Bridging unemployment gaps through ICT Bootcamps: A reality or precarity to equitable learning?

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Abstract
In recent years, there has been a paradigm shift to skills development in ICT due to the demand for low to middle-income jobs. We provide an in-depth guide to ICT bootcamps in this article for organizations in developing countries that are interested in participating in producing low to middle-level skills and reducing unemployment rates in previously disadvantaged communities, rather than relying solely on universities and technical vocational education centres. Using questionnaires, data was collected from a single case of an ICT bootcamp located in previously disadvantaged communities of the Cape Flats. The questionnaire was completed by 92 participants. Social cognitive career theory (SCCT) was used in this study to analyse the success of ICT bootcamps in the context of skill development. As a bootcamp, SLCA's success is dependent on the degree to which it provides an equitable learning environment that reflects equity, diversity, and inclusion. Making sure students' social, psychological, economic, and academic needs are met is a key recommendation for creating equitable learning environments. Our findings are based on the findings of a single case study. More case studies would strengthen our argument. Nonetheless, we believe our research has provided a solid foundation for future coding bootcamp literature.

Keywords: ICT Bootcamps; equity; diversity; inclusivity; self-efficacy; outcome expectations.

INTRODUCTION AND BACKGROUND

In recent years, there has been a paradigm shift to skills development in ICT due to the demand for low to middle-income jobs. Traditionally, countries relied on universities and technical colleges for skills development (Iversen & Soskice, 2019). However, university or Technical Vocational and Education and Training (TVET) programs fail to address the power dynamics that underpin unjust social structures (Otten, Faughnan, Flattley, & Fleurinor, 2021) and coupled with their rigid systems exacerbate the time delay in producing the needed skills with equity not sufficiently addressed. Bootcamps are intended to equip students with skills and mindsets to solve complex problems in a sustainable and just manner. Unlike university programs, bootcamps are agile, responsive, and flexible (Miranda & Molina, 2020) presenting graduates to the labour market within a shorter period compared to 3 to 4 years of traditional tertiary qualifications. Additionally, bootcamps due to their enrolment numbers which are lower than other tertiary institutions, can provide an equitable training environment necessary for positive skill development.

This study aims to guide other non-profit organizations focusing on youth empowerment through on-demand short and intense coding skills. An in-depth case
study focusing on a single Non-Profit Organisation that adopted a bootcamp model spanning two years is discussed. The study highlights how the underpinning philosophy of providing an equitable learning environment potentially results in positive benefits. Most tertiary institutions fall short of this aspect despite the voices of the need for equitable learning.

In South Africa, most youth from disadvantaged communities cannot secure funding from their parents or the state to enrol for tertiary studies and often give up their career dreams after matriculation. Youth enrolled in Academy X, an NPO organisation, are predominantly from Cape Flats, one of the South African townships that have been deemed previously disadvantaged with a high unemployment rate among the youth. Many of the residents fall into a low to medium-income bracket, with a high youth unemployment rate. In general, youth unemployment in South Africa has been well documented. Studies (Cassim & Oosthuizen, 2014; Sulla & Zikhali, 2018; Webb, 2021) highlight the high unemployment and poverty as among the highest in the world. Among South Africans, unemployment, inequality, poverty, and social ills are closely linked (Mcgrath & Akoojee, 2007). Webb (2021) cites the images of army patrols in Cape Flats highlighting gang violence and other vices associated with townships perpetrated mainly by unemployed community members who are predominantly youths. Despite being aware that education can potentially improve their social and economic status, historical imbalances in the family can deter them from registering at colleges as they might not have the required funding and support. Moreover, the need to immediately support families is another thorn that requires quick fixes and some of the youths end up getting affiliated with gangs as they reckon it to be their only future (Van der Westhuizen & Gawulayo, 2021).

The factors cited above are further compounded by the legacy of Apartheid which left unprecedented spatial mismatches between residential areas and employment. Areas of middle to high-income levels are predominantly concentrated with high employment opportunities (Turok, 2001). According to (Naudé, 2008) ‘friction of distance’ exacerbates existing social and economic divisions and results in most youths in Cape Flats having to travel long distances to seek employment. The distance factor coupled with the limited resources needed to travel to seek employment becomes a further deterrent to the active employment-seeking efforts of youth in these communities.

There is little doubt that institutions of higher learning can build a secure and productive society resilient to crime and respond to historical challenges. However, South African institutions, predominantly the traditional universities and TVET colleges do not seem to be doing much particularly in poverty-stricken Cape Flats where help is most needed (Naudé, 2008; Chetty, 2015; Van der Westhuizen & Gawulayo, 2021) youth have been neglected. There is a gap between bringing equitable learning environments to the underprivileged and providing lifelong learning opportunities. In its attempt to redress the imbalances of the past, the government of South Africa introduced TVET programmes in an attempt to provide training for low to intermediate skills (Akoojee & McGrath, 2008; Papier, Needham, Prinsloo, & McBride, 2016; Dzvapatsva, 2020). Nonetheless, there have been reported cases of misappropriation of funding for needy students, poor success rates (Gewer, 2016; Marock, Hazell, & Akoobhai, 2016; Dzvapatsva, 2020), and low absorption into the labour markets leaving issues of equity un-addressed. Several government interventions to address
unemployment through skills transfer and education in a bid to eradicate poverty have yielded some positive results but more interventions are needed if we are to significantly dent the problem of youth unemployment. To close the mentioned gaps, we suggest the use of ICT bootcamps to offer equitable learning environments. This study will explore such initiatives that can be rolled out by several economic players including but not limited to NGOs, NPOs, and other social compact programs as we seek solutions to address the problem of high youth unemployment.

Research question for the study

It is well known that unemployment among youth is a shared South African challenge as it stood at 45.3% in Quarter 4 of 2022 (Statistics South Africa, 2022). The study departs from the standpoint of attempting to reduce youth unemployment at an accelerated rate through coding bootcamps (World Bank, 2018). The traditional learning institutes take longer to feed into the labour markets with a degree taking up to 4 years (Burke, Bailey, Lyon, & Green, 2018) and are coupled with imbalances that do not accommodate learners from disadvantaged communities (Case, Marshall, McKenna, & Mogashana, 2018) as witnessed by ‘FEES MUST FALL’ demonstrations (Calitz & Fourie, 2016).

This implies that traditional institutions of Higher learning still struggle to accommodate learners from an equity, diverse, and inclusion perspective and provide employment to the youth within a shorter period as compared to coding bootcamps. As such, to better our understanding of the bootcamp environments and how best these can be implemented to cater for youth from disadvantaged communities, this study poses the following research questions:

1) How can ICT Bootcamps assist in bridging unemployment gaps in ICT?
2) How can ICT Bootcamps promote equitable learning in a bid to increase lifelong learning?

The subsequent section discusses the literature related to the phenomenon under study.

LITERATURE REVIEW

In this section, we discuss the existing knowledge in the field of bootcamps and identify the gaps in the literature. Using bootcamps as a keyword, we searched databases for traditional literature. The section gives an overview of bootcamps and discusses ICT Bootcamp trends in South Africa. The section further gives an illustration the how the concept of equity, diversity, and inclusion in higher education plays a role in bootcamps. We then provided the underlying theoretical framework for the study.

Overview of bootcamps

The concept of bootcamps was conceived informally by Shareef Bishay who in November 2011 proposed to train 6 individuals over 8 weeks using Ruby on Rails (Seibel & Veilleux, 2019). Although the concept of teaching skills-based short courses dates back to the 19th century in farming education, this article claims that the concept was losing momentum due to increased attention paid to degrees and diplomas. Although researchers (Brown, 2001; Triventi, 2013; Wright & Horta, 2018) suggest that university degrees and diplomas are associated with financial stability, the length
of time it takes to obtain such qualifications cancels out these benefits. There appears to be a shift back to skills-based short courses popularised as coding bootcamps.

Maxville (2012:885) describes the term bootcamp as an “... intense training at the start of military service”. The training is intense and can be equated to that of military recruits (World Bank, 2018). The emphasis of coding bootcamps is on teaching students how to code, with less emphasis on the underlying knowledge of why. Coding bootcamps offer technology-focused training programs that teach programming, frameworks such as Angular, Vuejs, Django, Ruby on Rails, systems, and tools that are in demand in many entry-level software developer positions (Waguespack, Babb, & Yates, 2018). Coding bootcamps are a new wave of vocational training with fast-paced learning curves geared towards addressing the rising demand in information technology for people with hands-on skills (Waguespack, Babb, & Yates, 2018; Raghavachary, 2019). Experiential learning is commonly adopted for bootcamps since it is a combination of concrete experience, reflective observation, abstraction, and active experimentation. Bootcamps attract different types of students concerning self-efficacy (Burke & Bailey, 2019) compared to those in traditional colleges and universities. Waguespack, Babb, & Yates (2018) discuss three ways in which bootcamps achieve their targets and these are: topic isolation, cohort cohesion, and practice immersion.

**Topic isolation** – here the focus is on identifying the coding stacks which are highly in demand by the tech labour markets. As of 2021, the majority of the bootcamps in South Africa were focusing on web applications, data science, User Interface design, and web development (Joshi, 2019) just to mention a few with popular languages such as Python, Node.JS, JavaScript, and coding frameworks such as Angular, Django, Flask, Express. These frameworks allow quicker development of applications, a trend characterising software application company.

**Cohort cohesion** – unlike traditional learning institutes, students enrolling at coding bootcamps have a common goal of employment. Students operate like communities of practice (Thayer & Ko, 2017) and these are some of the strengths of this wave of learning that employers are looking for. Coding bootcamps are primarily for profit with training periods ranging from 8 weeks to 2 years (Seibel & Veilleux, 2019) but are cheaper than a university degree (Waguespack, Babb, & Yates, 2018). Joshi (2019) points out that some of the coding bootcamps are unaccredited and charge exorbitant prices with less focus on job placement which ironically is the fundamental goal. A study on coding bootcamps in Kenya by the (World Bank, 2018) charged $2,500 for the course which in itself is too high, especially in low and middle economies.

**Practical immersion** – involves enduring long class hours similar to the work environment where students start at 8 in the morning till 5 in the afternoon (Berg & Bujak, 2017; Burke, Bailey, Lyon, & Green, 2018).

**ICT Bootcamp trends in South Africa**

There is a steady increase in the number of bootcamps in South Africa, which suggests the need to upskill youth and fill employment gaps. A report by a leading tech recruiter in South Africa showed the rise in ICT bootcamps in South Africa (van Niekerk, 2021; Dzvapatsva, Risinamhodzi, & Matobobo, 2023) with the majority situated in Gauteng and Western Cape provinces. As of the time of writing this research, there were 20 coding academies listed on https://codeschooldirectory.co.za/ offering the bootcamp program. African countries are generally proving to be cost-effective
sites for ICT-related innovation (Schofield, 2018). Most bootcamps in South Africa emphasize recruiting youth from under-represented communities as one of their major focuses. Perhaps this explains why most of these academies are free or operate on a pay-forward basis. While some academies offer accredited courses, others offer unaccredited courses with a focus on a job-oriented curriculum that guarantees employment after graduation.

**Equity, diversity, and inclusion in higher education**

Most developing countries strive to eliminate the imbalances of the past through education, with ICT being the focus since technology advances require highly trained professionals. Perhaps, if institutional leaders have digital leadership, it might assist in fast-tracking the imbalances. The results from a study by (Karakose, Polat, & Papadakis, 2021) showed that digital leadership potentially supports the establishment of a digital learning culture in their schools. Assuming that leaders at traditional institutions of higher learning have these skills, they can use ICT too in providing equitable learning environments.

The key aspects that educational institutions are focusing on are equity, diversity, and inclusion in education. Defining diversity, inclusion, and equity, as well as discussing the relationship between the three, helps clarify our discussion. In this study, diversity is defined as people with different group affiliations of cultural significance represented within one social system. Typically, inclusion refers to individuals feeling included in critical organizational processes (Bernstein, Bulger, Salipante, & Weisinge, 2020). Education equity refers to closing the achievement gap between historically underrepresented populations and the rest of the population through equal access and participation in educational programs (Fuentes, Zelaya, & Madsen, 2021).

Equity, diversity, and inclusion have attracted attention not only in developing countries but appear to be a global call (Fink, 2005; Deem & Morley, 2006; Booi, Vincent, & Liccardo, 2017; Fuentes, Zelaya, & Madsen, 2021). Research has shown planning educational initiatives with a focus on EDI promotes an inclusive learning environment with the potential to foster a conducive environment for pedagogical efficiency (Fuentes, Zelaya, & Madsen, 2021). We believe that equity, diversity, and inclusion are critical attributes of inclusive pedagogy potentially stimulating learner participation. Educational initiatives that involve the participation of all students are more likely to reap the benefits of the philosophy while responding to any form of exclusion (Moriña, 2017). Bootcamps are the only educational initiatives that can address the anti-Black and white supremacy with ease as they have limited bureaucracy. Given the red tape associated with universities and TVET colleges, it makes it easy for bootcamps to address equity, diversity, and inclusion as bootcamps are owned by Non-Profit Organisations (NPOs) or individuals. Incubators such as bootcamp hold the space to allow infusion of EDI.

Equity, diversity, and inclusion in South Africa are still a work in progress, according to this study. COVID-19 revealed significant disparities (Oyedotun, 2020) in these three attributes as institutions of learning had to implement measures during hard lockdowns to continue teaching. Assuming that issues of equity, diversity, and inclusion have been thought of and addressed successfully prior, educational gaps would not have existed. The equity, diversity, and inclusion-seeking groups in higher
education in South Africa face systemic barriers and implicit biases. It may also be necessary to include equity, diversity, and inclusion (EDI) as core competencies as curricula shift toward justice-oriented ecosystems (Otten, Faughnan, Flattley, & Fleurinor, 2021). Even though educational initiatives have been focusing on power dynamics and oppression, many still ignore EDI and resemble pre-independence. To redistribute power, it is crucial to recognize, analyse, and subvert power dynamics by addressing equity, diversity, and inclusion in learning within institutions of higher learning (Mitchell, 2008; Otten, Faughnan, Flattley, & Fleurinor, 2021).

Focusing on equity, diversity, and inclusion in skills development, this article is planned to be distinctive in two ways. First, the study combines theories of social practices in addressing skills development for the youth in previously marginalised communities. Second, the field of ICT Bootcamps is still growing in South Africa and other developing countries yet there is a death in peer-reviewed texts in these countries. While our study is not exhaustive, we intend to highlight how bootcamps are emerging to be great contributors to skills development. A creative enterprise, the review does not claim to be comprehensive. Rather, the contribution of this work is a cross-disciplinary process of theory generation.

Theoretical framework

This study used the social cognitive career theory (SCCT) to understand the successes of ICT bootcamps against the backdrop of skills development. Through the use of the SCCT, people could understand how the attributes of individuals (such as gender and culture) and their socioeconomic locations become developed in ways that make specific career-relevant learning experiences and consequent choices available to particular individuals (Lent & Brown, 2019). The SCCT seeks to explain three interrelated aspects of career development, namely; the development of basic academic and career interests, influences on educational and career choices, and aspects of how academic and career successes are achieved (Lent, 2013), which is the platform of the three building blocks namely self-efficacy, outcome expectations and goals. The SCCT has been applied in different contexts to address the career concerns of professional athletes (Demulier, Le Scanff, & Stephan, 2013), career development of students at secondary schools, high schools, and tertiary levels (Park, Kim, Kwon, & Lee, 2018; Zhang et al., 2019) and predictions of career choices from various academic majors (Lent, Lopez, Lopez, & Sheu, 2008; Wendling & Sagas, 2020).

Methodology

This study examined a single case of ICT bootcamp application by a Non-Profit Organisation whose major thrust is to address inequality among youths through upskilling. By using this approach, we were able to analyse factors and outcomes of the learning experience at multiple levels. Students were the unit of analysis. We explore connections between educational innovation and pedagogical successes while situating analysis within equity, diversity, and inclusion discourses.

The study utilised a quantitative approach (survey) to gather data as it allows for the collection of numerical data that can be analysed statistically, reducing the potential for bias and subjectivity (Creswell & Creswell, 2017). Furthermore,
the quantitative approach makes use of statistical tests that help establish whether observed differences or correlations are statistically meaningful, providing robust evidence of the impact of bootcamps (Pallant, 2020). The quantitative data were collected from 92 students using a closed-ended questionnaire. The researchers used convenience sampling to select the respondents to participate in the survey to target students who were accessible and willing to participate in the study. ICT bootcamps may be attended by a diverse group of participants, and convenience sampling may be more feasible than other sampling methods. The questionnaire was developed by all the authors who are ICT professionals. The questionnaire was reviewed by all the authors independently to check for grammatical errors and also to check if all the questions were relevant to the study. The questionnaire was further given to SLCA management and two (2) colleagues who are ICT professionals to review the content, check grammatical errors and flow of the questions. These experts were used to ensure content, construct, and face validity. Recommendations from the experts were incorporated into the final questionnaire. The questionnaire was administered on Google Forms. The final questionnaire was distributed to ten (10) students as a pilot survey. There were no issues that were reported from the pilot survey and a link to the questionnaire was sent to the rest of the students. To assess the internal consistency of the measurements, the reliability test of the questionnaire based on Cronbach’s Alpha was 0.771, which is within the acceptable range (Tavakol & Dennick, 2011). Quantitative data collected through a survey were analysed using Statistical Package for the Social Sciences (SPSS) version 26. SPSS was used because of its accessibility, adaptability, user-friendly interface, data management capabilities, statistical testing options, and data visualization tools available. Also, SPSS has been used widely in research and academic contexts. The findings are presented in the form of tables and graphs.

Case description

SLCA is located in Lansdowne in the Cape Flats of the Western Cape province of South Africa. Founded in 2017, the academy was created in response to unemployment-related challenges. As reported by the organization, many students complete matric but cannot continue their education for economic, social, and academic reasons. This academy prepares these students for careers in software development. The academy recruits 60 students per cohort for a 12-month program. In each cohort, 60 students come from a broad spectrum of social exclusion backgrounds, some of whom had previous experiences in universities or TVET colleges where they were considered misfits or not accommodated. The first half of the course consists of intensive face-to-face instruction in simulated work settings, with assessments focusing primarily on knowledge and skill acquisition. As part of the second half of the program, students will participate in a six-month paid internship at a company under the supervision of an experienced developer. To satisfy the needs of students and labour market demands, the organization’s applied curriculum and pedagogy are regularly revised to fulfil its mission.

Ethical considerations

As mentioned by (Miles, Huberman, & Saldana, 2018) "we need to attend to the ethics of what we are doing before, during, and after the study". Since our study
dealt with human elements, we sought clearance from the Walter Sisulu University Research Ethics Committee (UREC) under reference FET/FRHDC/2023/ECC001. We also seek permission from the director of Academy X which we have abbreviated as SLCA for the study. We presented our data collection instruments and permission was granted. For privacy, we made sure that the names of the respondents were concealed. The data was only accessible to the researchers. Participation in the study was voluntary.

**RESEARCH FINDINGS**

This section presents the research findings from the data that were collected through a questionnaire from an ICT bootcamp training institution. The data were analysed using SPSS version 26. The results are presented in the form of charts and tables. Fig. 1 shows the gender distribution of respondents.

![Gender distribution of respondents](image)

**Figure 1. Gender distribution of respondents**

Fig. 1 shows that the majority of respondents (70.7%) that participated in the study were males with female respondents constituting 27.2% and 2.2% preferred not to say their gender. The gender distribution is skewed towards males.

Respondents were asked to indicate their highest educational qualification before joining the SLCA Bootcamp training and the findings are presented in Fig. 2.

![Highest educational qualification before joining the ICT Bootcamp](image)

**Figure 2. Highest educational qualification before joining the ICT Bootcamp**
Fig. 2 shows that the majority of respondents (70.7%) who joined the ICT academy had completed the matric qualification. There were, however, few respondents who had done TVET certificate or diploma (14.1%), degree (7.6%), and other qualifications (7.6%). This means that the majority of the students who join the Academy are mainly matric certificate holders.

In Fig. 3, the respondents were asked what made them join the Academy. The respondents were given options to choose from.

![Figure 3. Reason for joining the Academy](image)

Fig. 3 shows that the majority of respondents (64.1%) joined the Academy after getting recommendations from friends or family members. Other reasons chosen included free education offered by the Academy (17.4%), ICT bootcamp being the course wanted by the respondent (16.3%), being the institution that the respondent qualifies for (1.1%) and being the training institution that met the respondent’s expectation.

Fig. 4 shows the age distribution of respondents. The majority of the respondents (83.7%) were within the age group of 18 years to 24 years while only 16.3% were within the age group of 25 years to 34 years. The Academy covers a wide age group in its enrolment.

![Figure 4. Age group distribution of respondents](image)
In Fig. 5, respondents were asked to indicate their race. The majority of the respondents (65.2%) were Coloureds while 30.4% were Africans and 4.3% were Indians.

![Race of the respondents](image)

Figure 5. Race of the respondents

In Fig. 6, the respondents were asked to indicate if they had any disability or not. The findings show that the majority of respondents (97.8%) had no form of disability while only 2.2% had some form of disability.

![Disability of the respondents](image)

Figure 6. Disability of the respondents

**Equity**

The respondents were asked three (3) questions relating to equity using a 5-point Likert scale, very helpful (5) to not helpful (1). The results for the respondents’ ratings, means and standard deviations are presented in Table 1. The results show that the financial support provided to the respondents was at least helpful (frequency of 80.5%) during their studies with a mean of 4.03 and standard deviation of 0.954. The majority of the respondents (frequency of 68.5%) at least agreed that the financial support provided helped them concentrate on their studies without financial worries with a mean of 3.88 and a standard deviation of 0.959. Furthermore, the majority of the respondents at least agreed (54.4%) that the transport subsidy or food assistance from the Academy helped them during their studies with a mean of 3.42 and standard deviation of 1.207.
Table 1. **Equity**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not helpful (1)</th>
<th>Slightly helpful (2)</th>
<th>I choose not to comment (3)</th>
<th>Helpful (4)</th>
<th>Very helpful (5)</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you rate the financial support received during the program?</td>
<td>-</td>
<td>12.0%</td>
<td>7.6%</td>
<td>45.7%</td>
<td>34.8%</td>
<td>4.03</td>
<td>0.954</td>
</tr>
<tr>
<td>How would you rate the financial support received in terms of helping you concentrate on your studies without any financial worries?</td>
<td>3.3%</td>
<td>2.2%</td>
<td>26.1%</td>
<td>40.2%</td>
<td>28.3%</td>
<td>3.88</td>
<td>0.959</td>
</tr>
<tr>
<td>How would you rate transport subsidy or food assistance from SLCA during your studies?</td>
<td>8.7%</td>
<td>14.1%</td>
<td>22.8%</td>
<td>34.8%</td>
<td>19.6%</td>
<td>3.42</td>
<td>1.207</td>
</tr>
</tbody>
</table>

**Inclusivity**

To assess the level of inclusivity at the Academy, respondents were asked to indicate the extent to which they agree or disagree with the given statements using a 5-point Likert scale, strongly agree (5) to strongly disagree (1). The results for the respondents’ ratings, means and standard deviations are presented in Table 2.

Table 2. **Inclusivity at the Academy**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree (1)</th>
<th>Disagree (2)</th>
<th>Neutral (3)</th>
<th>Agree (4)</th>
<th>Strongly agree (5)</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student feedback is considered at SLCA.</td>
<td>2.2%</td>
<td>4.3%</td>
<td>8.7%</td>
<td>45.7%</td>
<td>39.1%</td>
<td>4.15</td>
<td>0.913</td>
</tr>
<tr>
<td>I am happy with the support I received from my instructors in the program.</td>
<td>-</td>
<td>3.3%</td>
<td>7.6%</td>
<td>51.1%</td>
<td>38.0%</td>
<td>4.24</td>
<td>0.732</td>
</tr>
<tr>
<td>I am happy with the support I received from my student support services such as therapy and counselling in the program.</td>
<td>-</td>
<td>1.1%</td>
<td>13.0%</td>
<td>19.6%</td>
<td>66.3%</td>
<td>4.51</td>
<td>0.763</td>
</tr>
<tr>
<td>SLCA promotes an inclusive environment regardless of sexual orientation, race, age, nationality, or disability status.</td>
<td>-</td>
<td>-</td>
<td>7.6%</td>
<td>34.8%</td>
<td>57.6%</td>
<td>4.50</td>
<td>0.638</td>
</tr>
<tr>
<td>Induction training received at SLCA promotes inclusivity.</td>
<td>5.4%</td>
<td>13.0%</td>
<td>-</td>
<td>34.0%</td>
<td>44.6%</td>
<td>4.15</td>
<td>1.026</td>
</tr>
</tbody>
</table>

The results show that there is inclusivity at the Academy. This is shown by the high rating of the statements and mean from 4.15 to 4.51. The majority of the respondents
at least agreed (84.8%) that their feedback was considered at the academy with a mean of 4.15 and a standard deviation of 0.913. Furthermore, the majority of respondents at least agreed (89.1%) that they were happy with the support they received from their instructors during their studies with a mean of 4.24 and standard deviation of 0.732. Also, the majority of respondents (85.9%) at least agreed that the support they received from student support services helped them during their studies with a mean of 4.51 and a standard deviation of 0.763. In terms of promoting an inclusive environment, the majority of the respondents (92.4%) at least agreed that the Academy promotes an inclusive environment regardless of sexual orientation, race, age, nationality, or disability status. The results show that the level of inclusivity is high at the Academy.

Diversity

Table 3 shows the findings of the assessment that was done to assess the level of diversity at the Academy using a 5-point Likert scale, strongly agree (5) to strongly disagree (1). The table shows the respondents’ ratings, means, and standard deviations. The respondents were given six (6) sentences to rate the extent to which they agree or disagree with those statements. The findings show that the majority of respondents at least agreed with all the statements with mean values from 4.15 to 4.51. The respondents felt that the Academy considers applications from diverse groups (85.8%), respondents felt recognised for the work they do regardless of their status (88%), felt comfortable sharing their opinions and ideas with other students (86.9%), and their staff (77.2%), staff complement is diverse (88%) and felt that they could share their background without being judged (75%).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLCA considers applications to study from diverse groups (sexual orientation, race, age, nationality, or disability status) equally.</td>
<td>2.2%</td>
<td>-</td>
<td>12.0%</td>
<td>38.0%</td>
<td>47.8%</td>
<td>4.15</td>
<td>0.913</td>
</tr>
<tr>
<td>I feel recognised for the work I complete, regardless of my sexual identity, race, disability, or economic status.</td>
<td>2.2%</td>
<td>1.1%</td>
<td>8.7%</td>
<td>41.3%</td>
<td>46.7%</td>
<td>4.24</td>
<td>0.732</td>
</tr>
<tr>
<td>I feel comfortable sharing my opinions and ideas with other students even if they differ.</td>
<td>-</td>
<td>3.3%</td>
<td>9.8%</td>
<td>39.1%</td>
<td>47.8%</td>
<td>4.51</td>
<td>0.763</td>
</tr>
<tr>
<td>I feel comfortable sharing my opinions and ideas with staff even if they differ.</td>
<td>4.3%</td>
<td>3.3%</td>
<td>15.2%</td>
<td>44.6%</td>
<td>32.6%</td>
<td>4.20</td>
<td>0.774</td>
</tr>
<tr>
<td>SLCA staff complement is diverse in terms of sexual orientation, race, age, nationality, or disability status.</td>
<td>-</td>
<td>1.1%</td>
<td>10.9%</td>
<td>47.8%</td>
<td>40.2%</td>
<td>4.50</td>
<td>0.638</td>
</tr>
</tbody>
</table>
Realisation of goals

The respondents were given four (4) statements to assess if the students had realised their goals using a 5-point Likert scale, strongly agree (5) strongly disagree (1). The results for the respondents’ ratings, means and standard deviations are presented in Table 4. The majority of the respondents (91.3%) at least agreed that the program had provided them with a foundation to excel in the IT field with a mean of 4.34 and a standard deviation of 0.715. The majority of the respondents also at least agreed that they could do most of the programming tasks very well with a mean of 4.15 and standard deviation of 0.755. Furthermore, the majority of the respondents (92.4%) at least agreed that they were motivated to pursue a programming career with a mean of 4.39 and a standard deviation of 0.741. In terms of confidence for the future, the majority of the respondents (93.5%) at least believed that they could succeed at almost any endeavour to which they set their minds with a mean of 4.60 and a standard deviation of 0.696. The results show that the ICT bootcamp had helped the students to develop and realise their goals in their programming careers.

Table 4. Realisation of goals

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel the program has provided me with a foundation to excel in the IT field.</td>
<td>1.1%</td>
<td>-</td>
<td>7.6%</td>
<td>46.7%</td>
<td>44.6%</td>
<td>4.34</td>
<td>0.715</td>
</tr>
<tr>
<td>Compared to other students from other academies/colleges, I can do most programming tasks very well.</td>
<td>-</td>
<td>1.1%</td>
<td>18.5%</td>
<td>44.6%</td>
<td>35.9%</td>
<td>4.15</td>
<td>0.755</td>
</tr>
<tr>
<td>I am motivated to pursue a programming career</td>
<td>1.1%</td>
<td>1.1%</td>
<td>5.4%</td>
<td>42.4%</td>
<td>50.0%</td>
<td>4.39</td>
<td>0.741</td>
</tr>
<tr>
<td>I believe I can succeed at almost any endeavour to which I set my mind.</td>
<td>1.1%</td>
<td>-</td>
<td>5.4%</td>
<td>25.0%</td>
<td>68.5%</td>
<td>4.60</td>
<td>0.696</td>
</tr>
</tbody>
</table>

DISCUSSION

The results are discussed under the following subsections:

Diversity

The students enrolled at SLCA are all from the Cape Flats, an area notorious for its socioeconomic problems. The majority of students at the academy are male peers.
While efforts are being made to raise the ratio of female peers, the numbers remain lower than planned. Perhaps there is a need to reconsider enrolment and recruit just girls. Nonetheless, the academy appears to be performing well in terms of ethnic backgrounds although the findings did not reveal any kids who identified as white. A follow-up conversation with the instructor showed that the funding mechanism is aimed at historically disadvantaged persons. There is also evidence of individuals of various sexual orientations. Each cohort includes students with varying levels of education. While matric students were initially targeted, the academy now attracts graduates which is a sign that more and more people are finding coding bootcamps worthy. The respondents felt that SLCA provides a good safe environment that caters to all students from different backgrounds. Our findings resemble shared meanings of the concept of diversity. As in the literature, as curricula seek to achieve justice-oriented systems (Otten, Faughnan, Flattley, & Fleurinor, 2021), issues of diversity have great space in curricula refinement.

**Self-efficacy**

More than 90% of respondents were enthusiastic about pursuing an IT career and believed that they could perform programming better than students from other universities. It is worth noting that students from various colleges do ask each other how they are doing through peer assessment. When compared to other institutions of higher learning, Coding Bootcamp students are exceptionally skilled in practical principles. Burke and Bailey (2019) emphasized the self-efficacy mindset that bootcamp cohorts have, which was also identified as the cornerstone of success in our theoretical framework (Lent, 2013). When selecting coding stacks as a service provider, Academy X implemented topic isolation. The literature suggests that they are cheaper than traditional universities, but we were not able to find out what the costs were. From what we’ve heard from Academy X's management, bootcamps are expensive only because they are funded by international communities, so they appear cheaper to students. While there were elements of communities of practice, they were not so strong as to suggest cohort cohesion as a practice.

**Outcome expectations**

The number of students who enrolled in college as a result of recommendations is very high, which is most likely related to outcome expectations. If a person believes that a college graduate is doing well in life, he or she is more likely to enrol at the same institution with the same expectations. The majority of respondents believed that the training they received would help them achieve in their careers. This is also backed by the number of trainees who have been hired by the industry after graduating from the academy. It should be highlighted that the SLCA academy has established itself well as a coding bootcamp, with people applying from as far away as Gauteng and Limpopo. The number of learners who got absorbed by industry after completing at SLCA supports the idea of bridging unemployment gaps through coding bootcamps. This exposition responded to the research question below:

How can ICT Bootcamps assist in bridging unemployment gaps in ICT?

**Equity**

Equitable learning environments set a platform for academic, social, and emotional success for each student (Bernstein, Bulger, Salipante, & Weisinge, 2020;
Otten, Faughnan, Flattley, & Fleurinor, 2021). Based on our findings, we conclude that SLCA is a strong educational institution, with a strong sense of economic awareness of its students, and it values all social identities to create an equitable learning environment. It is evident that the institution puts in a lot of rigorous work, engages its staff, and aims to foster positive relationships within the academy by providing a wide range of psychological safety and emotional safety to its students. Our findings in this regard of equitable learning environments are similar to what our literature pointed towards. Students who enrol are mostly from previously disadvantaged communities, according to the data collected. As participants come from different backgrounds, the academy understands that they require different support structures to excel in the learning process hence, providing transportation and food support to all who need it. There is no one size fits all philosophy when it comes to creating an equitable environment. The organization addresses social imbalances while upskilling young people. This support is not offered by other institutions, which leads to a high dropout rate, in contrast to the SLCA. There were a few students who stated that the assistance they received was ineffective, and we believe that these are the few students who have been assessed and determined to be in a financially better situation.

Two disadvantages of ICT bootcamps have been identified. The first is the qualification's narrow scope, as it only allows students to fit in software development, as opposed to university courses, which give candidates a variety of career options. Second, traditional articulation, such as National Qualification Framework levels, has a limited path to progression, whereas industry certification has an easy path to progression through international certifications. Despite the negatives highlighted, this study has highlighted that there is more to gain by implementing ICT bootcamps. Our case study methodology worked well for the topic understudy since we were able to dive deeper into bootcamp concepts and get valuable insight from the students. We must acknowledge the talk that one of the directors had with us giving us a clear perspective of how equitable learning environments have proved to be their secret weapon to achieving their success. We also believe that our chosen theoretical framework, SCCT, gave a good frame for equitable learning environments due to its holistic approach to understanding career development, its recognition of the importance of social context and individual differences. Its ability to inform interventions and strategies that promote equitable access to educational and career opportunities for all students is well recommended for the topic of understudy and similar studies.

Moreover, this study addressed issues of equity diversity, and inclusivity fundamental to equitable and lifelong learning. Hence, we believe our research question stated as:

How can ICT Bootcamps promote equitable learning in a bid to increase lifelong learning? has been answered.

**CONCLUSION, RECOMMENDATIONS, LIMITATIONS, AND CONTRIBUTIONS**

**Conclusion**

The study explored initiatives that can be rolled out by several economic players including but not limited to NGOs, NPOs, and other social compact programs
to address the problem of high youth unemployment. ICT bootcamps are designed to give students the knowledge and perspectives they need to find sustainable and fair solutions to challenging situations. ICT bootcamps have the potential to provide individuals with real-world skills that are highly sought after in today's technologically oriented employment market. These courses frequently give participants rigorous instruction, practical experience, and exposure to tools and procedures used in the industry, all of which can speed up their move into ICT-related employment. These bootcamps can be a feasible option for people looking to change careers or who don't have access to regular higher education.

ICT bootcamps’ ability to close the employment gap depends on several variables, including the calibre of education, how well the curriculum aligns with market demands, and how well graduates are supported after they leave. Furthermore, graduates of bootcamps must be ready for ongoing learning to stay relevant in their employment due to the rapidly evolving nature of technology.

It is important to recognize the precarity inherent in this approach. ICT bootcamps' quick speed can occasionally result in a restricted concentration on particular technical abilities, potentially disregarding the development of critical thinking, problem-solving, and adaptability. Additionally, some people may find the cost of participating in these programs to be burdensome, which perpetuates socioeconomic inequities.

In this study, data was collected using a questionnaire from a single case of an ICT Bootcamp located in previously disadvantaged communities of the Cape Flats in South Africa. The questionnaire was completed by 92 participants. Social cognitive career theory (SCCT) was used in this study to analyse the success of ICT Bootcamps in the context of skill development. The study provided an in-depth guide to ICT Bootcamps in developing countries that are interested in participating in producing low to middle-level skills and reducing unemployment rates in previously disadvantaged communities, rather than relying solely on universities and technical vocational education centres.

In conclusion, ICT Bootcamps can significantly contribute to closing the employment gap and fostering equal access to education. Their potential must be utilized wisely, with an emphasis on quality, inclusivity, and participants' long-term success in a job environment that is always changing. We can get closer to a time when technology education is a potent force for social transformation and economic development by addressing these issues and highlighting the benefits of ICT Bootcamps.

**Recommendations**

If learners are exposed to equitable learning environments, coding bootcamps have the potential to promote lifelong learning and equip them with the skills needed by the labour market. Making sure students' social, psychological, economic, and academic needs are met is key to creating equitable learning environments. Unlike traditional colleges and universities, coding bootcamps have the freedom to address most of the concerns that learners need to succeed such as curriculum and personal needs with few restrictions. For instance, coding bootcamps also offer flexibility in their curriculum, and most of them have one that addresses industry needs. Further, those who support Non-Profit Organisations are willing to do whatever it takes to make sure students succeed.
Limitations and contributions

Our findings are based on the results of one case study. Our argument could be strengthened with more case studies. Nonetheless, we believe our study has given us a solid foundation for coding bootcamp literature. In addition, our study has shown how equitable learning environments foster inclusive pedagogy necessary for lifelong learning. Educational institutions can attempt to adopt similar models to get the best from the learners. Among the benefits highlighted by the study are accelerated industry-relevant skill development and diverse learning environments that can be derived from ICT bootcamps within higher education. However, the study was limited to a single site and a small sample. We believe future studies could consider large sample sizes and geographic coverage. Also, the concept of bootcamps can be extended to other fields.

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