



Language of instruction and learning effectiveness in Tanzania higher education: Undergraduate students' perceptions of English - The case of Tanzania Institute of Accountancy

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ABSTRACT

Language of instruction is an important predictor of learning effectiveness, especially in a multilingual context like Tanzania, where Kiswahili dominates in day-to-day communication and English is widely used as a medium of instruction in secondary and higher education. This study examined perceptions of undergraduate students on the use of English as a medium of instruction and its effect on learning effectiveness. The Tanzania Institute of Accountancy (TIA), Dar es Salaam Campus, was used as a case study. The study was guided by Cummins' linguistic interdependence hypothesis and Vygotsky's sociocultural theory. The campus had a total of 11,365 undergraduate students. Data were collected using a structured questionnaire from a total of 179 undergraduate students who were obtained using a simple random sampling technique. Reliability analysis of the instrument showed a Cronbach's Alpha value of 0.87, which indicates strong internal consistency. Descriptive statistics were used to test for frequencies, median, and standard deviation. Inferential statistics was also used to test for correlation and regression. Learning effectiveness was operationalized through comprehension, participation, confidence, and academic performance. The findings revealed high perceptions of MOI ($M = 3.68$, $SD = 0.81$) and positive ratings across learning effectiveness indicators, which are comprehension ($M = 3.74$), participation ($M = 3.59$), confidence ($M = 3.63$), and academic performance ($M = 3.71$). Moreover, MOI was found to have significant positive correlations with academic performance ($r = .66$), comprehension ($r = .62$), participation ($r = .55$), and confidence ($r = .58$) ($p < .01$). Regression analysis indicated that MOI significantly predicted learning effectiveness ($\beta = .69$, $p < .001$), explaining 48% of its variance ($R^2 = .48$). The study concludes that English as MOI significantly influences all the four predictors of learning effectiveness. It further recommends strengthening academic language support mechanisms to students in higher education and reviewing policy to enhance learning effectiveness in Tanzanian higher education institutions.

Keywords: English Medium Instruction, Higher Education, Language of Instruction, Learning Effectiveness, Students' Perceptions, Tanzania

I. INTRODUCTION

Language of instruction is one of important determinants of effectiveness in the learning process. It facilitates how knowledge is accessed, processed and demonstrated by learners (Brock-Utne, 2007; Mohamed, 2014). In Tanzania, the issue of LOI particularly in higher education has been an issue of debate among different stakeholders. As far as teaching and assessment is concerned, English language has been widely used (Qorro, 2013). Students receive learning materials that are in English language and when writing their exams and different assessments English is used. While English language is used in teaching, students in all education levels in Tanzania are more used to Kiswahili than English language. Kiswahili being the national language and the most spoken language is considered to be effective if used in learning by some scholars (Mohamed, 2014).

It is expected that the use of English as the medium of instruction can produce uneven learning experiences in contexts where majority of learners have stronger functional competence in Kiswahili than academic English. Previous studies show that the issue of LOI has been posed transition challenges, contributing in reducing classroom interaction with performance implications when students have to must both content and language simultaneously (Qorro, 2013). In societies that use multiple languages like Tanzania, policies governing language in education has been complex. While Kiswahili is being used as MOI in primary education, English is used in secondary and higher education institutions. However, many students join higher education with varied levels of English proficiency. This variation may affect their level of comprehension, participation, performance and the overall learning effectiveness (Albakri, 2017).

In higher education institutions, the medium of instructions is key in shaping students' academic experiences especially on how they can participate and engage with the learning processes. It should be noted that, learning effectiveness is not the results of the ability of students to achieve high academic performance alone but also their capacity to comprehend instructional content, participate in classroom activities and develop confidence in academic communication. These dimensions are interrelated and all together are capable of determining the extent to which students benefit from the educational process process (United Nations Environmental, Scientific and Cultural



Organization [UNESCO], 2021; Trudell et al., 2022). Comprehension is an important aspect of learning effectiveness as it is capable of influencing the extent to which students can understand concepts, instructions and academic materials which delivered during the teaching and learning process. When students do not fully understand and master the language of instruction, they may find themselves struggling to grasp key ideas, follow lectures and interpret written materials. This can lead to students memorializing the materials but not having deep understanding (Cummins, 1979; UNESCO, 2021).

Participation is another important critical dimension of learning effectiveness. Active engagement of students in classroom discussions, asking questions as well as contributing ideas are indicators of meaningful learning. However, willingness and ability of students to participate are often influenced by their levels of proficiency in the language that is used for instruction. Limited command of command of English may affect the ability of students to express their ideas which reduce their ability to interact (Trudell et al., 2022). Confidence of learners is another important key factor for students' engagement in academic activities. The ability to communicate effectively in the language of instruction helps students to have self-assurance in presenting their ideas, engaging in discussions as well as completing academic tasks successfully. On the other hand, inadequate language proficiency in students may lead to anxiety, fear of making mistakes and reduced self-confidence. These psychological barriers can negatively affect overall learning experience and limit their academic potential (Macaro et al., 2018; UNESCO, 2021).

Academic performance, as an outcome of the learning process, reflects students' ability to demonstrate their knowledge and skills through assessments. In contexts where assessments are conducted in English, students' performance may be influenced not only by their understanding of the subject matter but also by their ability to express that understanding clearly in the language of instruction. As a result, language proficiency becomes a critical factor in determining academic success, particularly in higher education institutions where complex and abstract concepts are frequently assessed (Dearden, 2018).

Academic performance of students as an outcome of the learning process, reflects ability of students to demonstrate their knowledge and skills through assessments (Mwita et al., 2023). In contexts like in Tanzania where students use a foreign language, performance of students may be influenced not only their ability to understand the subject matter but also their ability to express their understanding in the language of instruction. This makes language proficiency an important factor for academic success especially higher education institutions where complex and abstract concepts are frequently assessed (Qorro, 2020; Trudell et al., 2022). Despite the growing body of literature on language of instruction in higher education in Tanzania, still there is a need of providing empirical evidence that links the medium of instruction to specific dimensions of learning effectiveness in higher education institutions. Available studies in the literature have focused on policy debates or just language challenges with limited attention how language influences learning outcomes such as comprehension, participation, confidence and academic performance. against this backdrop, this study seeks to contribute to the existing literature by examining the role of medium of instruction in shaping these key dimensions of leaning effectiveness among students in Tanzania higher education.

1.2 Research Objectives

The study aimed to achieve the following objectives;

- i. To describe students' perceptions on medium of instruction used in higher education in Tanzania
- ii. To describe the indicators of level of learning effectiveness in higher education in Tanzania
- iii. To examine the influence of language of instruction on learning effectiveness in Tanzania higher education

II. LITERATURE REVIEW

2.1 Theoretical Review

This study is underpinned using two main theories which are Cummins' Linguistic Interdependence hypothesis and Vygotsky's Socio-cultural Theory. Cummins' Linguistic Interdependence hypothesis suggests that cognitive academic language (CALP) is an alternative language which is gradually developed by a learner and significantly affects his/her academic achievement (Cummins, 1979). As per the theory, students with low academic language proficiency are more likely to struggle in processing complex subject matter delivered in that language. On the other hand, Vygotsky's Sociocultural Theory puts an emphasis that language is a primary tool in developing and generating knowledge (Vygotsky, 1978). This gives an implication that, if learners are not fully competent in a language that is used for instruction, internalization of knowledge may be constrained.

2.1.1 Learning Effectiveness Concept

Learning effectiveness is the degree to which students are able to achieve intended learning outcomes, demonstrate understanding as well as applying knowledge acquired in the learning process. It includes comprehension, participation, confidence and academic performance (Biggs & Tang, 2011).



2.2 Empirical Review

2.2.1 English as Medium of Instruction (EMI) and Learning Effectiveness

Across Sub-Saharan Africa, English is widely used as a medium of instruction in higher education (Brock-Utne, 2007). Countries like Kenya, Uganda, Rwanda, Zambia, Malawi and South Africa just to mention a few, use English as MOI. The level of proficiency in using and mastering the language differs across country significantly. Countries which are consistent in using English as a medium of instruction across all education levels have better results in higher education with regard to learning effectiveness. In Tanzania, the story is different. Generally, students in primary schools use Kiswahili as a medium of instruction in all subjects except English subject. However, when they join Secondary schools, they use English medium of instruction in all subjects except Kiswahili subject. Empirical evidence shows that students often face challenges such as limited vocabulary, difficulty in understanding lectures and hesitation in participating in discussions and seminar presentations (Qorro, 2013).

Some studies indicate that, it is not students alone who face challenges when it comes to the use of English as MOI. Even lecturers struggle to use the language. This poses a policy challenge on appropriateness of English as a medium of instruction in higher education. A recent study by Hiza and Paschal (2023) conducted an empirical review of language in education policy in Tanzania. The study highlights the persistent discrepancy between English and Kiswahili as media of instruction. The study posits that dominance of English has led to systematic dilemmas which affect multiple education stakeholders. The study concludes that unresolved issue of MOI between English and Kiswahili have broader educational and societal consequences. Similarly, Hiza and Paschal (2023) reviewed policy governing LOI in Tanzania. Their study highlights, challenges arising from the shift to English from Kiswahili that students face when they join secondary schools. The study found that this transition negatively affects students' academic performance and overall educational outcomes. The authors argue that Kiswahili should be kept on being used up to tertiary education level with English retained as a subject.

A study by Anwer et al (2020) which was none Punjab India, examined the effect of MOI in secondary schools on students' motivation to learn. The study used a sample of 1, 456 students to collect data using a questionnaire. The study found that location of students (which affect their English proficiency) had significant effect on motivation to learn. Students enrolled in urban English medium schools reported higher motivation than those located in rural areas. This entails that language proficiency level is an important determinant of learning motivation which is a predictor of learning effectiveness. Another empirical mixed-methods study was conducted in Rwanda across five Universities with a focus on students' mastery of English as the MOI by Irakoze (2024). From a sample of 354 students and 27 lecturers the study found that supportive linguistic environment is among of predictors of English mastery which is key to learning effectiveness. This study gives an implication that, having low English proficiency can be enhanced by linguistic supportive language in higher education and support students to perform better in their studies. While the above study presents important insights on MOI in higher education while linking it with that of primary and secondary education and academic performance, yet, the studies ignored one of important element which is learning effectiveness. This study aims at examining language of instruction and learning effectiveness in Tanzania higher education using Tanzania Institute of Accountancy as a case.

III. METHODOLOGY

3.1 Research Design

The study used quantitative cross-sectional survey design. Cross-section design is used to collect from a population at a single point in time (Mwita, 2025). The design is useful for studies that aim to establish link between or among study variables.

3.2 Study Area

The study included undergraduate students of TIA main campus Dar es Salaam. The use of TIA was based on the fact that the institute has a long history of providing higher education with undergraduate students who were the target of the study.

3.3 Target Population

The study's target population were undergraduate students from higher learning institutions in Tanzania. With specific to TIA, the institute had a population of 11, 365 undergraduate students.

3.4 Sampling and Sample size

The research focused on 11,365 students from the Tanzania Institute of Accountancy (TIA). Using Yamane's (1967) method, we found that the sample size was 387 respondents with a 95% confidence level and a 5% margin of error. But 179 people answered (45.5% of the time). This sample size is suitable for statistical analysis, given that



samples beyond 100 are permissible for quantitative research (Hair et al., 2019). To make sure everyone had an equal chance of being chosen and to cut down on prejudice, a simple random sampling method was applied.

3.5 Data collection tool and procedure

Data was collected using a structured questionnaire. A questionnaire had four sections which are demographic information, English language proficiency self-assessment, perceptions of English as MOI and learning effectiveness. The responses were measured on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). In order to confirm validity and reliability of the questionnaire content was reviewed by 3 experts for content validity and Cronbach's alpha was tested for reliability. Cronbach's alpha was 0.87 which indicates presence of internal consistency.

3.6 Data Analysis

Data were analyzed using SPSS version 26 through which descriptive statistics and differentiation statistics were conducted. Descriptive statistics outputs included mean, frequencies and standard deviation. Inferential statistics outputs included Pearson correlation and multiple regression analyses were conducted.

IV. FINDINGS & DISCUSSION

4.1. Findings

The findings for the study are shown below

4.2 Demographic Data

The study had a total of 179 participants from which 97 (54%) were males and 82 (46%) were female. On the other hand, the respondents were in different years of study. First year students were 68 (38%), second year students were 61 (34%) and third year students were 50 (28%).

Table 1

Demographic Data

Category	Sub-category	Percentage (%)	Actual Number (n=179)
Gender	Male	54%	97
	Female	46%	82
Year of Study	First Year	38%	68
	Second Year	34%	61
	Third Year	28%	50

4.3 Descriptive Results of the Study's Variables

Students were asked to express their level of agreement to various statements which focused on assessing their perception on MOI, level of comprehension, level of participation, level of confidence, and perceive academic performance. It was found that respondent's perception towards MOI was moderately high with mean of 3.68 and standard deviation of 0.81. Comprehension was found to be high with mean of 3.74 and standard deviation of 0.76, participation was found to be moderately high with mean of 3.59 and standard deviation of 0.84, confidence was moderate to high with mean of 3.63 and standard deviation of 0.79. On the other hand, academic performance level was found to be 3.71 and standard deviation of 0.73 which is considered a good perceived academic performance.

Table 2

Descriptive Results of the Study's Variables

Variable	Mean	Std. Deviation	Interpretation
MOI	3.68	0.81	Moderately high perception of MOI effectiveness
Comprehension	3.74	0.76	High level of understanding
Participation	3.59	0.84	Moderate to high engagement
Confidence	3.63	0.79	Moderate to high self-confidence
Academic Performance	3.71	0.73	Good perceived academic outcomes

4.4 Correlation Results

The study examined strength of relationship between MOI and learning effectiveness indicators. It was found that MOI had a strong positive correlation with academic performance ($r = .66$, $p < 0.01$). strong positive correlation was also detected between MOI and comprehension ($r = .62$). On the other hand, two other indicators participation ($r = .55$) and confidence ($r = .58$) were found to have moderate and significant correlation with MOI. Generally, the results



show that improvement in MOI is also associated with improvements in all the dimensions of learning effectiveness. The results are summarized in table 3

Table 3

Pearson Correlation Results

Variables	MOI	Comprehension	Participation	Confidence	Academic Performance
MOI	1				
Comprehension	.62**	1			
Participation	.55**	.60**	1		
Confidence	.58**	.64**	.59**	1	
Academic Performance	.66**	.69**	.57**	.61**	1

4.5 Regression Analysis Results

4.5.1 Model Summary

Based on the results shown in table 4, $R = .69$ indicates presence of strong relationship between MOI and learning effectiveness. The R square of .48 shows that 48% variation in learning effectiveness is explained by MOI

Table 4

Model Summary

Model	R	R ²	Adjusted R ²	Std. Error
1	.69	.48	.47	0.54

4.6 ANOVA Results

The ANOVA results shows that model is statistically significant since the p value is less than 0.001

Table 5

ANOVA

Model	F	Sig.
Regression	161.84	.000

The model is statistically significant ($p < 0.001$).

4.6.1 Regression Coefficients

Results in table 6 shows that MOI has a positive significant effect on learning effectiveness ($\beta = .69$, $p < 0.001$). Moreover, one unit increase in MOI will lead to 0.71 unit increase in learning effectiveness. Generally, the findings show that MOI is capable of predicting learning effectiveness as it is interpreted through students' comprehension, participation, confidence, and academic performance.

Table 6

Coefficient

Variable	B	Std. Error	Beta	T	Sig.
Constant	1.12	0.21	—	5.33	.000
MOI	0.71	0.06	.69	12.72	.000

4.7 Discussion

This study examined the influence of MOU on students' learning effectiveness which was operationalized through comprehension, participation, confidence and academic performance. The study found that MOU significantly predicting the learning effectiveness since it explains 48% of the variation in learning effectiveness. Detection of positive and statistically significant correlations between MOU and all four indicator is a suggestion that language of instruction is not a communication medium but also an important pedagogical determinant of academic success of students in higher education. This finding support previous studies such as Brock-Utne (2007) and Qorro (2006) which demonstrate that MO has a role in fostering students' learning outcomes especially in multilingual societies where there is a difference between language proficiency and language that is used in classrooms for learning.

The strong correlation between MOI and comprehension ($r = .62$) is in line with the argument that when students have sufficient language proficiency, their cognitive engagement with academic content tend to be better. This finding is consistent with Cummins' Linguistic Interdependence Hypothesis which posits that proficiency is a second language which is the result that development level of the previously known language. This also entails that when students experience difficulties in comprehension it may not necessarily be due to their low intellectual capacity but also their



level of language mastery. This also support Cummins' proposition that cognitive academic language proficiency plays a decisive role in educational outcomes. Other studies that have been done in African higher education showed similar findings that students who are taught in the language that they understand or they have mastered have higher chances of having higher levels of comprehension and conceptual understanding comparing to those who learn using language which they are less familiar with. Studies such as Mkumbo and Amani (2012) and that of Nyaga and Anthonissen (2012) empirically support the findings.

The moderate to strong association between MOI and Participation ($r = .55$) as well as confidence ($=.58$) reveals the socio-psychological element of language in education. This means, students are more likely to play an active role discussion, asking questions as well as engaging in collaborative learning when they feel that they have mastered the language. On the other hand, language barriers may be the main reasons for reducing class interactions. These results support what Vygotsky's Socio-cultural Theory purports that social interactions and language are important in facilitating cognitive development of learners. This observation is consistent with studies such as Macaro (2018) and Tshabangu et al. (2013) which indicate that language proficiency fosters interactions in the class, willingness to communicate as well as learners' experience. On the other hand, linguistic insecurity is the reason for less participation and engagement.

The results show the strongest relationship between MOI and academic performance ($r=.66$) which indicates that language competence is capable of shaping students' academic outcomes. This entails that students' poor performance may be the result of students' comprehension difficulties rather than failure to understand concepts. This interpretation reinforces both theoretical frameworks used in this study. While Cummins shows that transferring of cognitive skills across different languages on the other Vygotsky advocates for the central role of language in facilitating thinking. Generally, the results from regression analysis confirm that MOI is a significant predictor of learning effectiveness ($\beta = .69, p < .001$). The significant explanatory power of $R^2 = 48$ shows that language policy and teaching practices cannot be ignored rather they lay a strong foundation for student engagement, cognitive development and performance outcomes of students. This finding is in line with those reported by studies of UNESCO (2016) and Wolff (2017) which showed a direct link between language proficiency and academic achievement. The studies also emphasized that inadequate mastery of the language of instruction can lead low performance even when students are capable.

V. CONCLUSION & RECOMMENDATIONS

5.1. Conclusion

This study focused on examining the effect of medium of instruction on learning effectiveness. The findings confirm that MOI is a significant predictor of learning effectiveness. The results show that when students perceive MOI as clear and understandable it will be easy for them to understand course content, being active in class room discussions, having better confidences and perform well in their assessment. The results reinforce Linguistic Interdependence Hypothesis by Cummins and Socio-cultural Theory by Vygotsky. Each theory proposes that language is an important tool for cognitive development and knowledge construction. The study therefore concludes that having effective language policy as well as instructional strategies is important for enhancing learning outcomes in higher education.

5.2. Recommendations

Colleges and universities should create and enforce policies that are relevant to the aiming at helping students have a conducive learning environment. The policies should make sure that both lecturers and students use and understand the language of instructions. The policy should also take into account the students' language backgrounds to make it easier to cope with the language used in higher education. Higher education institutions should start programs to help students with academic language, like bridging courses, language development classes, and writing support centers. These programs will assist students get better at the language of instruction, which will help them understand, participate, and do better in their studies. Lecturers should learn how to use effective teaching methods that help students understand. Lecturers should assess and come up with effective teaching methods for effective learning experiences and understanding

REFERENCES

- Albakri, S. (2017). Effects of English medium instruction on students' learning experiences. *Journal of Language and Education*, 3(2), 45–56.
- Anwer, M., Tatla, I. A & Butt, I. H. (2020). Effect of Medium of Instruction on Students' Motivation Towards Learning at Secondary Level. *Journal of Business and Social Review in Emerging Economies*, 6(1), 301-308. <https://doi.org/10.26710/jbsee.v6i1.1065>



- Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university* (4th ed.). McGraw-Hill.
- Brock-Utne, B. (2007). Learning through a familiar language versus learning through a foreign language—A look into some secondary school classrooms in Tanzania. *International Journal of Educational Development*, 27(5), 487–498. <https://doi.org/10.1016/j.ijedudev.2006.08.003>
- Cummins, J. (1979). Cognitive/academic language proficiency, linguistic interdependence, the optimum age question and some other matters. *Working Papers on Bilingualism*, 19, 121–129.
- Dearden, J. (2018). The Changing Roles of EMI Academics and English Language Specialists. In: Kirkgöz, Y., Dikilitaş, K. (eds) *Key Issues in English for Specific Purposes in Higher Education*. English Language Education, vol 11. Springer, Cham. https://doi.org/10.1007/978-3-319-70214-8_18
- Hair, J. F., Babin, B. J., Anderson, R. E., & Black, W. C. (2019). *Multivariate Data Analysis* (8th ed.). Cengage Learning. <https://www.cengage.com/c/multivariate-data-analysis-8e-hair-babin-anderson-black/9781473756540/?searchIsbn=9781473756540>
- Hiza, C. D & Paschal, M. J (2023). Emphasizing Kiswahili as a Medium of Instruction for Effective Education Output in Tanzania. *Education, Language and Sociology Research*, 4(1), 31-38.
- Irakoze, J. (2024). Determinants of Students' Mastery of English Language as the Medium of Instruction in Rwandan Universities. *African Journal of Empirical Research*, 5(3), 614-628.
- Macaro, E. (2018). *English medium instruction: Content and language in policy and practice*. Oxford University Press.
- Macaro, E., Curle, S., Pun, J., An, J., & Dearden, J. (2018). A systematic review of English medium instruction in higher education. *Language Teaching*, 51(1), 36–76. <https://doi.org/10.1017/S0261444817000350>
- Mkumbo, K., & Amani, J. (2012). Perceived university students' attributions of their academic success and failure. *Asian Social Science*, 8(7), 247–255. <https://doi.org/10.5539/ass.v8n7p247>
- Mohamed, M. H. (2014). Language policy and its impact on quality of education in Tanzania. *Journal of Education and Practice*, 5(14), 90–96.
- Mwita, K. (2025). Understanding Research Philosophies and Designs: A Guide for Early-Career Researchers. *Eminent Journal of Social Sciences*, 1(1), 43-52. <https://doi.org/10.70582/28z5p186>
- Mwita, K. M., Kinunda, S., Obwolo, S., & Mwilongo, N. H (2023). Soft skills development in higher education institutions: Students' perceived role of universities and students' self-initiatives in bridging the soft skills gap, *International Journal of Research in Business and Social Science* (2147- 4478), 12(3), 505-513. <https://doi.org/10.20525/ijrbs.v12i3.2435>
- Nyaga, S., & Anthonissen, C. (2012). Linguistic complexity and language proficiency: Implications for academic success in higher education. *Southern African Linguistics and Applied Language Studies*, 30(3), 297–310. <https://doi.org/10.2989/16073614.2012.739530>
- Qorro, M. (2013). Language of instruction in Tanzania: The quality of education issue. *HakiElimu Working Papers*, 1–23.
- Qorro, M. (2020). The language of instruction debates in Tanzania: Voices from classrooms. *African Educational Research Journal*, 8(2), 120–130.
- Qorro, M. A. S. (2006). *Does language of instruction affect quality of education?* HakiElimu. <https://www.hakielimu.org>
- Trudell, B., Piper, B., & Schroeder, L. (2022). Language choice in education and its impact on learning outcomes in Africa. *International Journal of Educational Development*, 88, 102512. <https://doi.org/10.1016/j.ijedudev.2021.102512>
- Tshabangu, I., Ivala, E., & Ndeya-Ndereya, C. (2013). Academic challenges faced by students in higher education: A case study of Zimbabwe. *Journal of Education and Practice*, 4(18), 28–35.
- UNESCO. (2016). *If you don't understand, how can you learn? Global education monitoring report policy paper 24*. UNESCO. <https://unesdoc.unesco.org>
- UNESCO. (2021). *The use of languages in education: Policy and practice*. UNESCO Publishing.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Wolff, H. E. (2017). Multilingual education and language policy in Africa. In O. García, A. Lin, & S. May (Eds.), *Bilingual and multilingual education* (3rd ed., pp. 239–254). Springer. https://doi.org/10.1007/978-3-319-02258-1_18
- Yamane, T. (1967). *Statistics: An introductory analysis*. Harper & Row.