemical change and reactivity (Zoller 1990; Abraham et al. 1992), solution chemistry (Ravialo 2001; Goodwin 2002; Pinarbas and Caupolat 2003; Calik et al. 2005, 2006), intermolecular forces (Treagust 1988; Tan and Treagust 1998; Baker and Millar 2000), and many others could easily be studied directly or indirectly in the kitchen. Hence, home and community activities become useful consolidating factors 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? What of if 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 and Hausafus 1997); parental involvement is a vital ingredient in a child's education and science (Holmes 2006; House and Gerber 2006); parental socio-economic status is a major predictor of cognitive achievement (Bugental and 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 and Sanders 2000; Henderson and Mapp 2002). Reports further confirmed 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 holds 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 (NCPPIE), Family Friendly School/Foresight Learning, Harvard Family Research Project and many others. The goals of these programmes include: provision of a seamless system of support, resources, and training to families with children from birth through high school; building capacity of parents to become an integral part of their children's educational success; helping families establish home environment to support children as students; designing 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.

Studies also support that though parents are overwhelmingly interested in their children's science education and understand its importance,

yet (Americans') 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 they 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 meagre income many of such parents cannot afford the luxury of hiring helpers. They have to combine the household chores 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 week ends 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, convection, 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.

Problem 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.

Research Questions

Four research questions were raised in the study. 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?

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.

Instrument for Data Collection

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.

RESULTS

Preliminary Analysis

From the table 1 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.

It can be seen from the table 2 that the bulk of the children of the parents sampled are in the secondary school. The age of the parents and the families is likely to be a factor for this distribution. Their ages are in 35-50 brackets. They are not likely to be newly wedded families.

It can be seen from the table 3 that majority of the parents, even those of other disciplines than science, have their children in science or science-based careers. 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.

Majority of the children go to schools from homes. They are likely to have been involved in household chores with parents at home (Table 4).

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.

It can be seen from the table 5 that only very common concepts and skills like measuring volume, boiling and boiling point, solution, hard and soft water, and evaporation did we have more than half of the parents responding. Despite the fact that the respondents are educated, they still skipped items. 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 table 5 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-science educated parents responded less to. That they are even able to 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-science educated parents.

Research Question 3: Would parents be willing to engage and help their children learn science through home activities?

From the table 6 it can be seen that 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.

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

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

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

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

Research Question 4: Are there barriers to parents' willingness to help their children learn science through home activities?

It can be seen from the table 7 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 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	
		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/decreasing 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
	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
Conversion of energy		32	21
Oscillation		19	11
Rotation and revolution		18	6
		22	12

Table 6: Reasons why parents do or do not engage their children in home activities

<i>Reasons</i>	<i>Science</i>		<i>Non-science</i>	
	<i>Agree</i>	<i>Disagree</i>	<i>Agree</i>	<i>Disagree</i>
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

<i>Barriers</i>	<i>Science</i>		<i>Non-science</i>	
	<i>Agree</i>	<i>Disagree</i>	<i>Agree</i>	<i>Disagree</i>
Not 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

DISCUSSION

The average number of children per parent of the one hundred and ten sampled in this study is four. This is indicated on table 4. The question one may ask is how a parent can cope effectively with the education of this number of children. If the number of children in the family is too large it could affect the upbringing and the overall development of the children. This point is supported by Slymansky et al. (2000) who claimed that much time is expended on how to take care of the biological need of the children with little or no time left for interaction with them. This means that the more the number of children a family is having the more the problems such family has to contend with. Attempts to solve these problems might rub the parents the valuable times and efforts needed to get involve in their children's science learning at home.

In the past, many African parents took pride in having a large number of children (Fafunwa

1967). These children hardly attended school. They constituted major labour force on the farm (Ohunche and Otaala 1987). The situation has changed with education. Parents now have a fewer numbers of children. Notwithstanding, some of the children from these educated homes are actively being engaged in household chores as helpers or in the shops and markets as supporting breadwinners. This explains, in part, why majority of the children go to schools from home (See Table 4), so they could perform the roles of helpers and breadwinners along with their schooling. While Pedrosa (2006) described this type of home as disadvantaged background, The Department of Children, Schools and Families (2009) called it a detracted one. However, they (Pedrosa et al. and the Department of Children, Schools and Families) like Ohunche and Otaala (1987) were of the opinion that children from such background could consolidate school learning through activities they engage in at home. They could learn chemistry from the kitchen as indicated

in studies by Abraham et al. (1992), Ravialo (2001) and Goodwin (2002) or computational mathematics from the sales shops.

How well students could relate home activities to school learning will depend on parental assistance and the ability of the teachers to cite these related and complementary experiences in their teaching. As could be seen in tables 5 and 6, majority of the parents were not only willing to engage their children in household chores, they were also willing to render assistance to them (the children) in this aspect irrespective of their backgrounds. However, parents with science background could be seen to offer better assistance (See Table 5). There are studies that support this point. Such studies indicate that parents offer science-related explanation (Cowley and Callanan 1998) and use conceptual questions and scientific vocabularies (Tenenbaum and Leaper 2001) if they have science background and are literate in science. Many parents are limited in offering the needed assistance to their children. Barriers to their involvement, as can be seen on table 7, include lack of literacy and proficiency in science, fear and dislike for science

Many of the parents are of the opinion that what the children were taught in the school might not be enough. They were ready to be involved at home in their children learning (Mapp 2000; Slymansky et al. 2000) only they do not know how to do this since they are not in science. Majority of them, irrespective of their background wanted their children to study science.

CONCLUSION AND RECOMMENDATIONS

That many parents, in spite of or either because of their background, wanted 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. The only means of overcoming these barriers and be able to get involved in children science learning is for

them (the parents) to be literate in science. 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. This calls for a curriculum reform, a kind of 'science for all'. If future parents are exposed to some rudiments of science at all levels of education, there will be the assurance of not only being scientifically literate, such parents will be in a better position to help consolidate their children science learning at home.

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