Examining Instructional Approaches to Foster Soft Skills among Information Technology Undergraduates in Nairobi Metropolitan Area, Kenya

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Abstract: This study examines the pedagogical methods meant to improve soft skill acquisition and development in information technology undergraduates in the Nairobi Metropolitan Area. Utilizing a sequential mixed-methods design, the research adopted a two-stage cluster sampling where 10 universities were selected from a total of 31 within the region, representing 5 private and 5 public institutions. Thereafter, 1,143 undergraduate IT students were randomly sampled from an overall population of 3,814 enrolled students, while professors and IT technicians were purposively selected for qualitative interviews. Quantitative data in this respect were collected by using semi-structured questionnaires, capturing the points of view of stakeholders on perceived improvement in soft skills. Although the modern-day job markets require graduates with soft and non-cognitive skills, employers have nonetheless complained about the lack of such competencies among university graduates concerning aspects such as communication, teamwork, problem-solving, and leadership. This study was based on Vygotsky's social constructivism theory and investigated the development of soft skills among students taking a Bachelor of Information Technology at selected universities within the Nairobi Metropolitan Area. The results have indicated that modern learning methods support the development and acquisition of soft skills aptly. The programs for soft-skill are adequate and frequent training which impacts performance in other disciplines. Signs were proving that there was significant enhancement regarding interpersonal and cognitive competencies of the students as a result of collaborative projects, problem-solving in real life, and reflective practices. It also stresses that educational institutions need to orient themselves more toward interactive and practical teaching methods to better prepare IT graduates for the challenges of a modern workforce.

Keywords: Experiential Learning, IT Education, Soft Skills, Teaching Methods

I. Introduction

The modern IT sector stands at the threshold of rapid changes along many dimensions and needs skilled people not only in technical abilities but also highly proficient in soft skills. Among the acknowledged attributes that bring success in the IT industry, soft skills like communication, teamwork, problem-solving, and adaptability find their place rather quickly. These skills enable IT professionals to collaborate, manage projects, and communicate with clients and colleagues effectively. The reliance on soft skills has been emphasized through an increased drive for interdisciplinary collaboration, customer-facing roles, and the dynamic nature of IT projects, which often require quick adaptation and effective problem resolution, as pointed out by Bughin et al. (2018).

Employers claim the reason for the unemployment or underemployment of graduates lies in their shortage of soft skills, which are different from the cognitive ones required to undertake tasks in the labor market. From this perspective, the challenge for universities and other higher education institutions is ensuring that their graduates possess the soft skills demanded by the global economy of the twenty-first century. Moreover, the Fourth Industrial Revolution (FIR), marked by significant technical progress, has profoundly transformed the job market by prioritizing economic growth and efficiency (Qizi, 2020).

Within the Nairobi Metropolitan (NM) region, numerous universities provide IT programs specifically tailored to educate students with the requisite technical proficiency required to excel in the IT sector. These universities are crucial for shaping the future workforce, combining both theoretical and practical skills. However, even though IT students undergo intensive technical training, they may lack the much-needed soft skills. Employers often complain that students possess commendable technical capabilities but lack the essential soft skills necessary to be productive in the workplace (Deloitte, 2018).

Several factors can be attributed to the disparity in non-technical competencies among IT graduates from universities in the Nairobi Metropolitan area. The traditional emphasis on core technical competency within the curriculum, often at the expense of developing soft skills, is a significant factor. Instructional approaches may also be slow in adapting to incorporate soft skills training into the learning process. Traditional lecturing and technical assessments tend to emphasize knowledge retention and problem-solving skills over experiential learning activities that facilitate the development of soft skills (Murgor, 2017).

Such deficiencies call for a review of educational procedures and a reevaluation of instructional methods in IT programs. It is particularly important for teaching-learning methodologies to explicitly incorporate training in soft skills. Strategies may include cooperative projects, case studies, role-playing, and other interactive, active learning approaches. Interpersonal and communication skills development should be integrated into the training program to better equip students to handle the multifaceted demands of the IT industry, as supported by Guàrdia et al. (2021).

The importance of this study lies in its potential to further improve teaching methodologies in university IT programs in the Nairobi Metropolitan Area. The study is likely to contribute significantly to curriculum development and instructional design by assessing the level of soft skills acquisition among IT undergraduates and analyzing the effectiveness of current teaching techniques. The results may lead to the introduction of holistic educational frameworks that combine technical and soft skills training, producing graduates better prepared to meet the challenges of the modern IT industry.

II. Literature review

Universities worldwide are under pressure to churn out highly skilled graduates who have a wide range of abilities in an ever-growing, dynamic environment (Succi & Canovi, 2020). Thus, this begs the question regarding what possibly is the most effective approach in instruction for fostering soft skills among IT undergraduates. Various kinds of instructional methodologies are applied by universities to develop soft skills among students, especially in streams like the IT sector where technical capabilities are usually considered more significant (Ahmed et al., 2012). Some of the most used and effective methods include project-based learning, collaborative learning, case studies, internships, practical experience, role-playing, simulations, workshops, seminars, service learning, and mentorship programmes (England et al., 2020).

The development of soft skills among undergraduates in Europe was identified as a crucial aspect in transforming the global economy (Succi & Canovi, 2020). The initiative known as "Skills4Employability" has been kicked off by five European countries: Romania, Belgium, Lithuania, Italy, and Spain. This programme aims at the insertion of soft skills into the educational curricula as well as their linking with job market requirements (Conexx-Europe ASBL, 2020). Mainly, this study aimed at recommending ways how HEIs across Europe can embed soft skills training into their curricula. This was accomplished by analyzing the appropriate labour market situation from a Pan-European point of view. The study identified gaps in higher education curriculum design and suggested methods for promoting the training and development of soft skills.

The discourse around the cultivation of soft skills in universities in developing countries has revolved around two opposing viewpoints (Fulgence, 2015). Some academics believe that it is possible to teach soft skills separately from the subject matter, while others argue that it is necessary to teach soft skills together with important subject matter (Glaittli, 2018). Some specialists have come up with a recommendation for the subject matter and educational curricula to include interpersonal skills (Qizi, 2020). According to Ahmed et al. (2012), advocates of the former opinion believe that soft skills are better imparted by infusing them into teaching hard/technical skills or embedding them into the syllabus. However, in the case of the latter, the lecturers have a clear mandate to develop interpersonal skills in learners, regardless of whether such gifts themselves are embedded in the syllabus. Besides this, the followers of this ideology support the very fact that soft skills can be acquired during practical experience and while participating in extracurricular activities (Munishi, 2022).

The absence of incorporation of soft skills in the curriculum has also been observed to contribute to the lack of soft skills among graduates from colleges and universities in Tanzania. Munishi (2022) identified that the deficit curriculum is mainly responsible for the shortage of soft skills in graduates. For example, it emerged that national education and development frameworks and policies had no provisions for soft skills. As a result, it is not a wonder that the school sector does not emphasize the development and acquisition of soft skills. However, employers are often satisfied with the soft skills of graduates from universities, which are significant elements in the employment world. Munishi (2022) established other problems as an enactment of ineffective policies, inadequately trained teachers, congestion within classes, stakeholders' negative attitudes toward the training of soft skills, and inefficient techniques for teaching and learning. A few research studies have aimed at investigating the incorporation of soft skills in curriculum offerings for some programs in Kenya Higher Education Institutions (Busaka et al., 2022; Ondieki et al., 2019).

Theoretical Framework

The theoretical framework that underpins this study is derived from Vygotsky's theory of social constructivism; this occurs when knowledge is actively constructed through social interactions and contextual learning experiences. This theory dates back to the early 20th century and the work of Lev Vygotsky. It posits that human beings construct knowledge through interaction with others and more knowledgeable peers, being a way of emphasizing cultural and social contexts in cognitive development. Another initial concept of Vygotsky, which places ZPD as its central pillar, points out the difference between what the learner can accomplish independently and what he can achieve guidedly. This too appears more relevant in the context of developing soft skills among IT undergraduates, as ZPD does suggest that there should be scaffolding techniques used by instructional methodologies to help the students acquire necessary competencies.

The applicative theoretical assumptions forming the basis for this study involve the recognition that "learning is an essentially social phenomenon" and that "productive" methods in education should see to the creation of collaborative learning environments. The latter assumption permits only critical assessment because this method challenges traditional pedagogical approaches based on processes of individual or inner-growth learning. The incorporation of scaffolding into the teaching methods

enables facilitators to bolster students' competence in handling transitions on more complex tasks and grooming "soft" skills such as communication, teamwork, and leadership. This is in tandem with findings in some other studies, which focus on the role that soft skills play in enabling college students to have remarkable academic performances and post-career preparedness in a discipline such as information technology.

Numerous studies have attested to the effectiveness of scaffolding in facilitating improved learning outcomes across a wide range of disciplines. For instance, many studies have illustrated that scaffolding helps to acquire knowledge and motivates students to learn (Montgomery et al., 2022). This thus corresponds with the claim by Vygotsky that human interaction is necessary for the development of cognition, and it places this study within a larger academic discussion that has supported the value of collaborative learning environments as a means for promoting soft skills among learners. That is, according to Li, 2022.

III. Methodology

A mixed-methods research design has been adopted that integrates the quantitative and qualitative approaches. This choice is justified because it is of paramount importance to understand the multi-faceted nature of soft skills development among IT undergraduates, as established from the literature review (Lin et al., 2023). The use of mixed methods, however, allows the examination of the stated research gaps in depth through the capture of numerical data concerning views held by prospective students, as well as qualitative insights from lecturers and IT technicians. This dual approach is especially appropriate to handle complex educational research where statistical trends and personal experiences are generally important in describing the phenomenon (Silva et al., 2022).

IT undergraduate students enrolled in universities within the Nairobi Metropolitan Area are the unit of analysis for this study. The study used a two-stage cluster sampling methodology to select ten universities out of the total 31 institutions. Following that, five universities from each category of public and private universities were randomly selected. Using a simple random sampling technique, a total of 1,143 participants were selected out of the 3,814 IT students that were in the pool. This sampling strategy is bound to realize a representative sample that realizes the generalization of the findings. In addition, purposeful sampling was used to select lecturers and IT technicians for in-depth qualitative interviews. This was meant to ensure the diversity and relevancy of data gathered and made informed (Silva et al., 2022).

The data collection tool included a semi-structured questionnaire for quantitative data semi-structured interview guides and an observation schedule for qualitative data. Quantitative data on the extent to which the development of soft skills was perceived as such by students themselves will be gathered from questionnaires, including perception scales. Semi-structured interviews with lecturers and information technology technicians will assist in eliciting in-depth discussions regarding experiences and observations that these participants have about enhancement regarding soft skills. Pilot studies were conducted to validate these instruments for their validity and reliability, to ascertain that data was captured as intended (Chen, 2019).

IV. Results and Discussion

This chapter presents the findings of the study on the instructional approaches used in developing soft skills among Information Technology undergraduates within the Nairobi Metropolitan Area. The results are presented according to the key themes identified in this study, which include the effectiveness of different instructional methods, the perception of students and instructors of the importance of soft skills, and challenges facing the integration of the training of soft skills into the IT curriculum.

Student's and stakeholders' perception indicators on learning pedagogies

It is from this point that Table 1 presents stakeholders' perceptions of the effectiveness of various learning techniques in enhancing IT undergraduates' soft skills growth at universities around Nairobi. Generally, stakeholders perceive current teaching techniques to be favourable to fostering soft skills such as communication skills, decision-making skills, creativity, leadership qualities, interpersonal relationships, problem-solving, positive attitude, adaptability, teamwork, and work ethics. Only about 59.67% of the stakeholders feel that through oral presentations, simulations, and group tasks, the current method effectively develops communication skills. In addition, about 60.15% regarded the current methods as effective in decision-making through problem-based learning and case studies. In cultivating creativity skills, the confidence level is around 59.41%, through purely group projects and presentations. About 56.92% believed that current methods cultivate leadership skills through collaborative assignments and peer instruction. More than 57.18% have confirmed these methods appropriate for interpersonal skills, referring to group work and cooperation principles. About 62.35% have shown faith in problem-solving methodologies due to problem-based learning and case studies. About 57.04% recognize the strategies adopted by the university today are successful in attitude development. And about 57.44% feel confident with the approaches designed for adaptability. A full 67.28% support current practices to develop teamwork skills, and 61.68% believe in the effectiveness of methods for instilling a solid work ethic.

The qualitative responses of the lectures are summarized in Supplementary I. The various activities to be focused to develop the necessary skills among the students were identified by the lecturers and ICT Lab Technicians. Oral presentations, the use of simulations, and box and practical demonstrations are included as one of the key strategies for communication skill development by Lecturer L1. Group assignments, peer teaching, and presentations are the payment options that correlate with communication, creativity, and teamwork according to Lecturer L3. ICT Lab Technicians T1 also supports communication through group

discussions and practical sessions. Although decision-making skills are not mentioned, problem-based learning and case study activities involve decision-making processes by implication. Lecturer L3 encourages creativity through group projects, simulations, and presentations. Group projects and peer teaching develop leadership skills as identified by Lecturers L7 and L10, respectively. Group work and teamwork to develop interpersonal skills are mentioned by Lecturers L5 and L7. Problem-solving by Lecturers L4 and L9 is done through problem-based learning, case studies, and project-based learning; research such as Tadjer et al. (2022) supports this in the form of evidence in significant development in the student's cognitive profiles along with soft skills. Adaptability skills could be developed through various activities like simulations and practical sessions, as mentioned by Lecturers L6 and L8. Teamwork skills have been mentioned by Lecturers L2, L3, and L10 through group projects and collaborative work. Lecturers L1, L4, and L9 insist on work ethic skills, such as industriousness and discipline in attending practical sessions and doing project work professionally.

Table 1 Student's and stakeholders' perception indicators on learning pedagogies

Learning approaches	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Do not encourage development and acquisition of communication skills	39.11%	20.56%	18.02%	12.16%	10.15%
Do not encourage development and acquisition of decision-making skills	37.30%	22.85%	20.05%	12.00%	7.79%
Do not encourage development and acquisition of creativity skills	37.10%	22.31%	19.25%	12.86%	8.49%
Do not encourage development and acquisition of leadership skills	34.24%	22.68%	19.70%	13.84%	9.54%
Do not encourage development and acquisition of interpersonal skills	34.50%	22.68%	21.28%	12.43%	9.11%
Do not encourage development and acquisition of problem -solving skills	38.88%	23.47%	19.53%	10.68%	7.44%
Do not encourage development and acquisition of positive-attitude skills	35.87%	21.17%	20.91%	12.34%	9.71%
Do not encourage development and acquisition of adaptability skills	34.94%	22.50%	21.80%	11.30%	9.46%
Do not encourage development and acquisition of teamwork skills	42.43%	24.85%	17.94%	7.96%	6.82%
Do not encourage development and acquisition of work ethic skills	38.23%	23.45%	20.56%	10.15%	7.61%

Learning Approaches Used in the Development and Acquisition of Soft Skills.

From Table 2, on whether problem-based learning enhances soft skills, there is a moderate consensus, given that a good proportion of the respondents agree or strongly agree at 28.26%. On the same score, there is reasonable consensus in favor of student-centred learning at 30.45%, with another portion of 27.12 going to strong agreement. The traditional lecture technique is popularly adopted, but the views on its effectiveness with regard to developing soft skills are varied. A large group of respondents were undecided at 25.42%, while a smaller group agreed at 25.77% and strongly agreed at 28.83%. Case study approaches, on the other hand, are viewed to be effective by a huge proportion of the respondents who agreed to this 30.15% and 25.94% strongly agreed. An overwhelming majority of the participants (72.61%) believe in collaborative or group learning: 30.53% agree and 42.08% strongly agree that it is helpful to develop soft skills. England et al. (2020) also promote collaborative learning as an activity-based pedagogical approach to train the students in soft skills en masse, which are required in most professions.

Table 2: Learning Approaches Used in the Development and Acquisition of Soft Skills.

Learning pedagogies	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Problem-based learning	8.22%	10.41%	26.16%	28.26%	26.95%
Student-centred learning	5.51%	10.06%	26.86%	30.45%	27.12%
Traditional lecture method	9.64%	10.34%	25.42%	25.77%	28.83%
Case study approaches	6.13%	11.04%	26.73%	30.15%	25.94%

Collaborative/Group learning	2.62%	6.30%	18.46%	30.53%	42.08%
Class oral-Presentations	3.94%	7.36%	19.46%	29.36%	39.88%
Simulation	12.95%	12.86%	28.87%	22.05%	23.27%
Modelling	13.65%	14.70%	29.22%	21.61%	20.82%
Peer-teaching	9.62%	12.34%	25.55%	25.98%	26.51%

Most of the respondents believe class oral presentations are effective for their learning. An impressive percentage agreed to this, 29.36%, while 39.88% agreed strongly. While the class adapts to the use of simulation, there is not any great consensus on whether it is or is not effective. A very high percentage, 28.87%, are undecided, while 22.05% agreed and an even lower percentage, 23.27%, strongly agreed that it works. Modelling shows sharp polarities: 13.65% disagree and 14.70% strongly disagree that it's effective for soft-skill development, while the majority 25.98% agree and 26.51% strongly agree. Peer instruction is assessed to have a moderate degree of utility in developing soft skills.

IT/BBIT course lecturers, heads of departments, and lab technicians from the responding universities reported some of the adopted teaching and learning approaches for teaching soft skills to IT undergraduates. Lecturer L1 pointed out problem-based learning and a case study approach, integrating industrial scenarios and student-centred methods such as oral presentations, simulations, and modelling. He also said, "… Problem-based and case study approaches that are similar which we also use with problem cases in the field and then we apply IT or computing concepts to solve problems. And that also means we use students-centred methods" see Supplementary IIsee*. To develop teamwork skills and problem-solving skills, Lecturer L2 emphasizes group work, collaboration, and peer teaching. As L2 explained, "We have students working in groups. you have them working in twos or threes" see Supplementary II. He continued, "We are also asking them to cooperate" and "We inform the students when they are puzzled to first consult their colleagues in their groups" "But you, of course, must monitor," L2 emphasized see Supplementary II. The presenter L3 covers project presentations, group assignments, and deadlines, but emphasizes her belief in the need for more emphasis on soft skills beyond the content of a course. She elaborated that she "group work, oral presentations, and if you're giving them assignments you can use the case studies. Then they do a presentation or they come up with assignments."

In HOD L4, emphasis on project-based learning and scenario-based teaching is included through traditional lectures, group discussions, oral presentations, and practical demonstrations. The use of group projects, oral presentations, simulations, and modelling in lecturer L5 provokes innovation and solving real-life problems. Lecturer L6 integrates the use of emerging technologies, and industry mentorship coupled with project-based learning to inculcate self-learning skills and collaboration with industry experts. In this regard, it would appear that Lecturer L7 puts greater emphasis on group projects, presentations, case studies, and challenge-driven education to enhance critical thinking and teamwork. The lecturers would contribute by mentioning project-based learning, case studies, and role-playing skills in developing problem-solving, critical thinking, and communication, while Lecturer L9 does industry mentorship, practical training, and certification to bridge academia-industry gaps and focuses on real-world projects and presentations. Lecturer L10 integrates certifications, case scenarios, practical sessions, and industry attachments while preparing students for the real-world challenges they have to face in applying the standards of the industry. Even ICT Lab technicians extend such approaches by lecturers through supervision in practical sessions, group work meant for students, and ensuring that the essence of collaboration and presentation skills is underscored. T2 stated, "By the end of the semester, we normally have those groups presenting on what they have researched" (see Supplementary II). Added T3, "Universities also give projects during the 4th year of study to impart and test innovation skills." Overall, these approaches collectively try to equate the IT undergraduate student with a holistic set of skills, meeting the demands of the industry for lifelong learning and professional development.

In the project conducted by Paredes-Velasco et al. (2023), future computer science engineers collaborated in the development of an educational application with preservice teachers. Results have shown that computer science students who participated in this interdisciplinary, project-based learning approach attained better learning outcomes compared to the non-participants. Besides this, the educational context had a significant impact on developing teamwork skills; thus, students demonstrated a higher ability to cooperate and participate in group work after the experience.

Relationship between pedagogical approaches to soft skills development and soft skills acquisition

Table 3 Estimates for the pedagogical approaches to soft skills development and soft skills acquisition among undergraduates studying IT courses in universities within Nairobi Metropolitan, Kenya.

Term	Estimate	Std. error	Statistic	p.value
(Intercept)	-0.00121305	0.02943762	-0.04120778	0.9671
Pedagogical approaches	0.45686227	0.03129433	14.59888005	0.0000
R squared	0.21078186			

Adj. R squared	0.20979287				
p. value	0.00000000				

The null hypothesis assumes that there is no statistical relationship between the pedagogical method and the achievement of soft skills among IT undergraduates within the set of Nairobi universities. The intercept (-0.0012) is the estimated value for the development of soft skills when the levels of all independent factors are zero. In the same way, a coefficient value of 0.457 asserts that with an increase in a pedagogical method by one unit, its acquisition of soft skills increases by 0.457 units. Since the probation value is below the 0.05 threshold level, this p-value of 0.0000 can be said to be highly significant in the relationship between pedagogical approaches and the acquisition of soft skills. The R-squared is 0.211; therefore, 21.1% of the soft skills development variability is attributed to pedagogical methods. Moreover, if one is testing a p-value, then there is sufficient evidence to reject the null hypothesis that no significant relationship exists between teaching methods and development processes of soft skills among Nairobi IT undergraduates. In other words, pedagogical methods attributable to the data are significantly influential in promoting the growth of soft skills among students.

V. Discussion

This study assessed effective instructional methods for developing soft skills in IT undergraduates in Nairobi. Generally, the stakeholders hold a positive view of the current methodology, and they emphasize that group projects, problem-based learning, oral presentations, and simulations are very important in developing decision-making, creativity, leadership, problem-solving, attitude positivity, flexibility, teamwork, and work ethics. This also agrees with the findings by Chepkwony et al. (2023) also conducted their study among students at private universities in Western Kenya. The lecturers of education reported that there was indeed an improvement in communication, ethics, and professionalism due to teaching activities. They recommended continued incorporation of soft skills within education programs to increase employability. However, opinion about the availability of soft skill training and suitability differs. A portion completely feels that there is adequate training; another portion doesn't agree, while a number of them are not sure. There are also divergent views on the frequency and usefulness of the training programs: the majority indeed believe that soft skills training leads to improved performance in all industries, while a good number either disagree or are uncertain about that. Training sessions are largely accepted, though there is a fair number of strong objectors to their adoption, with recommendations on trainers' commitment to training being mixed. Muindi & Thinguri (2022) also came to almost similar conclusions when they established that communication skills were often taught theoretically.

They recommend the incorporation of industry-specific skills into curricula, flexibility and interactive approaches, and integration of technology to enhance soft skills training. They propose that Kenyan institutions revisit courses taken in communication skills and align them with the Competency-Based Curriculum to adequately develop graduate soft skills. On the whole, the study portrays areas through which soft skills training programs could be improved toward recommendation investments for their enhancement.

VI. Conclusion

The research on IT undergraduate students in Nairobi provided clear evidence that it enhances the technique of experiential learning, with some principles borrowed from the social constructivist approach for developing soft skills among learners. It also proved to enhance social skills such as communication, teamwork, problem-solving, and adaptability much more compared to other modes of lectures; this is through collaborative projects and practical activities. It specified that to develop interpersonal skills, interaction and collaboration are required, where peer assessment and collaborative tasks proved more fruitful.

While internships and industry-relevant projects demonstrated how theoretical input could be translated into practical skills, students' employability was enhanced. Reflective practices, like for instance, maintaining a journal, also contributed to increasing awareness and adaptability. Of course, there are also limitations: the research was conducted mainly among IT students in Nairobi; hence, generalization to other settings or contexts is not possible. The applicability of this study's findings could therefore be culturally and educationally sensitive. Self-reported data and peer evaluations introduce possible biases; there is no objective verification. Longitudinal studies in further research would establish the long-term effect of these learning methodologies in soft skills development. Comparative studies in other countries, disciplines, and settings would provide broader relevance to the findings. The inclusion of diversified participants and objective measures, such as standardized exams, would provide a more comprehensive evaluation. The role of technology-driven tools and virtual environments in education would also provide insights into the enhancement of soft skills development.

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