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Exploring Students' Experiences of Practical Tests Utilization in Formative Evaluations in Secondary School Computer Studies Curriculum Implementation in Kenya.

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ABSTRACT

This study set out to explore the experiences secondary school students' experiences undergo while undertaking practical tests used in formative evaluations in Computer Studies curriculum. Participatory action research that took the qualitative research approach was used in designing the study. Two Focus Group Discussions (FGD), consisting of eight Form four Computer Studies students each, were selected from a target population of 93 students in Thika Municipality, Kenya. Data on students' experiences of practical tests was collected using a Focus Group Discussion Schedule. Thematic analysis was used to analyze the data gathered. Majority of negative experiences were exemplified under four themes namely: frequency of practical tests, students' experiences as they undertake tests, scoring of tests and management of feedback from tests. The theme of student preparation for tests was mainly characterized with positive experiences. Based on these findings, the study concluded that there were gaps in how the practical tests used in formative evaluation of secondary school Computer Studies curriculum are implemented. The study therefore recommends that Computer Studies teacher need to adjust the strategies they use to implement practical tests so as to better meet the needs of their students.

1. INTRODUCTION

The utilization of practical tests in Computer Studies enable students to apply the knowledge they have acquired in a concrete manner, which can enhance their comprehension of concepts and enable them to develop skills that will be useful in their future professions (Daghan & Akkoyunlu, 2014; Komari, Aryanti & Sudjani, 2019; Salma & Prastikawati, 2021). Further, they provide a more accurate assessment of a student's understanding and abilities than traditional written exams, as they measure practical skills and knowledge (Lai, Ferrara, Nichols & Reilly, 2014). The importance of these tests is even greater when they are used for formative evaluations, as they provide immediate feedback, enabling students to pinpoint areas where they need to improve and take corrective measures accordingly (Mc Tighe, 2015).

Literature contends that for practical tests in Computer Studies to achieve the foregoing ends, they need to be implemented within a constructivist framework. This approach makes the tests more engaging, challenging, and sometimes requires more time to complete (Asan & Haliloglu, 2005; Mc Tighe, 2015; Wren, 2015). This therefore raises the question of what positive and negative experiences students have when undertaking such practical tests. Despite this, limited research has been conducted to explore the experiences of students when undertaking these "engaging" and "time-consuming" practical tests in the subject.

2. STATE-OF-THE-ART REVIEW

The use of practical tests is one of the most common methods used to assess student's mastery of concepts secondary school Computer Studies. Since the subject is mainly hands-on, it is a foregone conclusion that accurate measurement of student learning can best be done by determining how well they can accomplish practical tests. Besides, as Espinosa (2015) advances, practical tests integrate teaching, learning, and evaluation, which facilitates differentiation in the teaching and learning process. As such, the probability of achieving of desirable learning outcomes is increased.

The theoretical underpinnings for the use of practical tests for formative evaluation is that meaningful learning occurs through direct experience and that students learn by discovering knowledge themselves rather than solely receiving it from their teacher (Chan, 2023; Kolb & Kolb, 2013; Vygotsky, 1978). Further, in contrast to traditional written tests, where feedback is limited to test scores, in practical tests, feedback is viewed as a crucial tool for improving student learning and teacher instructional practices (Espinosa, 2015). This is also echoed by William and Thompson (2007) who note that practical tests provide teachers and students with clear and inferable evidence of learning progress which can be used to guide future action. As a result, effective teachers should often use practical tests as a formative evaluation tool to keep track of progress in student learning from different perspectives and under varying instructional conditions.

In many computing education systems worldwide, practical tests for Computer Studies normally include projects and lesson-based practical exercises. The main distinction between a project and a practical exercise lies in the difficulty level of the task that students are required to accomplish (Bagheri, Ali, Abdullah & Daud, 2013). Projects are more intricate, multifaceted in terms of content tested and time consuming to accomplish. Typically a project takes at least a week to complete. Practical exercises are lighter, covering basic concepts and can even be completed in a single lesson (CSTA, 2011; Tucker, 2009). For these reasons, in Computer Studies curriculum implementation, practical exercises are more prevalent than projects (Musyimi, Orodho & Thuo, 2021; Munyiri, 2014; Kithungu, 2015).

To effectively carry out practical tests, a social constructivist approach has been recommended (James, 2008). According to this approach, learners construct their own knowledge actively and develop their skills by receiving support from a more proficient peer or skilled teacher. As learners progress, they gradually become more independent and are encouraged to solve new tasks on their own (Adam, 2017; James, 2008). Vygotsky (1978) referred to this concept as the "zone of proximal development." James (2008) vouch for the use of such model for practical tests to yield their intended outcomes. This therefore implies that two main elements are of key essence in practical tests administered in a constructivist setting, that is, competent teachers and adequate resources. Competent teachers scaffold learners by designing meaningful tasks, training them on the use of rubrics or checklists for self-regulation, setting up the testing environment and providing feedback from the test. Adequate resources facilitate collaboration and communication and ensure the smooth administration of tests (James, 2006; Adam, 2017). In Computer Studies practical tests, such resources include personal computers, up-to-date reference materials, reliable internet bandwidths, printing facilities, computer networks for interaction, and sufficient time for completion of tests (Wren, 2015).

The importance of the administering practical tests in a constructivist framework cannot be overstated. Nevertheless, research in this area has primarily focused on the challenges involved in their implementation. For instance, Colley (2008) found that teachers in the United States were reluctant to utilize practical tasks that had open-ended features. The reason for this reluctance was that such tasks involved a vast array of possible approaches, solutions, and answers, making it challenging for teachers to create,

administer, and grade students accurately. Yildirim & Orsdemir (2013) discovered that educators lacked guidance on the application of practical tests, leaving them feeling ill-equipped to use these assessment methods effectively. Consequently, they were not prepared to train their students in the use of this type of assessment, resulting in learners being unable to complete their tasks satisfactorily and not achieving the intended outcomes.

According to Kirmizi & Komec (2016), Turkish high schools faced challenges in conducting practical assessments during class due to limited time and insufficient materials. Meanwhile, Espinosa (2015) discovered that the utilization of performance tests in Ecuadorian secondary school language classrooms was limited, with teachers acknowledging the benefits of these strategies but hesitant to transition to performance-based and open-ended formats.

Research conducted in Nigeria, Zambia, and Ghana investigated the issue of resource availability in the implementation of Computer Studies curriculum. The studies reveal a shortage of resources, including limited time for practical lessons, a shortage of ICT teachers, inadequate access to electricity, computers, computer labs, internet, scanners, printers, and projectors (Simulwi, 2018; Nyanja & Musonda, 2019; Aikins Nyarko, 2019; Ogwo, Maidoh & Manwe, 2015).

The government of Kenya recommends the use of practical tests, such as case studies, projects, and practical exercises, in the secondary school Computer Studies curriculum. This is to equip students with skills on how to apply computing knowledge in solving everyday problems (Kenya Institute of Education, 2002). Studies conducted in this context have mainly focused on the challenges that are encountered in the use of practical tests and frequency of their use. Research on the frequency of practical tests reveals the frequency of the lesson-based practical exercises has not been sufficient to enhance higher order thinking skills such as innovation skills among learners (Musyimi, Orodho & Thuo, 2021; Munyiri, 2014; Kithungu, 2015). Studies on the challenges highlight issues such as the lack of resources, including internet access and ICT policy frameworks, inadequate teacher proficiency in assessing problem-solving skills, and a shortage of computers and peripherals (Mwangi, 2013; Awour & Kaburu, 2014; Gichuru, 2014). The lack of studies that delve deeper into the experiences of students with practical tests is a significant concern, as it hinders informed decision-making. It is with this gap in mind that this study aimed to provide a better understanding of the students' experiences with practical tests.

3. PROBLEM STATEMENT

The use of practical tests for students' formative evaluation in hands-on subjects such as Computer Studies helps provide immediate feedback, allowing students to identify areas where they need improvement and take corrective action. They also help students to stay motivated and engaged in the learning process, as they are able to see the results of their efforts in real time. Further, it can help teachers to adjust their teaching strategies to better meet the needs of their students. On this basis, the Kenyan government recommends their use in the secondary school Computer Studies curriculum implementation. Despite this entrenchment it is not clear what experiences students have as they undertake these practical tests. This portends a risk of making uninformed decisions in the learning process thus likely to inhibit the achievement of the objectives of the subject. Against this background, this study set out to explore students' experiences of practical tests utilization in formative evaluations in secondary school Computer Studies curriculum implementation.

4. METHODOLOGY

4.1 Research Design

The research methodology used in this study was participatory action research, which employed a qualitative research approach with a phenomenological design. Vaughn & Jacquez (2020) endorse such an approach when one wants to understand a lived experience from the participants' point of view and develop action-oriented interventions that are beneficial and acceptable to all stakeholders. As such, this particular approach was deemed suitable as it allowed for an in-depth exploration of the experiences of students with practical tests. By gaining insight from their perspectives, practitioners can develop interventions that are actionable and acceptable to all involved parties.

4.2 Population and Sample Size

The study targeted 93 Form Four Computer Studies students of the year 2023, in two secondary schools within Thika Municipality in Kenya. Out of this, two focus group discussions (FGD), one from a boys' school and the other from a girls' school, with each consisting of eight Form four Computer Studies students, were selected. Purposive sampling was used to select the participants that were included in the FGDs. This sampling technique was used here in order to ensure that the respondents selected are those that could give valuable information with respect to the study objectives.

4.3 Instrumentation and Data Collection

Data on students' experiences of practical tests utilization in formative evaluations in secondary school Computer Studies curriculum implementation was collected using a focus group discussion schedule. For

each FGD, two sessions were conducted. Before the first session, the researcher asked each of the participants to bring five copies of practical tests they had done before. He then asked each participant to randomly select three copies of the tests and write down their reflections on their experiences of undertaking them. The researcher also used the first session to build rapport with the participants and gain their trust. The researcher analyzed each participant's notes from the first session and used them to prepare for the second session. During the second session, the researcher reviewed the notes from the first session with the participants and engaged in deeper conversation to get a full picture of their lived experiences of undertaking practical tests in Computer Studies.

4.4 Data Analysis

The data was analyzed using thematic analysis approach. This is a method for analyzing qualitative data that entails searching across a data set to identify, analyze, and report repeated patterns (Braun & Clarke, 2012). It is considered appropriate and powerful method to use when seeking to understand a set of experiences, thoughts, or behaviors across a data set (Braun & Clarke, 2012). Accordingly, the approach was used to single out five essential themes that were dominant in the two FGDs.

5. RESULTS AND DISCUSSION

The process of analyzing the data started after converting the recorded data stored in a memory card into written text. The data reduction stage commenced by thoroughly reading and reviewing the transcribed data. During the first reading of each transcript, themes became evident. An open coding approach was then employed to identify additional themes that emerged. The analysis led to the development of five main themes: frequency of practical tests, students' preparation for practical tests, and students' experiences as they undertake tests, scoring of tests and management of feedback from tests.

According to the "frequency of practical tests" theme, participants indicated that their expectations frequency of practical tests had not been met. They reported that out of the lessons allocated for the subject, their teachers had not made it clear which lessons were meant for theory and which ones were for practical work. Teachers would switch between practical tests and theory work sporadically. These findings are supported by the following excerpts:

> "*When I joined form one I was so excited to be in a Computer Studies class because I thought Computer Studies was all about practical work. But when we joined things were not as we expected. In fact, we spent the whole form one year doing theory work. We started doing practical tests in Form two*."
>
> "*I thought I would spend most of the time doing computer practical, however I found that was not the case. This was quite disappointing but I have had to adjust. The number of times I have been exposed to practical tests has not been adequate to earn practical skills as I expected…*"
>
> "*The practical tests are inadequate. Some topics such as desktop publishing need a lot of practice. I am afraid that I have not been able to gain practical skills as I expected…*"
>
> "*We are not aware which lesson is reserved for theory and practical work. It is our teacher who decides when to give us practical tests.*"

Under the "students' preparation for practical tests" theme, most of the participants felt that they were adequately prepared to undertake the tests. They reported that, prior to taking practical tests, their teacher would explain to them the instructions and what was expected of them in the test. However, there were a few divergent voices that indicated that this was not the case in all practical tests. This would make them anxious and sometimes making them to fumble around the test. These findings are supported by the following sample sentences from participants:

> "*The instructions for practical tests are always clear to me. I am always eager to personally perform what the teacher has demonstrated in the lesson. It is always an exciting experience.*"
>
> "*For the practical activities we do in class, our teacher takes us through every aspect of it, step by step, as he highlights areas we need to look out for. Although sometimes I do not get some things clearly, I am always afraid to seek for clarification…*"
>
> "*Test instructions are given well and they are always clear. As the teacher takes us through them they come out clear. This makes me to carry out the test with confidence and to perfection…*"
>
> "*The preparations for practical tests is sometimes insufficient. For example in spreadsheets, some questions go beyond the basic skills and concepts that the teacher has taken us through. This makes me get confused and demoralized…"*

According to "students' experiences as they undertake tests" theme, participants reported both positive and

negative experiences. The most prominent experiences were those related to sharing of computers, power fluctuations during tests, adequacy of time allocated for the tests, poor condition of computers and availability of support from peers and the subject teacher. These findings are supported by the following excerpts:

> "*I have been sharing a computer for the lesson based practical tests. To me this does not feel good since sometimes quarrels emerge on how we share the computer. The one I share with is experienced in computers and he says that I am slow in typing. So he wants to be the one using the computer always…*"
>
> "*Our teacher puts us in pairs to share one computer. I get bored when I am paired with someone I do not like working with…*"
>
> "*When doing the tests, sharing computers helps me exchange ideas with my colleague and widens my thinking scope…"*
>
> "*To me sharing a computer for lesson-based practical tests is a nice thing, since we get to help one another."*
>
> "*When doing practical tests we sometimes experience abrupt power loss. Since the computers in our lab are not connected to power backups, all the unsaved work gets lost. This is always discouraging since I have to start doing it all again*."
>
> "*My worst experiences in practical tests is when abrupt power loss occurs especially when I am almost through and I have not saved my work. It is always disheartening since I have to start all over again. In most cases the additional time is never enough to complete the work*."
>
> "*The time allocated for the practical tests have never been enough for me. I have been leaving my work unfinished*."
>
> "*I have a problem with time management during practical tests. I have not been able to finish my practical tests within the allocated time*."
>
> "*The time for practical tests is always limited. In most cases I give out my work without fully answering it. This really brings down my spirits and makes me very disappointed…"*
>
> "*Some computers are slow in processing, this makes me not to finish the test within the required time. It makes feel bad…"*
>
> "*Some computers peripherals are old especially the keyboards, one has to press the keys so hard for you to enter data. Some keys totally fail to work. This makes me tensed due to the fear of losing marks in a certain question..."*
>
> *"…Most of the time I consult my friends whenever I encounter challenges for not all the time the teacher is available during the test*"
>
> "*The teacher is always ready to help me whenever I seek help on how to handle challenging situations. He always gives a deep explanation on a problem which helps me understand and be able to solve similar problem…"*

Under the "scoring of practical tests" theme, responses revealed varied experiences. A majority concern was on the dearth of scoring lesson based practical tests. However, there were a few that indicated that scoring of practical tests was fair and transparent. These findings are shown by the following excerpts:

> "*The teacher does not mark class based practical tests and it is really discouraging. I am unable to know my strengths and weaknesses…"*
>
> "*Only practical tests for end of term exams are marked. Lesson based practical tests are never marked..."*
>
> "*Tests are given to us during lessons are not marked. This is quite discouraging because one cannot know where they messed and where to make corrections…"*
>
> "*Even if lesson based practical tests are not marked, I take them as a way of acquiring skills. So I am comfortable with that. For the tests that are marked, the marking is always fair and the areas that where scored are always shown in a scoring guide which is made available to us…"*
>
> "*For the tests that the teacher marks, he does it well, fast and with a lot of fairness. This is good since it pushes me to do it again and correct my mistakes*…"
>
> "*The lesson based practical tests are never marked. Sometimes we do not even complete them. When the set time is over, the tests are never revisited by both the teacher and the students…"*

In the "management of feedback from practical tests" theme, most participants decried lack of review of practical tests after they are scored. This finding is exemplified in the sample statements from the participants:

"*After doing practical tests, there is no time to look at how they were done including those done in end of term exams where scoring is usually done. So it is difficult for me to know my weaknesses and where I went wrong…*"

"*The feedback from test is sometimes delayed. This makes me keep on repeating the same mistake…"*

"*Once the tests are marked, there is little amount of feedback from the teacher. No time is usually given for discussion of the exam practical…*"

"*The practical tests are not revised by the teacher. Therefore I fail to know my areas of weaknesses. This makes me fail to achieve my targets…"*

6. CONCLUSION AND RECOMMENDATIONS

The central aim of this study was to explore the experiences secondary school students undergo while undertaking practical tests used in formative evaluations in Computer Studies curriculum. Participants reported mixed experiences under the five themes that were generated from the data collected. Majority of negative experiences were exemplified under four themes namely: frequency of practical tests, students' experiences as they undertake tests, scoring of tests and management of feedback from tests. However, the theme of student preparation for tests was mainly characterized with positive experiences. Based on these findings, it can be concluded that there are gaps in how the practical tests used in formative evaluation of secondary school Computer Studies curriculum are implemented. The study therefore recommends that Computer Studies teacher adopt the following: (1) increase the frequency and time allocated for practical tests, (2) update and maintain the physical inputs such as computer peripherals and power backups, (3) ensure that they are available to offer support during the test, (4) score every test and give timely feedback, (5) set time to review scored tests.

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8. FOCUS GROUP DISCUSSION GUIDE

1. How often does your teacher use practical tests in Computer Studies? Which genre of practical tests is most common? Is there any of the two genres that you find enjoyable than the other? Give reasons?
2. What are the student experiences with regard to how they get prepared for the tests by their teacher? (Probe for information on student experiences with instructions/scoring guide/rubrics of the test)
3. What are the student experiences with regard to how they are organized when undertaking the tests? (probe information with regard to how students seek for help/collaborate during tests, adequacy of resources e.g. time, computers, internet connectivity)
4. What are the student experiences regarding how feedback on the practical test is collated? (Probe for information on how the tests are scored, how long it takes to get feedback, how they use the feedback).
5. Tell me about one your greatest distasteful experiences you have had in practical tests?
6. Of all the things we have discussed above, what is the most enjoyable experience you have had in practical tests in Computer Studies?

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