

Finger-Pointing in Mathematics Education: Causes of Dropouts in High School Mathematics in Masvingo Urban, Zimbabwe

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The main thrust of this article was to explore the causes of dropouts in high school Mathematics in Masvingo urban secondary schools. The researchers got primed to delve into such a research study after realising that a significant proportion of high school pupils were dropping Mathematics when paradoxically a pass in high school Mathematics is mostly a precondition for admission into many tertiary institutions in Zimbabwe. The phenomenological research design was used with individual interviews and focus group discussions as data collection instruments. The researchers used a random sample of 35 respondents comprising 10 Mathematics teachers and 25 high school Mathematics dropouts. The teachers mostly laid the blame on the pupils' lack of career foresight and frivolous attitudes coupled with lack of parental guidance. The pupils pointed fingers at the teachers and the nature of Mathematics as a subject. The major reason for dropping high school Mathematics from the pupils' viewpoint was the general belief that Mathematics is an exceptionally difficult and tedious subject. The researchers recommended that teachers have to intensify their efforts in giving high school pupils academic guidance regarding the importance of Mathematics as an academic discipline especially for tertiary training.

Keywords: dropouts, adolescence, ability grouping, parenting styles, technological innovations, peer pressure, career guidance

INTRODUCTION

Mathematics as an academic discipline has been viewed by a significant proportion of learners all over the world as a challenging subject. This is backed by Saraswathi (2003:326) who avers, "Mathematics is often referred to as the 'killer' subject." However, Mathematics is also held in high esteem by a sizeable proportion of people for various reasons. According to Atweh, Forgasz and Nebres (2001:228), "high school Mathematics is commonly regarded as a prerequisite for many college Mathematics, Science and Statistics courses." Horne (2006) remarks that the study of Mathematics is not only necessary for future occupations but to teach logical thinking. Wu (2002:2) comments, "Mathematics is by its very nature a subject of transcendental clarity...Yet Mathematics is often presented to school students as a mystifying mess". It was through meditating upon such conflicting views regarding Mathematics that the researchers decided to explore the causes of Mathematics dropouts in high schools.

The nature of Mathematics as a discipline of learning has also been blamed for causing dropouts not only in a specific subject but for triggering general dropouts from high school and even beyond. For instance, Horne (2006) indicates that researchers from the United Negro College Fund established that high school dropouts ascribed their decision to drop out of school to the nature of Mathematics as a subject. Moreover, a research study conducted at Dublin

University revealed that few students completed courses that involved Mathematics (<http://www.guardian.co.uk/education/2001/may/08/education>). Such allied research findings triggered the researchers' enthusiasm to explore the causes of dropouts in Mathematics as an academic discipline at high school level.

A research study conducted by Croninger and Lee (2001) in the United States of America established that general dropouts were lower in schools where learners received additional academic support from their teachers. It has also been consistently found out that teachers are one of the crucial in-school variables influencing students' academic achievement in the United States of America (http://en.wikipedia.org/wiki/Achievement_gap_in_the_United_States).

Rumberger and Thomas (2000) confirmed through research that schools with higher student-teacher ratios tended to have high dropouts. Ability grouping is another school-related factor which has been blamed for causing dropouts in Mathematics as well as other academic subjects (<http://www.ernweb.com/public/996.cfm>). Battle (2002) claims that ability grouping can lead to underachievement since labels become a self-fulfilling prophecy. The cases of dropouts in Mathematics among teenagers have also been attributed to their family background. Permissive parenting styles, failure to enforce discipline by parents, lack of parental interest in the

children's academic work and lack of parental encouragement have all been cited as variables which account for high school dropouts (<http://www.focus.com/Dropouts.html>). Desforges and Abouchaar (2003:7) further assert, "It is widely recognised that if pupils are to maximise their potential from schooling, they will need the full support of their parents".

According to Allexshaht-Snyder and Hart (2001), the learning of Mathematics can be negatively influenced by a variety of beliefs which are harboured by the learners, parents, especially the creed that mathematical intelligence is an intellectual privilege of a limited number of learners who have biologically inherited it from their parents. Savell and Anthony (2000) as well as McNamara, Hustler, Rodrigo, Beresford, and Botcherby (2000) concur that the attitudes of pupils towards Mathematics are heavily influenced by the attitudes, beliefs and perceptions of their parents and guardians. Tiedemann (2000) reiterates that the Mathematics learners' levels of self-efficacy can be affected by the extent to which their parents help them in learning Mathematics. While the cases of school dropouts have been blamed on variables such as the extent of parental involvement as well as teachers, some people have laid the blame on the learners themselves. This is in partial agreement with the views of Desforges and Abouchaar (2003:12) who posit, "The children themselves, of course, with their unique abilities, temperaments and propensities play a central role in forming and reforming their behaviours, aspirations and achievements". This research study somehow attempted to establish the extent to which the high school dropouts in Mathematics would point fingers at themselves in connection with their decision to drop study of Mathematics.

Technologically advanced facilities in urban areas have been implicated for either causing academic underachievement on the part of the learners or even causing dropouts. Goldin (2008) and Monroe (2008) concur that while technological advancement can facilitate learning in some subjects, it can at times become a hindrance to pupils' educational endeavours. Internet facilities, sophisticated mobile telephones, video games and movies, among other things, have all been implicated for stealing pupils' study time. While acknowledging that the internet has brought about great convenience in virtually all facets of human existence including education, Subong (2008) regrets that the internet unfortunately exposes young minds to emotionally absorbing materials which to some extent steal their study time. It has been established through research that in the United States of America, pupils in urban areas are more likely to drop out of school than pupils in suburban areas (<http://education.stateuniversity>). Although the subject of dropouts seems to be relatively belaboured, it can be argued that this research study remains

justified since it focused on dropouts in Mathematics as a single subject and not school dropouts in general. Moreover, the unique social, economic, political, and cultural attributes of Zimbabwe as a country may arguably lead to the generation of relatively novel research findings which can complement the existing pool of knowledge.

THEORETICAL FRAMEWORK

The researchers interpreted and discussed some of the research findings using two psychological theories which are Erikson's psycho-social theory and Bandura's social learning theory. Erikson's psychosocial theory is a lifelong stage theory with eight stages, the fifth of which is called identity versus role confusion (Meggitt, 2006:163) in which adolescents battle with biological and emotional transformations coupled with trying to gain an identity. Santrock (2004:71) allude to the idea that adolescents tend to value the opinions and sentiments of their peers for the sake of being accepted. Bandura's social learning theory emphasises, among other things, the principles of modelling and self-efficacy. Modelling is the process whereby human beings learn through imitating significant others (Santrock, 2004:227). According to Kiamanesh, Hejazi and Esfahani (2004), self-efficacy is the belief by an individual in his or her own abilities to undertake and accomplish a given task. There is a strong positive correlation between a person's self-efficacy and amount of effort exerted in an attempt to accomplish the task.

RESEARCH QUESTIONS

The research study was guided by the following research questions:

1. What are the causes of dropouts in high school Mathematics from the dropouts' point of view?
2. Which variables account for dropouts in high school Mathematics from the Mathematics teachers' viewpoint?

METHODS

The researchers employed the phenomenological research design so as to get an insight into the causes of dropouts in Mathematics on the basis of the lived experiences of the dropouts themselves as well as their teachers (Haralambos and Holborn, 2008:794; Groenewald, 2004:44). Individual interviews and focus group discussions (Chilisa and Preece, 2005) were used to collect data from the research participants. The research instruments were pilot tested to enhance their reliability and validity. From a population of 114 Mathematics dropouts in five Masvingo urban high schools, 5 dropouts were purposively sampled from each school to give a total of 25 Mathematics dropouts. From each of the five schools, the researchers purposively sampled two Mathematics teachers. Therefore a sample of 35 respondents comprising 25 Mathematics dropouts

and ten Mathematics teachers was used. The researchers got permission to visit the schools from the local Regional Education Offices. The ethical principles of confidentiality, informed consent and anonymity were observed (Chiromo, 2006:11). For the sake of anonymity, the researchers used letters of the alphabet to identify the 10 teachers, that is, letters A to J, for instance, Teacher C. The names of the pupils were coded into numbers, that is, the numbers 1 to 25, for example, Pupil 13.

RESEARCH FINDINGS

The following are the findings which emerged from the data which was collected from the respondents:

- (a) Mathematics teachers and pupils to some extent blamed one another for causing dropouts in Mathematics at high school level.
- (b) 88% (22) of the school pupils indicated that they dropped Mathematics because they nursed the belief that Mathematics is an extremely difficult subject which can only be successfully tackled by the intellectually endowed.
- (c) 10 out of the 25 school pupils (40%) in the sample claimed that their decision to drop Mathematics was an upshot of between-class ability grouping which was undertaken by their teachers.
- (d) 52 % (13) of the dropouts in the sample attributed their decision to drop high school Mathematics to incompetence and hostility on the part of the Mathematics teachers.
- (e) Eight out of the 10 (80%) teachers blamed the pupils for being unfocused and directionless probably because of being developmentally immature.
- (f) The desire to have ample time to seek entertainment brought about by technological innovations was mentioned by some teachers as a cogent cause of dropouts in high school Mathematics.
- (g) Some teachers apportioned the blame of dropouts in high school Mathematics on the lacklustre parenting styles which some families were implementing.

DISCUSSION OF FINDINGS

The majority of the Mathematics dropouts, that is 88% (22), claimed that they dropped high school Mathematics because they believed that Mathematics is a difficult subject. This agrees with the sentiments of Allexshaht-Snyder and Hart (2001) who posit that some pupils harbour the creed that Mathematics is generally difficult and unattainable to many learners. Moreover, the same sentiments were echoed by Saraswathi (2003:226). The respondents maintained that even during their days as primary school pupils, they gathered that Mathematics was one of the most difficult subjects at secondary school level. They

indicated that they were relatively comfortable with other subjects but they found Mathematics unbearable. Pupil 18 remarked,

Mathematics is actually the most notorious subject at high school level because of its intricate nature. My senior siblings had warned me in advance while I was still at primary school, you know. I later experienced what they had warned me about. Hence I dropped the subject, you see.

The nature of Mathematics as a subject was further implicated by some pupils who indicated that they dropped Mathematics in order to concentrate on other subjects which they believed were not intellectually taxing. They were clinging to the belief that high school Mathematics should be studied separately after one has passed other subjects. Pupil 9 backed this stance by saying,

I realised that I cannot simultaneously study Mathematics and other subjects because it demands a lot of effort and commitment. I will study it later after I have passed the other subjects.

40% (10) of the pupils claimed that they dropped Mathematics because of between-class ability grouping which was done in their schools thereby exposing them to various factors which militated against their scholastic endeavours. The pupils claimed that teachers attended lessons sporadically and they seemed rude, ill-prepared and impatient with the pupils in the lower streams. The respondents further claimed that they could hardly seek assistance from their classmates since the generality of them were almost equally discouraged. This implies that the pupils in low ability classes lacked intellectual models from whom they could emulate good scholastic behaviours as postulated in Bandura's social learning theory. Moreover, the respondents alleged that incompetent teachers, relief teachers and inexperienced teachers were usually assigned to the low ability classes in their streamed schools. This is in partial agreement with the views of Battle (2002) who established that streaming can negatively impinge upon pupils' academic achievement. Moreover, it can be tentatively argued that ability grouping can erode the self-efficacy of the learners in the lower classes resulting in them dropping some subjects as alluded to by Kiamanesh, et al (2004).

It also came to the researchers' attention that some pupils fervently held their teachers responsible for their dropping of Mathematics. 52% (13) of the pupils claimed that some teachers were incompetent and hostile so much that they decided to drop Mathematics. Some pupils further alleged that some Mathematics teachers were just lazy to the extent of only giving them one written exercise per week. However, when the researchers quizzed the teachers

over such allegations during a focus group discussion with teachers, the teachers unanimously dismissed the claims as baseless and mischievous.

During individual interviews, one school dropout confessed that it was not her original intention to drop Mathematics. She pointed out that she was quite aware of the importance of Mathematics for future vocational training in tertiary institutions. She indicated that she was merely persuaded by her peers to drop Mathematics by claiming that Mathematics is an energy-sapping subject which robs people of their time to rest. This concurred with the views of Erikson who theorised that individuals in the identity versus identity confusion stage are heavily vulnerable to peer pressure (Meggett, 2006).

As far as the Mathematics teachers were concerned, they were to a large extent not responsible for dropouts in high school Mathematics. They claimed that nowadays pupils are generally unfocused and directionless. 80% (8) of the teachers attributed dropouts in Mathematics to the pupils' own frivolous attitudes towards their future. Some of the teachers remarked that the pupils needed career guidance before they could decide on which high school subjects to drop. These teachers quizzed the logic behind dropping high school Mathematics given that it is a very crucial subject in many tertiary institutions just as intimated by Atweh, et al (2001). Teacher C summed it up by saying,

Pupils who drop high school Mathematics mostly do it out of ignorance and lack of vision. It is almost impossible for someone to be admitted into most tertiary institutions for training without a pass in high school Mathematics.

Other teachers lambasted the pupils in urban schools for being overwhelmed by technological developments at the expense of their education. Such teachers claimed that urban pupils usually concentrate on entertainment found on the internet, digital satellite transmission, sophisticated cell phones, video games as well as movies. These teachers hypothesised that the pupils ultimately dropped Mathematics so as to have enough time to seek such entertainment as theorised by Goldin (2008), Monroe (2008) and Subong (2008).

Sixty percent (6) of the teachers intimated that some parenting styles were responsible for the pupils' recklessness in academic matters. They alleged that some parents were generally too permissive and were not doing enough to enhance their children's commitment to academic activities. The teachers cited the case of school pupils who were under the custody of their older siblings who in some cases encouraged the pupils to indulge in non-academic adult activities such as beer drinking and drug abuse

which are not propitious for sound academic performance in Mathematics. The sentiments of the teachers are relatively in agreement with the remarks of Desforges and Abouchaar (2003) who emphasise that parents should play an active role in their children' academic endeavours.

Some teachers attributed the cases of dropouts in high school Mathematics to the developmental stage of the pupils. Four out of the ten teachers (40%) remarked that the generality of high school pupils are adolescents and their behaviour is developmentally unique as outlined in Erikson's psycho-social theory (Meggett, 2006). One of the teachers emphasised that the turbulence associated with the transition from childhood to adulthood made the male pupils rebellious and the female pupils highly irritable and emotionally touchy. These teachers speculated that some pupils dropped Mathematics as a way of rebelling against the school authority and making their presence felt. However, none of the school pupils in the sample admitted that their decision to drop Mathematics was triggered by the maturational turbulence of adolescence.

CONCLUSIONS

Both the sampled Mathematics dropouts and the Mathematics teachers acknowledged that several variables account for dropouts in high school Mathematics. While the dropouts pointed their fingers at variables such as the nature of Mathematics as a subject, their teachers and educational practices such as ability grouping, the teachers pointed their fingers at high school pupils and their parents. The researchers noted that neither the Mathematics dropouts nor the teachers wanted to shoulder the blame of causing dropouts in Mathematics at high school level.

RECOMMENDATIONS

The researchers made some recommendations which they hoped will trigger subsequent educational research studies which can lead to the generation of solutions to the various pedagogical challenges associated with dropouts in high school Mathematics. Firstly, career guidance needs to be intensified at both primary and secondary school levels so as to inform the pupils of the importance of high school Mathematics in their future career pursuits. Furthermore, school events such as consultation days, prize-giving days and parent-teacher meetings should be used to encourage parents and guardians to monitor their children's academic progress in all the subjects including Mathematics. Moreover, the school authorities should intermittently invite resource people from higher and tertiary institutions to give some presentations and probably distribute some pamphlets which highlight the importance of high school Mathematics in the vocational, professional and employment sectors.

Finally, future researchers should replicate this research study in rural settings. This might lead to the generation of more information which can ultimately enhance the quality of teaching and learning of high school Mathematics.

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