A self-directed assessment framework in distance learning for clothing and textile technology undergraduate teacher trainees under COVID-19

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Abstract

COVID-19 has affected social and economic life in several countries and the educational system is no exception. In response to the prevalence of the pandemic, digital technology has become a critical addition to face-to-face interactions for educational purposes. This study aimed to design a self-directed assessment framework (SDAF) for clothing and textile technology (CTT) undergraduates for distance learning. The assessment framework derived its understanding from the key concepts constituting assessment as the broader construct associated with sub-constructs such as skills and rubrics. A mixed methods approach was used in which twenty students and four lecturers from four purposively selected universities in Zimbabwe participated. Curriculum documents were analysed to identify skills to be assessed. Focus group discussions with lecturers confirmed the skills identified and ascertained the rubric for assessment. The framework was validated using a pilot test and a Likert scale administered to students. A content data analysis method was used. Results showed that students found the framework for self-directed assessment of the skills outlined in the curriculum document valuable. Future explorations will help determine the usefulness of a similar framework in the theoretic concepts of the CTT curriculum.

Keywords: assessment, self-directed assessment, competencies, rubric, curriculum

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Introduction

Assessment is a significant facet of students' learning. It plays an important role in achieving educational goals. It is important for developing teaching and learning processes as it involves gathering information synthesized mainly by lecturers for making decisions about students (Bearman, Dawson, Boud, Bennett, Hall, Molloy & Joughin, 2014; Walde, 2016). Methods used for assessments include practical and project work, portfolios, prototypes, testing, and examinations (Sewagegn, 2019; Yambi, 2018). Due to the COVID-19 pandemic there has been a global movement toward distance learning, necessitating the need for institutions and educators to adapt to the particular difficulties of this mode of instruction (Cochrane et al., 2020). In remote learning environments, CTT, which combines theoretical and applied knowledge in design, materials science, and production presents unique challenges (Hseuh, 2020). A self-directed assessment framework (SDAF) can provide structure and support for distance learners to take charge of their learning experience in order to overcome these difficulties (Zimmerman, 2000). The purpose of this study is to design a self-directed assessment framework for undergraduate students studying CTT during COVID-19.

Background of the study

Due to the COVID-19 pandemic educational institutions worldwide have had to make a transition to alternative delivery modes for learning. The closure of physical campuses has led to an increase in distance learning, which poses challenges to both the lecturers and the students (Tlili, Burgos, Olivier & Huang, 2022). An SDAF has been widely used to support student-centered learning and effective assessment in traditional classroom settings, but its adaptation and implementation have not received much attention, especially in CTT at the undergraduate level.

Self-directed assessment involves students identifying their learning needs, setting goals, selecting strategies, and assessing and reflecting on their progress and achievements (Caffarella & Daffron, 2013). In contrast, traditional assessment methods rely on the instructor's assessment of the student's learning outcomes. Thus, self-directed assessment shifts the locus of control from the instructor to the student (Kivunja, 2014). In the context of distance learning, an SDAF can assist students in taking responsibility for their learning outcomes, improving motivation and

engagement, and providing a clear framework for assessment (Colvin & Swainey, 2013). However, the implementation of self-directed assessment in this setting requires careful consideration of various factors such as technical skills, motivation, and the resources available to the student. Self-directed assessment begins with self-directed learning through a distance mode of delivery where students develop lifelong and self-initiated learning (Seifert & Felik, 2019).

During self-directed assessment students take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes (Caffarella & Daffron, 2013; Knowles, 1975). Students select strategies and activities that will help them achieve the set goals. This involves identifying resources and tools required such as sewing machines, fabric, patterns, and tools such as videos, webinars, and discussion boards. Finally, the student evaluates the progress towards set goals using a variety of assessments, such as self-directed assessment. Therefore, it is clear for students to determine how their learning and assessment should take place and with what resources

The proposed SDAF was not intended to replace the traditional teacher-centered assessments, but rather complement them. The framework sought to empower students to take charge of their own learning experience, which is critical for distance learning where learners need to stay motivated and engaged. The COVID-19 pandemic challenged traditional systems globally and innovative solutions have been developed to adapt to the new reality. This research proposed an SDAF for CTT undergraduate students during COVID-19, aimed at guiding towards a student-centered approach and providing a structure to distance-learning assessment.

Statement of the problem

Distance learning has been implemented by higher education institutions due to the COVID-19 pandemic. The impact of COVID-19 has seen various changes in the teaching methodologies employed like blended learning, flipped classrooms, and project-based learning (Natale, 2021; Xie, Bowles-Terry & Davis, 2020). These adjustments were made in an effort to correct distortions in the teaching and learning of practical-based curricula (like CTT). Despite these adjustments, there still appears

to be a significant disparity in how assessment is carried out. The lack of appropriate assessment frameworks to measure practical skills can make it difficult for both learners and teachers to provide an effective learning environment (NLAF, 2017). Therefore, this study suggests a framework for self-directed assessment for CTT practical skills through distance learning during COVID-19.

Objectives of the study

The study aimed to design a self-directed learning assessment framework for CTT undergraduates specifically for practical work and projects. This study is therefore aimed to:

1. Identify the specific skills and competencies for practical tasks in the CTT undergraduate curriculum.
2. Identify activities that promote directed and self-directed assessment from the undergraduate CTT curriculum.
3. Design a framework for self-directed assessment in the CTT curriculum during distance learning.

Conceptual framework and literature review

This study derived its understanding from the key concepts constituting assessment as the broader construct associated with sub-constructs such as skills, competencies, and rubric as shown in Figure 1.
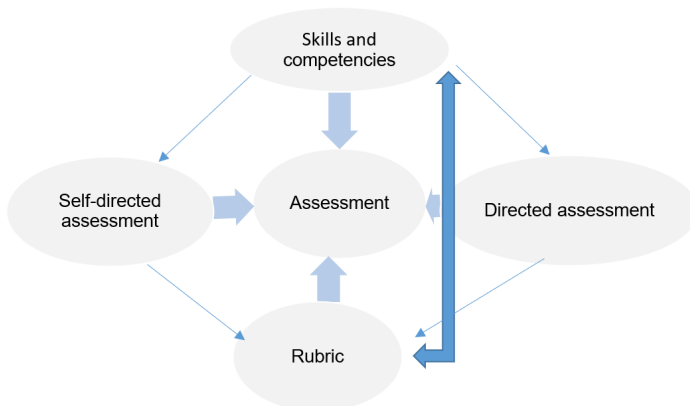

Figure 1: Conceptual framework for self-directed learning

Assessment plays a vital role in measuring student learning outcomes. Directed and self-directed learning are the two main forms of assessment. Directed assessment is the measurement conducted by the lecturer who sets the criteria and the rubrics for measuring student progress and then assesses the student. This is some form of formal assessment which was not quite possible during the COVID-19 pandemic, hence the need to adopt self-directed assessment. In this case, students oversee their own learning and assessment without active lecturer assistance. Discussing both directed and self-directed assessment in this study is important in understanding the effectiveness and challenges of the self-directed assessment framework. A rubric is a tool that assists the students in consistent evaluations as it provides the criteria to evaluate whether learning objectives have been achieved. Skills and competencies are important in assessment because they help identify what a student knows and can do. These are also related to rubrics as they are used to measure the level of mastery of a skill or competency, strengths, and weaknesses and to develop plans to improve as guided by the rubric. Nonetheless, self-directed assessment does not replace the directed assessment but complements it.

All these aspects illustrated in Figure 1 are interconnected and are useful in the designing of an effective SDAF. These aspects are elaborated in the following sections.

Assessment

According to Owens (2020), assessment refers to collecting and evaluating information or data to judge an individual's learning, knowledge, or performance. Assessment involves gathering and interpreting information about the students' level of reaching learning goals (Walde, 2016; Yambi, 2018). Abraham and Reiss (2015) highlight that assessment determines what is to be taught, and lecturers' preferences to use different types of practical work are regulated by their considerations of curriculum goals and assessment methods. For assessment to be effective, it is necessary to know what is to be assessed from the onset. By providing some guidelines about assessment tasks, procedures, and competencies CTT students can understand what is expected of them, prepare themselves, set goals, and better understand feedback. This can help to improve their performance and achieve better learning outcomes. According to Sedumedi (2017), assessment is important to enhance the quality of the learning processes. In the context of this study the quality of assessment of learning must

be relevance, appropriateness, reliability, and comprehensiveness of the projects and practical work (Saddler, 1998; Seifert & Felik, 2019). This ensures that evaluation is measuring what it intended to measure.

Assessment is collecting quantitative and qualitative information about student learning using various methods or techniques (O'Neil & Padden, 2021; Sedumedi, 2017; Sewagegn, 2019). Included in the methods of assessment are tests, assignments, projects, portfolios, and observations. Assessment can also be used for formative (a learning guide) and summative (to evaluate learning) purposes (Owens, 2020). In CTT the assessment includes examinations, design projects, garment construction projects, and critiques. Assessment is also used to identify individual student weaknesses and strengths, provides feedback on the efficacy of instruction and give students a measure of their progress. Assessment is important because it drives students learning and most students focus on the best or most expeditious way to pass their tests (Yambi, 2018). Since this section illuminated the concept of assessment in general, the following section discusses directed assessment where lecturers decide how students are assessed.

Directed assessment

Directed assessment involves providing students with specific tasks, questions, or prompts that guide their learning (Abraham & Reiss, 2015; Kline & Fox, 2019). Directed assessment focuses students' attention on particular aspects of the learning process and evaluates their understanding of specific concepts, skills, or procedures. For example, when assessing papers, tests, or performances in CTT, the lecturer identifies the objectives, skills and competencies, and activities to be developed by students (Abraham & Reiss, 2015; Biggs, 2003; Biggs & Tang, 2011). Directed assessments can be used for formative or summative purposes, and they can take many forms such as tests, examinations, and observations (Kline & Fox, 2019). In CTT directed assessment is essential because it allows lecturers to evaluate students' understanding of specific concepts and techniques related to the design and production of clothing and textiles. While direct assessment is important, it has been noted that it is very difficult to achieve when face-to-face lectures are restricted, hence the need to consider self-directed assessment.

Self-directed assessment

Self-directed assessment is how individuals assess their own learning (Bloxham & Boyd, 2007; Tractenberg, 2021). The students decide what they want to learn and how well it will be learned. In essence, students have greater control, ownership, and accountability over their own performed tasks (Yambi, 2018). Self-directed assessments are a great way for students to save time and money as they can learn from wherever they are (Born, Amman, Grunze, Post & Scharer, 2014; Kim, Olfman, Ryan & Eryilmaz, 2014). In addition, self-directed assessment can play a significant role in developing student competencies. In the context of CTT, self-directed assessment can involve students setting their own goals, identifying areas they need to improve, creating a plan for developing skills and knowledge, and then implementing that plan through various learning activities. Students will then track their progress and evaluate the effectiveness of their learning activities in helping them achieve their goals (Alawadh & AL-Saud, 2021). Self-assessment can be conducted easily if students know the skills and competencies they are expected to acquire.

Skills and Competencies

According to Abraham and Reiss (2015), practical skills include an individual's ability to manipulate a particular piece of equipment and the activities they practice regularly. In CTT, a student can show skills mastery in garment construction in several ways, including laying and cutting, sewing, finishing and fitting techniques. Competencies are the underlying characteristics, behaviours and attributes that a person possesses that enable them to perform a job or task successfully (Koo & Lee, 2021). To demonstrate competency and mastery, students can complete various assignments and projects that showcase their skills. These might include sewing samples, constructing a basic garment from a pattern, altering and fitting garments to specific measurements, and creating a more complex garment from a pattern or design. Additionally, students can evaluate themselves against given guidelines to help them improve their skills and ensure they meet the required competency standards (Koo & Lee, 2021). Since self-directed assessment is a process by which individuals assess their own learning, it can help students become more competent in CTT by promoting self-awareness, motivation, and a sense of ownership over their own learning and development (Koo

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& Lee, 2021). Students can become more self-aware by understanding their strengths and weaknesses in this area and by identifying which areas they need to improve upon. Motivation can come from a sense of accomplishment or challenges and they can develop a sense of ownership over their learning by taking an active role in their own education.

Assessment rubric

A rubric is a matrix that generally describes performance on some specific task. It includes evaluative criteria and descriptions by which the level or quality of response by students on each criterion can be ranked (Dawson, 2015), usually from poor to excellent. According to Tractenberg (2021), a rubric should be task specific. Consequently, the rubric developed through this study was only for practical work and projects. Students as self-assessors can provide their own feedback if they understand the standards by which they should perform so that they can judge and change their own performance (Bearman, Dawson, Boud, Bennett, Hall, Molloy, & Joughin, 2014; Bearman, Dawson, Boud, Bennett, Hall & Molloy, 2016; Biggs & Tang 2011; Tractenberg, 2021). Overall, the rubric will help CTT students track their progress and identify areas of improvement in self-directed learning. The rubric with detailed information on assessment activities, processes, and abilities can help them prepare, receive feedback, and understand what is expected of them. This could enhance their performance and lead to higher academic performance.

Self-directed assessment framework

An assessment framework is a structured and systematic approach for evaluating an individual, group, or a programme based on predetermined criteria or standards (Boud & Falchikov, 2021). An assessment framework offers a standardized method for assessing performance, giving feedback, and pinpointing improvement areas. A self-directed assessment framework in assessing CTT students is a tool that allows students to take ownership of their education and monitor their own progress towards reaching intended learning outcomes (Koo & Lee, 2021). It provides a structured approach for self-reflection and self-evaluation of one's performance. According to Klenowski (2020), the self-directed assessment framework can help students identify

their strengths and weaknesses and set goals for improvement. This entails that through the self-directed assessment framework, CTT students can develop an effective strategy for addressing gaps in their learning as they analyse their learning progress.

This study focused on providing a framework that facilitates self-directed assessment in CTT during distance learning through self-directed learning. Self-directed learning is an important component of distance learning because it allows students to learn at their own pace and in the way that is most comfortable for them. This type of learning is more engaging for students as they are able to control their own learning experiences.

In this study there is strong a relationship between assessment, directed assessment, self-directed assessment, rubric, and skills and competencies. The self-directed assessment in distance learning for CTT undergraduate students is likely to promote self-directed learning and assessment which can help students develop important skills such as critical thinking, problem-solving, and decision-making. Rubrics may be used to evaluate how well students have mastered the skills and competencies as they engage in self-directed learning and assessment.

Bastiaens and Kirschner (2004) and Zhu and Tettegah (2019) suggested a five-dimensional scheme for designing an authentic assessment framework: the task, content, competencies, results form, and criteria standards. This five-dimensional scheme highlights the importance of a holistic approach to assessment and designing assessments that measure learning outcomes across multiple dimensions (Zhu & Tettegah, 2019). This, therefore, suggests the authenticity of the framework proposed in this study as the aspects discussed are likely to provide a holistic approach to SDAF.

Methodology

A pragmatic paradigm was utilised which emphasises practicality and usefulness in solving real-world problems (Mertens, 2015; Creswell, 2014). A mixed methods research approach was used in this research, which included both qualitative and quantitative methodologies (Creswell, 2014; Teddlie & Yu, 2007). The research used an exploratory research design wherein qualitative data was collected and analysed first, followed by quantitative data (Creswell, 2014). The qualitative section focused on the data that was used to design the SDAF, and this data was obtained from documents reviewed as well as focus group discussions with lecturers. Quantitative data was

gathered through a Likert scale where CTT students evaluated the effectiveness of the designed framework after pilot testing the tool. Four universities offering CTT at the undergraduate level in Zimbabwe were studied: the University of Bangala, the University of Chipinge, the University of Charter, and the University of Marange. For ethical reasons, the purpose and the nature of the study were explained to participants who freely participated in this study. The data collected was anonymised and de-identified to prevent it from being linked to specific participants. Pseudonyms were used for the universities and participants so that data could not be tracked back to the source. Issues of respect were prioritised for autonomy and they were treated carefully. Participants were allowed to decide on the time convenient for interviews. There was no discrimination as everyone who met the criteria to participate in this study was considered—that is male and female, students, and lecturers. They all provided valuable data on the designing of a useful SDAF.

A sample of four universities, four lecturers, and twenty students were purposively selected for the study. Purposive sampling is a non-probability sampling technique used in research where participants and research sites are selected based on their unique characteristics or specific criteria (Babbie, 2016; Creswell, 2013). This allowed the researchers to select only lecturers who teach CTT, CTT students, and the universities that offer CTT at the undergraduate degree level. Researchers selected participants with the knowledge and expertise to provide the most informative data on the SDAF.

A document review was conducted to determine the competencies and skills and to extract the activities that promote self-directed assessment from the undergraduate CTT curriculum during distance learning. To confirm the existence of skills and competencies and derive the activities that promoted self-directed assessment, a focus group interview with lecturers was conducted through Google Meetings. Ultimately a rubric was designed to define the criteria upon which these skills and competencies would be measured. A focus group interview with lecturers was used to confirm the feasibility of the framework. A pilot testing of the framework was conducted to establish the viability of the SDAF in CTT undergraduate students in their field where practical skills are difficult to assess during distance learning. This trial was conducted to assess the viability of this new assessment method for a practically oriented program before rolling it to a larger scale. This was augmented by a Likert scale administered to students to ascertain the validity and effectiveness of the SDAF. A content analysis method was used whereby content mainly from the instructional documents was

used in designing the SDAF. The qualitative analysis component was prioritised, while quantitative analysis was incorporated to increase the understanding of the underlying phenomenon (Onwuegbuzie & Combs, 2010;2014).

Data presentation and analysis

This section presented and analysed data that informed the designing of the SDAF. The designing of the framework was informed by the Backward Design Framework (Bartlett, Stahl & Charnitski, 2012). This involves starting with the end working backwards to develop the appropriate assessment, activities, and instructional strategies (Grant & Wiggins, 2013). This ensures that the necessary steps are identified and followed to achieve the desired result. The main design principles are the intended learning outcome. In this study, the framework explicated the skills and competencies that the students should acquire, and these were compiled from the module outlines used by the four universities. The content that the student should cover was also included, and since the assessments will be conducted during distance learning the students will decide how they will organize their content and when to practice. A rubric was provided in the SDAF because it sets the expectations and provides clarity to students regarding the assessment process. Additionally, rubrics can be used to provide feedback to students in a constructive and specific way, allowing them to improve their skills. In this context, the rubric included clear descriptions of each level of performance and grading for each criterion so that as students self-assess, they can demonstrate their strengths and weaknesses, and suggest areas of improvement.

Documents used as the source of information pertaining to the SDAF were presented in a tabular format and analysed. Data from focus group interviews were presented next followed by pilot-tested data from the try-out of the instrument by the students who participated in this study. The most critical skills, competencies, and activities reflected in the curriculum documents are presented in Table 1. The policy documents in the form of module/course outlines from the four universities under study were scrutinised, and the skills, competencies, and activities were documented as shown below.

Table 1: Document review to determine the skills, competencies, and activities of CTT undergraduate students			
Name of the policy document	**Skills**	**Competencies**	**Activities**
Module outlines	**Garment designing**	– Understanding fashion trends and styles – Ability to draw sketches and technical drawings – Understand different types of fabrics and their properties – Ability to use designing software such as CAD, Adobe Illustrator, and Photoshop	– making a collection of designs – sketching back and front views – dressing the frameworks – selection of suitable accessories – painting – coming up with work drawings
	Pattern making	– Ability to create patterns based on sketches or technical drawings – Understanding of grading rules – Understanding of how fabric properties affect pattern development – Proficiency in pattern-making software such as CAD, Optitex, Gerber, or Lectra	– design interpretation – selecting appropriate blocks – tracing out – drafting patterns – dart manipulation – introducing style features – tracing out net patterns and reshaping – adding hem and seam allowance – adding pattern markings – adding pattern information to the final patterns – preparing a specification sheet

Name of the policy document	Skills	Competencies	Activities
Module outlines	**Marker making**	– Ability to create and optimize markers for efficient fabric utilization – Ability to make calculations according to size range, colour, and quantity	– determining fabric width and length – placing pattern pieces on the correct grain – placing all pattern pieces onto the marker – being economical – tracing out all pattern pieces – labelling all pattern pieces – preparing a marker for the main fabric, contrasts, lining and vilene – calculating fabric rating – calculating marker efficiency
	Laying and cutting	– Knowledge of different types of fabric and their cutting requirements – Knowledge of cutting equipment and tools such as cutting machines, scissors, and rotary cutters. – Ability to read cutting orders and specifications – Proficiency in spreading, laying, and cutting techniques	– inspecting fabric for flaws – pressing fabric if creased – spreading fabric according to the marker plan – placing marker onto the fabric – cutting out neatly – transferring all pattern markings – fusing appropriately

Name of the policy document	Skills	Competencies	Activities
Module outlines	**Garment Construction**	– Understanding garment construction techniques and machinery – Ability to read and interpret sewing instructions, technical drawings, and patterns – Proficiency in different garment construction techniques such as sewing, pressing, and finishing – Knowledge of different types of seams and finishes for different types of fabrics and garment styles – Understanding of fit and pattern adjustments and ability to implement them during construction – Attention to all detail and ability to work quickly and efficiently – Proficiency in using industrial sewing machines, sergers, and pressing equipment	– preparing all garment sections before the main assemblage – working all processes in sequence – pressing after every process – selecting appropriate seams – maintain correct seam and hem widths – spacing and positions of methods of disposal of fullness, and should be correct – stitching straight – maintaining correct sizes of all stitched sections according to the specification sheet – fastening on and off stitches – securing fastenings – attaching correct labels

Name of the policy document	Skills	Competencies	Activities
Module outlines	**Quality checking**	– Knowledge of quality standards and specifications for different types of garments – Ability to perform garment inspection and identify quality issues such as stitching defects, fabric flaws, and sizing issues – Understanding of quality control processes and procedures – Ability to perform quality checks at different stages of the production processes – Proficiency in using quality control tools such as measuring instruments and testing equipment – Attention to detail and accuracy	– avoiding dirt on the garments – pressing professionally, steam pressing where necessary – pressing all processes flat, facing the correct direction – cleaning the garment – checking that all processes are correctly worked – checking machine tension and thread used
	Costing	– Understanding cost components such as materials, labour, and overheads – Ability to calculate production costs and develop cost estimates for different garment styles – Knowledge of pricing strategies and market pricing trends – Understanding of cost optimization techniques such as material substitution and labour efficiency – Proficiency in using costing software such as Tukatech, FastTeact, or GSD	– calculating the number of materials used – calculating the cost of the materials – establishing production time – determining minute factor – calculating labour cost – determining percentage overheads – calculating production cost – calculating cost price – determining percentage profit – calculating the selling price

Name of the policy document	Skills	Competencies	Activities
Module outlines	**Purchasing**	– Understanding sourcing and procurement processes – Knowledge of fabric and trim sourcing and selection – Ability to negotiate prices and terms with suppliers – Understanding of supply chain management, inventory control, and logistics – Proficiency in using purchasing software and tools such as SAP or Ariba	– shopping around – comparing prices – establishing reliable suppliers – considering the quality of raw materials
	Merchandising	– Understanding fashion marketing and promotion strategies – Knowledge of retail buying and merchandising processes – Ability to develop product assortments and collections – Understanding market and consumer trends – Proficiency in using merchandising software and tools such as JDA, Oracle, or BlueCherry	– selling the product – justifying the design, colour, fabric, trimming, price – using appropriate forms of advertising the product

Name of the policy document	Skills	Competencies	Activities
Module outlines	**Machine knowledge and maintenance**	– Knowledge of different types of garment production machinery, such as sewing machines, cutters, and pressers – Ability to perform routine maintenance and troubleshooting of machinery – Understanding machinery safety and operations procedures – Proficiency in using machine maintenance software and tools such as CMMS or FT Maintenance – Knowledge of machine upgrades and modernisation techniques such as Industry 4.0 integration	– selecting appropriate machinery – threading correctly – winding bobbin correctly – inserting bobbin correctly – replacing needle – adjusting tension – adjusting stitch length – tightening loose parts – oiling the machine – routine cleaning

Source: CTT module outlines for practical and project work from the four universities (2021; 2022; 2023).

The documents used by the four universities contain similar skills, competencies, and activities as identified by the researchers through document reviews. However, the module/course narrations and codes differed in all universities (A module is a self-contained unit of study that is typically part of a larger course program of a study. It is mainly used in higher education to provide students with a flexible and modular approach to learning, Bigg & Tang, 2011). Nevertheless, lecturers were engaged in a focus group interview to confirm the identified skills, competencies, and activities derived through desk study. The lecturers made it clear that although the narrations differ, the skills, competencies, and activities were similar. The lecturer from the University of Bangala said:

In practical tasks, students always start with designing followed by pattern making, and

garment construction until the final process of selling the product.

A lecturer from the University of Chipinge added that students need to be able to translate the designs into patterns they use for cutting, hence design interpretation is very important. Skills entrenched in their curriculum are acquired developmentally as they progress from one module to another. The lecturer said:

> *Even if these modules are interrelated we made sure in designing the curriculum, students start from the basics going upwards. In their various modules, they should be able to design, make patterns, cut and assemble the garments using appropriate machinery. Students should produce good quality products, cost them and sell them.*

In addition, the University of Charter lecturer said:

> *There is also a need for students to operate different types of machinery for improved workmanship. I concur with my colleague that students need to do costing but before doing that, they need knowledge about the raw materials; where they get them and how much.*

The University of Marange lecturer indicated that students need to learn how to operate different machinery and perform minor servicing in concurrence with other lecturers.

Regarding activities that lead to the acquisition of these skills and competencies, all four lecturers agreed, although, for some, these were too detailed while for others, too brief, all pointing to the same outcomes. For example, the lecturer from the University of Marange said:

> *In designing students make a collection, make frameworks and work drawings which they use in pattern making where they include every stage of pattern development. Students should make a marker to determine the amount of fabric required for the garment and for costing. They cut and sew ensuring all processes are worked perfectly well and in sequence. Cotton cleaning is done, pressing, packaging and merchandising. Students do a lot and there is a lot of diversity in terms of the nature and quality of work produced since these are practical tasks but otherwise, all activities should enable students to acquire all the competencies at the end of the day.*

The lecturer from Chipinge University added:

> *The module narration itself reflects the competencies, content and activities while assignments and projects determine how the activities and content can be organised.*

It was also indicated that these tasks are performed repeatedly, especially in project work where tasks are derived from a combination of modules. The lecturer from the

University of Charter said it is the nature of activities conducted by students that make them different from the rest. She said:

> *Due to the variety of practical activities, students often choose different products with varying methods and levels of difficulty when completing their projects. As a result, the techniques and processes needed to complete those numerous tasks will reveal the level of ability each student possesses.*

It was emphasised throughout the focus group interview that students need to be guided in terms of activities so that they acquire the necessary skills and competencies for each module. Abraham and Reiss (2015) concur that for assessment to be effective, it is necessary to know the tasks to be performed, the procedure, and the competencies to be realised. Therefore, students can prepare themselves accordingly. They will know what they need to do and how to do it. This clarity helps them focus their efforts and avoid confusion or uncertainty. They can review relevant materials, practice skills or procedures, and ensure they have the necessary knowledge and skills to perform well in the assessment. They can better understand how well they did it and how they can improve. As a result, students can generally perform better and produce better learning outcomes. As a result, they will be able to assess themselves through the right kind of assessment tool.

The analysis of the module outlines and the interviews with the lecturers presented adequate information to design an SDAF for CTT undergraduate students for distance learning during COVID-19. Presented in the next section is the proposed SDAF.

Self-directed assessment framework

The framework was developed after carefully analysing and extracting the skills, competencies and activities from the documents confirmed by the focus group interviews with lecturers. The constructs from the conceptual framework also assisted in developing this framework.

Table 2: Clothing and Textiles Technology self-directed assessment framework for practical activities

Skills	Competencies	Activities	Rating Scale					AVG	Comments
			1	2	3	4	5		
Garment designing	– Strong understanding of fashion trends and styles – Ability to create sketches, technical drawings, and garments specifications – Knowledge of different types of fabrics, their properties, and how they drape and move on the body – Proficiency in design software such as Adobe Illustrator and Photoshop – Knowledge of garment construction techniques and fitting – Good communication and representation skills to convey design concepts.	**Guidelines** *Design collection*– theme, design suitability, creativity, originality, the balance of features, use of media, drawing skills *Framework drawings*– suitability, proportion, background, accessories, dressing skills, painting skills, creativity *Work drawings*- back and front views, style lines, design detail, originality, proportion, balance – Fabric types and properties – Designing using software – Effective communication skills **Self-assessment** – Design collection – Framework drawings – Work drawing							

Skills	Competencies	Activities	Rating Scale					AVG	Comments
			1	2	3	4	5		
Pattern Making	– Ability to create patterns based on sketches or technical drawings – Understanding of grading and scaling patterns for different sizes – Understanding of fabric properties and how they affect pattern development – Proficiency in pattern-making software such as Gerber and Lectra – Ability to perform pattern adjustments based on fit and design changes – Ability to use CAD software for creating patterns – Familiarity with cutting tools and equipment – Understanding of quality control and fabric inspection	**Guidelines** *Pattern draft*– choice of blocks, tracing out accurately *Pattern development*– dart manipulation, the introduction of style details *Final patterns*– seam allowances, hem allowances, pattern markings, pattern size, number of pattern pieces **Self-assessment** – Pattern draft – Pattern development – Final patterns							

Skills	Competencies	Activities	Rating Scale					AVG	Comments
			1	2	3	4	5		
Marker making	– Ability to create and optimize markers for efficient fabric utilisation – Ability to make calculations according to size range, colour, and quantity	**Guidelines** *Marker*– fabric width, number of pattern pieces, correct grain, economical *Calculations*– fabric rating, marker efficiency **Self–assessment** – Marker – calculations							
Laying and cutting	– Understanding different types of fabric and their cutting requirements – Knowledge of cutting equipment and tools such as cutting machines, scissors, and rotary cutters. – Ability to read cutting orders and specifications – Proficiency in spreading, laying, and cutting techniques	**Guidelines** *Laying out*– layout diagram, fabric design, observing pattern markings *Cutting out*– straight smooth edges *Transferring pattern markings*– transfer all markings *Fusing*– correct temperatures, fuse correct pieces **Self–assessment** – Laying out – Cutting out – Transferring pattern markings – Fusing							

Skills	Competencies	Activities	Rating Scale					AVG	Comments
			1	2	3	4	5		
Garment Construction	– Understanding garment construction techniques and machinery – Ability to read and interpret sewing instructions, technical drawings, and patterns – Proficiency in different garment construction techniques such as sewing, pressing, and finishing – Knowledge of different types of seams and finishes for different types of fabrics and garment styles – Understanding fit and pattern adjustments and the ability to implement them during construction – Attention to all detail and ability to work quickly and efficiently – Proficiency in using industrial sewing machines, sergers, and pressing equipment	**Guidelines** Preparations– collar, pockets, waistband, facings, binding, cuffs by applying interfacing, folding and pressing, blocking, working embroidery and other decorative processes, and trimming and notching where necessary. **Main processes**– correct width, spacing, and position of darts, gathers, pleats, tucks, easing; choice of seams, correct width, neatening; choice of neckline, armhole and waistline finishes; method of attachment; correct choice and position of pockets; method of attaching/ inserting; suitable opening and fastenings, methods of working; hem type, evenness, securing; final pressing **Self–assessment** – Fabric knowledge – Pattern adjustment – Stitch techniques – Sewing processes – Finishing processes – Interpretation of technical drawings – Selection of machinery							

Skills	Competencies	Activities	Rating Scale					AVG	Comments
			1	2	3	4	5		
Quality checking	– Knowledge of quality standards and specifications for different types of garments – Ability to perform garment inspection and identify quality issues such as stitching defects, fabric flaws, and sizing issues – Understanding quality control processes and procedures – Ability to perform quality checks at different stages of the production processes – Proficiency in using quality control tools such as measuring instruments and testing equipment – Attention to detail and accuracy	**Guidelines** *Cleanliness*– no loose threads, no watermarks, no dirt *Pressing*– no over pressing/ scotch marks/glazing, processes pressed flat *Workmanship*– seams, darts, and pleats face the correct direction; hem and seam widths, evenness, garment size, and correct dimensions *Labelling*– size tags and care labels correctly placed, correct information **Self–assessment** – Total quality management							

Skills	Competencies	Activities	Rating Scale					AVG	Comments
			1	2	3	4	5		
Costing	– Understanding cost components such as materials, labour, and overheads – Ability to calculate production costs and develop cost estimates for different garment styles – Knowledge of pricing strategies and market pricing trends – Understanding cost optimization techniques such as material substitution and labour efficiency – Proficiency in using costing software such as Tukatech or FastTeact	**Guidelines** *Bill of materials*– item, quantity, unit cost, sample cost, total material cost *Labour cost*– production/ standard time x minute factor *Production cost*– material cost + labour cost *Cost price*– production cost + overheads *Selling price*– cost price + profit **Self-assessment** – Costing – Calculating efficiency – Use of relevant softwares							

Skills	Competencies	Activities	Rating Scale					AVG	Comments
			1	2	3	4	5		
Purchasing	– Understanding sourcing and procurement processes – Knowledge of fabric and trim sourcing and selection – Ability to research and identify sources of materials – Ability to negotiate prices and terms with suppliers – Understanding of supply chain management, inventory control, and logistics – Proficiency in using purchasing software and tools such as SAP	**Guidelines** *Raw materials*– suitable fabrics and trims, appropriate notions *Suppliers*– reliable sources, best prices **Self-assessment** – Procurement procedures – Negotiation techniques – Supply chain management – Inventory control – Choice of software							
Merchandising	– Understanding fashion marketing and promotion strategies – Knowledge of retail buying and merchandising processes – Ability to develop product assortments and collections – Understanding of market and consumer trends – Proficiency in using merchandising software and tools such as Oracle	**Guidelines** *Product knowledge*– justification of materials used, colours, design details, pricing, care instructions *Commercial awareness*– merchandising strategies, use of media, target market **Self-assessment** – Product knowledge – Market research – Commercial awareness							

Skills	Competencies	Activities	Rating Scale					AVG	Comments
			1	2	3	4	5		
Machine knowledge and maintenance	– Knowledge of different types of garment production machinery such as sewing machines, cutters, and pressers – Ability to perform routine maintenance and troubleshooting of machinery – Understanding of machinery safety and operations procedures – Proficiency in using machine maintenance software and tools such as CMMS or FT Maintenance – Knowledge of machine upgrades and modernisation techniques such as Industry 4.0 integration	**Guidelines** *Machine knowledge*– choice of machinery, replacing the needle, adjusting tension, adjusting stitch length, winding bobbin, correct threading *Routine servicing*– changing oils, dusting and blowing **Self-assessment** --Machine knowledge --Routine servicing --Safety issues							

KEY: 5=EXCELLENT 4=VERY GOOD 3=AVERAGE 2=BELOW AVERAGE 1=POOR

CORRESPONDING MARK: 5= 80-100% 4= 65-79% 3= 50-64% 2= 35-49 1= 0-34%

The SDAF was sent to all the lecturers who participated in this study for their input. All lecturers expressed contentment about the instrument. They said it would go a long way in moulding the students' learning experiences without the facilitator's presence. For example, a lecturer from Chipinge University had this to say:

This is a well-designed tool as all the skills and competencies were included. The

> *activities are very clear and I am sure all our students will be able to use the tool.*

This framework includes variables expected in a standard framework such as skills and competencies, content, and the rubric. These would help in shaping the students' learning experiences as they will be able to follow the skills and competencies outlined, perform the specified activities, and rate themselves according to the given criteria (Dawson, 2015; Tactenbera, 2021). Charter University Lecturer added that:

> *I went through this framework severally checking against what is in the module outline and I have seen that for my university all components have been included exhaustively. From what l see, the students will not have challenges using it otherwise those who fail are the incompetent ones who would not make it even with direct assessment.*

There was a consensus among all lecturers that this assessment tool would be useful. They all expressed their satisfaction with this tool and commented that the standardization done using all universities would help yield standard outcomes from the CTT curriculum. After the confirmation of the usability of the instrument by the lecturers, the SDAF was sent to the twenty students from the four universities for pilot testing.

A project was administered to the 20 CTT students who participated in this study. Students were required to design a uniform tour guide to be sold at an International Trade Fair. Since self-directed assessment is a process where an individual evaluates their own skills, knowledge, or performance without external guidance, these students worked on this over a month from wherever they were. They were asked to submit the work and the individual ratings after self-assessment. The students worked at their own pace and according to their own schedules. They included the designing component, pattern making, purchasing, garment construction, costing, and merchandising aspects without consulting their lecturers, but rather working with the SDAF. Students were asked to submit their projects as a way to check on what they obtained during their self-directed learning time. Furthermore, a Likert scale was administered to these students to assess the validity and reliability of the SDAF that they had used.

Viability and reliability of the designed self-directed assessment framework

After developing the framework that could be used for self-directed assessment by the CTT students, a pilot test was conducted with the students who participated in

this study to test the usefulness of the SDAF in CTT for distance learning during COVID-19. The students performed the tasks given and assessed themselves using the designed SDAF. A Likert scale was administered by the researchers through the online method to assess the students' experiences during their interaction with the designed SDAF. This was completed by students and sent back to the researchers. Finally, a Cronbach alpha reliability test was conducted to ascertain the reliability of the framework. Table 3 shows the results of the reliability test.

Table 3: Respondents' views on the usability of the self-directed assessment framework

The skills and competencies outlined in the designed SDAF were tested. These included designing, pattern making, marker making, laying and cutting, garment construction, purchasing, costing, quality assurance, and machine knowledge. Twelve variables were used to describe the nature of the assessment framework and these were rated on a 5-point rating scale. These were as follows:

1. The framework is written in a simple and understandable manner
2. I understand the purpose of this framework
3. I understand the rubric in the framework
4. The framework allows me to identify all the skills and competencies that I need to know
5. The skills and competencies are logical and developmental
6. The framework allows me to identify activities that help me in self-directed assessment
7. The guidelines help me execute the plan with minimum errors
8. The framework allows me to identify gaps in my self-assessment
9. I can judge my progress using this framework
10. The framework helps me to improve the development of skills and competencies for practical work and projects
11. The framework is user friendly
12. I always want to use this framework to assess my work.

Table 3: Respondents' views on the usability of the self-directed assessment framework

RESPONDENTS	SKILLS AND COMPETENCIES TESTED												
	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
1	4	4	4	5	5	4	5	5	4	5	4	5	54
2	4	4	5	4	3	5	4	5	5	4	5	4	52
3	5	5	5	5	5	4	5	5	5	5	5	5	59
4	5	5	5	5	5	5	5	5	5	3	5	5	58
5	4	5	3	5	4	5	5	4	5	5	4	4	53
6	5	5	5	5	5	5	5	5	5	5	5	5	60
7	5	5	5	4	5	5	5	5	5	5	5	4	58
8	5	3	5	5	5	4	5	5	4	5	5	5	56
9	5	5	4	5	5	5	4	5	5	5	5	5	58
10	4	5	5	5	4	5	5	5	5	5	4	5	57
11	5	5	5	5	5	5	5	5	5	4	5	5	59
12	5	5	5	3	5	5	5	4	5	5	5	5	57
13	5	5	5	5	5	5	5	5	5	5	5	5	60
14	5	5	4	5	5	5	5	5	5	5	5	5	59
15	4	5	5	5	3	5	3	5	4	5	4	5	53
16	5	4	5	5	5	5	5	5	5	5	5	5	59
17	5	5	5	5	5	5	4	5	5	5	5	5	59
18	3	3	3	5	3	3	3	5	3	3	3	5	42
19	5	5	5	5	5	5	5	5	5	5	5	3	58
20	5	5	5	5	5	5	4	5	5	5	5	5	59
													17,5
	0,34	0,45	0,45	0,27	0,57	0,3	0,46	0,1	0,3	0,4	0,3	0,3	4,31

ALPHA

0,8

The Likert scale results indicated very good to excellent remarks regarding the usability of the SDAF with the majority of the responses in the excellent category. The Cronbach reliability test shows a positive value and a reliability coefficient of 0.8, indicating that the framework is reliable. This implies that the self-directed assessment tool for distance learning in CTT can be reliably used. Students can use the framework successfully with clearly elaborated tasks, competencies, and activities. Shrike and Lavy (2014) posit that lecturers should provide explicit, easy-to-understand guidelines to enable students to assess their performance and progress. Gulikers et al. (2004) aver that the users of the framework should perceive the tasks as those that confront them with activities carried out in professional practice for an authentic assessment, and those that integrate knowledge, skills, and attitudes.

The results from the focus-group interviews with the lecturers, the pilot testing, and the Likert scale authenticated the framework's usefulness. Villarroel, Bloxham,

Bruna, and Herrera-Seda (2018) assert that an authentic assessment tool impacts the quality and depth of learning students achieve and the development of higher-order cognitive skills. It improves autonomy, commitment, motivation for learning, self-regulation capacity, meta-cognition, and self-reflection. Zhu and Tettegah (2019) highlight the importance of a holistic approach to assessment that measures learning outcomes across multiple dimensions. The framework in this study requires students to conduct various tasks and activities that place assessment in a real-world context to reflect the complexity of learning outcomes better. The SDAF can be a viable solution for addressing the unique challenges faced by CTT undergraduate students during the COVID-19 pandemic by providing a supportive and flexible learning environment.

Limitations of the study

The study was affected by COVID-19 restrictions, therefore, focus group interviews were conducted online using Google Meetings. As a result, some sessions were interrupted due to network challenges as well as emergency meetings by some lecturers. The researchers had to reduce interaction time to allow lecturers to conduct their duties smoothly and also to conduct interviews off-peak when the network was a bit stable.

Conclusion

The purpose of the study was to design a self-directed assessment tool that could be adopted by the CTT undergraduate students in distance learning during COVID-19. The inclusion of competencies to outline how the skills should be acquired, and the provision of the guidelines for assessment blended well with the activities such as designing, garment construction, purchasing, marking, costing, and quality management the student had to undertake to ensure that positive learning occurs without any interruption. The SDAF can be a viable solution for addressing the unique challenges faced by CTT undergraduate students during the COVID-19 pandemic. By providing a supportive and flexible learning environment that fosters independence, critical thinking, and collaboration, this framework can help students navigate the complexities of distance learning and achieve academic success.

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Recommendations

Findings revealed that the proposed SDAF for CTT undergraduate students is usable, flexible, provides support, and encourages reflection and feedback. Therefore, the designed framework could be extended to other CTT modules to achieve the desired outcome through distance learning utilising an SDAF. It is also recommended that other subject areas within the university can modify the framework to suit their needs and achieve significant learning among undergraduate students. The framework could also be used for continued teacher professional development activities to capacitate lecturers in assessment procedures in light of the changing environments. Future explorations will help determine the usefulness of a similar framework in theoretical concepts of the CTT curriculum.

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