



Areas of leverage to enhance statistical literacy in Kenya – Lesson learned from organizing a poster competition

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Abstract

Organizing a poster competition among high school students in Kenya provided an opportunity to identify areas of leverage in improving statistical education. Incorporating use of real life data into classroom teaching environment enhances learning experience. Involving students in designing real life experiments where they collect, analyse and interpret data using modern statistical software prepares them for the job market where they are expected to solve real life problems. The phenomenal growth in Digital technology over the last few years has increased the demand, availability and accessibility to data. There are more information sharing spaces and advanced computing tools. Data is essential in planning for development since it supports optimization of resource allocation and monitoring of progress in development. Without data, a country's efforts to plan for future growth and welfare of its people cannot be grounded in reality and therefore may be severely flawed. There is therefore need for a developing country to build its statistical capacity to utilize data for sound policies and decision. The need for collaboration between the Industry and the academia to promote statistical education cannot be understated. Industry plays a vital role in ensuring that education being offered at the various levels is aligned to the needs of the industry. This paper explores sufficiency of the current Mathematics curriculum in Kenya in equipping students with the requisite knowledge to solve real life problems in the in the real world. It looks at areas of leverage in improvement of statistical literacy.

Keywords: Data; Digital technology; Learning; leverage.



1. Introduction

Developing statistical reasoning of students consists of incorporating active learning strategies that make it possible to complement what they have learnt in class. Data collection and analysis is the heart of statistical thinking. Data collection promotes learning by experience and links the learning process to reality (Snee, 1993).

In 2015 students from a little known school in the rural areas of Kenya emerged first runners up at a poster competition organized by Internal Statistical Literacy Project (ISLP). The poster titled “An experiment on Growth of beans under improved soil conditions” was based on an experiment on impact of growing beans under controlled conditions as advised by the agricultural extension officer. The experiment posed a question “is the Agricultural officer Right? Same variety of beans were planted on two different plots, a control plot where no treatment was given and the experimental plot which was designed to ensure good soil drainage and use of the appropriate farm inputs as advised by the Agricultural officer. The experiment measured two outcomes, the growth rate measured by mean height and of the distribution of growth measured by variance. The students developed the concept and designed the experiment by themselves with little assistance from the teacher. They engaged in data collection, exploration of statistical concepts, analysis and interpretation of the data. Even though they had never been exposed to any computer software in classroom learning, the students used Excel Spread sheets for analysis and graphical representation of the results.

Efforts to mobilize resources to host the competition and/or donate prizes from institutions were unsuccessful. Due to the high levels of adoption of digital technology in Kenya, the competition was hosted conducted online with the judges using video conferencing and Skype to pick the national winners.

Organizing the poster competition at the national level provided an opportunity to identify areas of leverage in improving statistical education.

The importance of developing the statistical literacy of our future generations is critical.

With a phenomenal growth in the ICT industry in the last few years Kenya today prioritizes availability of statistical information, statistical skills and statistical knowledge.

The need for collaboration between the Industry and the Academia to promote statistical education cannot be understated. Industry plays a vital role in ensuring that Education being offered at the various levels is aligned to the needs of the industry. The curriculum developers need to ensure inclusion of view from the industry players in curriculum review process.

This paper looks at opportunities for learning

The paper explores lessons learned from organizing the poster competition

2. - Teaching Statistics in Kenya- Need to Incorporate a More Active Approach to Learning

The Government of Kenya spends over 30% of its budget in Education. Critics however claim that the education system has not solved major challenges of the nation. As in many other developing countries, the education system is in a state of transition with the policy makers attempting to find a system that will foster economic growth, enhanced productivity, innovation and contribute to national and social development. Kenya currently uses an 8-4-4 system of education with eight years of primary education; four years of secondary education and four years of university/ Tertiary education.

Today there is more appreciation on the role of Statistics in providing techniques for evaluating ideas, testing theories, and discovering the truth across disciplines. This has led to a marked growth in student’s enrolment in Statistics courses at the universities and other tertiary institutions.

Despite the widespread emphasis on reform in the teaching of statistics and the increase in papers on Statistics education in the research literature, Statistics is still viewed as a discipline with a need for significant improvement in how students are educated (Garfield and Ben-Zvi, 2008). In Kenya,



approach to teaching statistics is theoretical with no specific requirement for the classroom teacher to expose students to real life situations. This thus means that students rarely get exposed to using their statistical knowledge to solve real problems

Statistics is introduced in the fifth year of primary school where as a topic in mathematics syllabus where the concept of interpretation of simple graphs is introduced. Simple measures of central tendency (mean, mode and median) are taught in the consecutive primary school years. At secondary school level Statistics and Probability are introduced as independent topics in Mathematics. Topics taught include data collection and presentation, more complex computations of measures of central tendency and dispersion and elementary concepts of probability. Courses in theoretical and applied Statistics are taught at different levels for students pursuing University and Tertiary education.

Students participating in the poster competition were able to apply knowledge gained in class room to solve a real life problem. There should be a deliberate effort to incorporate use of real life data to enhance classroom learning. There is need to review the syllabus to incorporate a more active approach to learning where students are engaged in exploring their environment and identifying problem situations in life that can be solved using data , engage in data collection, analysis and interpretation to solve the problems. This will equip with good basic knowledge in Statistics which equips them with the right job skills.

3 Adoption of Innovation and Technology for enhanced Statistical literacy

Adoption of technology in Kenya over the last decade has been phenomenal. Over 80% of the population is reported to have access to internet while over 70% own a Mobile phone. Most mobile phone users access internet. The mobile phone seems to be closing the technology and literacy gaps since segments of the population with very basic or no education are able to use the mobile phone to execute complex tasks such as mobile money banking, surfing internet for information and participating in social media forums . Despite this fast growth in ICT sector, technology is yet to be fully integrated into teaching in the formal school system. Opportunities for adopting technology to enhance statistical literacy include use of computing software (spreadsheets and more sophisticated software), access to data for use in class room teaching environments, use of web based data collection methods, online learning platforms and more computing gadgets. At the primary school level there has been no significant adoption of technology to teach mathematics while students get introduced to scientific calculators at the upper secondary school

Though not taught formally in the classroom, some students have been able to learn statistical computing skills outside the formal classroom learning environment. Students learn these skills at home and at cyber cafes. It is also common practice children to enrol for short computer classes during the school holidays. There is thus a growing number of primary school and high school students who are able to use their basic spread sheets such as excel to perform computations and develop graphs.

At the University level technology has been adopted at different levels at different universities. While some universities have adopted a practical approach by introducing students to computing software and other technologies such as web data collection and management, others are still stuck to the traditional theoretical approach. Employers generally perceive students from some universities as more techno survey. There is room for introduction of more technology and innovations in teaching statistics

Students who won the poster competition had not been taught any statistical software in classroom. They were however able to use excel spread sheets to perform basic data analysis and develop graphs for the project. Other students who participated in the competition demonstrated high levels of adoption of ICT and innovation with one project using a web survey administered through the social



media to collect data. This is an indication that students are enthusiastic and ready for use of ICT in classroom learning environment. This calls for periodic review of the curriculum to align it to the fast evolving technological space, and equip teachers with the right skills.

4. Increased Demand for Statistical Literacy for Development

4.1 Statistical Literacy for Development

The Kenya Vision 2030 is the national long-term development blue-print that aims to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment. As Kenya strives to achieve the vision 2030 there is need to develop reliable statistics that describe the reality of people's everyday live. For development to occur there must be conscious efforts by policy makers to optimize utilization of resources. This calls for understanding of availability and the distribution of resources vis a vis the demand. There is need to study the various segments of the population to understand their problems and opportunities so as to develop the right strategies for development. There is need to continuously measure and monitor indicators of development including levels of poverty, inequality index and accessibility of water and food. Statistical literacy will allow citizens to track progress of development initiatives in their jurisdiction and hold policy makers and leaders accountable.

4.2 Statistical literacy for Day to day decision making

The proliferation of statistics in the media and on the internet means that people are increasingly becoming consumers of information. The ability to evaluate critically the information presented is fundamental to effective citizenship (Gordon & Nicholas, 2006). In Kenya there is an apparent increase in demand for data among the citizens. Growth in number of people owning mobile phones has seen increase in availability and access to data. More and more people are using mobile gadgets to conduct business transactions and access information online. With an increasing youthful population, unemployment is rife and young people are venturing into agribusiness and other informal self employment opportunities. The younger segment of the population are more technology survey are fast adopting use of data for day to day decision making creating an increase in demand for data such as weather trends, best practice in production, new innovations, market trends, and available markets for products. In response to this there has been an increase in the number of entrepreneurs offering data online for a small fee. Use of data for decision making has made the informal businesses more lucrative characterised by increased productivity, ease access to information and more reach to both local and international markets. There is need to increase statistical literacy to equip citizens with the right skills

The student project was agricultural oriented which intended to test whether growing beans using best practice as advised by the agricultural officer had any significant impact on production . The students were able to design an experiment that provides solutions to their immediate environment.

5. Need for more collaboration

A good education system should equip students with skills that are applicable in the job market. The need for collaboration between the Industry and the academia to promote statistical education cannot be understated. Industry plays a vital role in ensuring that education being offered at the various levels is aligned to the needs of the industry. In Kenya just like other developing most other African countries there is very little collaboration between the academia and the industry in enhancing statistical literacy. The academia need to ensure engagement of the industry in curriculum design and reviews. The industry should on the other hand support the academia by funding programs that are aimed at producing the right skills for the job market .



5. Conclusions

Given the **current** emphasis on statistical knowledge in Kenya, there is need to review the scope of Statistics education in the primary and secondary school curriculum in Kenya. There is need to **realign** the Statistics education at primary secondary and tertiary institutions to trends and requirements of the industry. Technology should be adopted as much as possible at all levels of Statistics education. There is thus need to review statistics curriculum at all levels to ensure alignment the evolving dynamics. The curriculum developers need to ensure leverage on emerging technologies and inclusion of views from the industry players in curriculum review process.

References

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