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Perceptions of Educators on Simultaneous Implementation of Education 5.0 and Modularisation in the Higher Education Sector

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ABSTRACT: The government of Zimbabwe initiated a radical higher education reform programme in 2019, culminating in the simultaneous implementation of Education 5.0 and modularization. This mixed methods study employed concurrent triangulation research design to examine the compatibility of these reforms at Chinhoyi University of Technology by surveying 32 educators from various schools. The majority of educators believed that modularization enabled students to focus on one module at a time, master the content, and utilize limited resources more effectively. Modularization also afforded educators more time for research and non-teaching activities, flexibility in teaching methods, and enhanced student-educator interaction. However, educators disagreed that modularization aligned with Education 5.0, citing concerns that it placed students in a continuous examination mode and failed to facilitate connections between module content to address societal challenges. The study concludes by recommending the realignment of teaching and learning timetables to facilitate content connections, free time for educators, and student participation in innovation and industrialization activities, thereby optimizing the simultaneous implementation of Education 5.0 and modularization.

KEY WORDS: Perceptions, Education 5.0, Modularisation, University lecturers, Simultaneous implementation, Engineering and Natural Sciences.

1. INTRODUCTION

Higher education can be a key driver of national industrialization and national economic growth through engagement in innovative research (Valero & Van Reenen, 2019). The government of Zimbabwe came up with the National Development Strategy (NDS) whose goals dovetailed well with the sustainable development goals of the United Nations. Furthermore, government promulgated Vision 2030, which endeavours to transform the country into an upper middle-income economy by 2030. As part of efforts to achieve these goals, the government mandated higher education institutions to play a key role in producing graduates who are job creators rather than job seekers. Since 2018, the Ministry of Higher and Tertiary Education, Science and Technology Development has transformed the mandate of higher education institutions from the traditional Education 3.0 whose three pillars were teaching, research and community engagement into the Education 5.0 doctrine which encompasses innovation and industrialization as additional tenets (Mpofu-Hamadziripi, Rauch, & Dulle, 2022). Under Education 5.0, students of higher education institutions are supposed to be given more time to engage in practical activities which enable them to interact with the real-world situation, be able to identify and experience challenges faced and also proffer solutions to these challenges. Education 5.0 has been successfully rolled out and is being implemented by all state institutions of higher learning. In their study using the University of Zimbabwe as a case study, Muzira and Bondai (2020) found that educators viewed Education 5.0 as a more useful and beneficial approach than its predecessor, Education 3.0, provided more funding was availed for infrastructural development. Under this model, the aspects of innovation and industrialization are incorporated in all teaching and learning activities including practical and research projects. It is expected that as the students have more time to interact with colleagues and with the working and learning environment, they get more time to think critically and be innovative.

While universities were still perfecting their ways in implementing the new learning model whose teaching and learning content had been aligned to it, a second mode, Modularisation, which was expected to be implemented immediately, was introduced. Now universities have been asked to modularise their learning activities. Modularisation implies that academic content and courses are grouped into singleton and testable subject-related units. Notably, it is aimed at ensuring that the learner acquires skills as opposed to curricular development. For modularization to be effective, the teaching and learning process should be student-centred rather than teacher-centred (Dejene, 2019). Each module concludes with an examination, and once done, the students move to the next

module. In the current set-up, each module is taught everyday over a period of 3.75 weeks after which students will have one day to prepare for the examination that will be written on the second day after completion of learning. In essence, for a given module or subject area, students are expected to learn, interact with subject material and identify potential areas for innovation during these four weeks. This research seeks to determine whether or not the modular instructional process, particularly in the technical disciplines like agriculture, provides adequate time for students to interact with the real world, be able to identify practical challenges and thus be able to innovate.

2. STATEMENT OF THE PROBLEM

There is lack of synchrony between the need for students of institutions of higher learning to innovate and the current modularised instructional process. This is particularly so in practical disciplines such as agricultural and engineering sciences in which students have to spend more time interacting with the real world, identify challenges and then suggest solutions to these challenges. Under the modularised teaching and learning model, the maximum teaching and learning period for any given module is four weeks. Meanwhile, for agricultural sciences, the real-world processes are seasonal and for one to understand these processes there is need to go through a full season. Most subjects in the agricultural sciences have been designed to cover a full agricultural cycle, implying that students can only practically learn certain processes when they are in season. Unfortunately, most students are bound to set aside the learning concepts for the modules that they have successfully completed and focus on what they would be currently covering. It is therefore likely that the currently modularized instructional process may not be suitable for practical disciplines as there is potential for students to have practical experiences of certain activities and therefore deprive them of the opportunity to identify areas for innovative interventions. The purpose of this research was to investigate the perceptions of educators in selected faculties on the effectiveness of the simultaneous implementation of Education 5.0 and Modularisation at Chinhoyi University of Technology in Zimbabwe.

3. RESEARCH OBJECTIVES

The study sought to: -

- Determine the perceptions of educators in the practical sciences regarding the concurrent implementation of Education 5.0 and the modularised instructional process.
- Examine the effect of the current duration for teaching a module on the students' ability to identify challenges and proffer innovative solutions.

4. LITERATURE REVIEW

4.1 From Education 3.0 to Education 5.0

For a long time, the mandate of universities in Zimbabwe has had three pillars, namely, (1) teaching, (2) research and (3) community service (consultancy). This education system is referred to as Education 3.0. It has been realized that this three tier mandate has its own shortcomings, including the fact that there is no linkage between the knowledge generated through teaching and research, and industrialisation. In an effort to bridge this gap, the Ministry of Higher and Tertiary Education, Science and Technology Development (MHTESTD) embarked on a process to transform the education system in Zimbabwe. This was meant to ensure that education in institutions of higher education would result in goods and services that will lead to industrialization and modernization of the country. This need for redefining the role of universities and other institutions of higher education was further justified by the national vision as outlined by His Excellency, the President of the Republic of Zimbabwe, Dr. E. D. Mnangagwa, firstly, in his inauguration speech on 24 November 2017, which he repeated in his second inauguration speech on 26 August 2018 and in the State of the Nation Address (SONA) on 20 September 2018 (MHTEISTD, 2018). In these speeches, the President called upon universities to participate in the industrialization and modernization of Zimbabwe by embarking on a new trajectory based on scientific innovation. In response to this call, the MHTESTD engaged in a process to transform the education system from the old Education 3.0 to one that would enable delivery of industrialization and modernization of society through heritage-based education and technology development. This culminated in the birth of Education 5.0, with two new pillars, namely, innovation and industrialisation. In this new system, education in higher education institutions is now expected to produce graduates who are able to innovate, and ultimately such graduates should be job creators rather than job seekers (Mpofu-Hamadziripi et al., 2022).

4.2 Innovation, industrialization and modularisation

According to the MHTESTD (MHTEISTD, 2018), innovation serves as the bridge between knowledge that is generated during teaching and learning and industrial production. The need for education systems to engage in innovation is justified by the fact that education is a social institution that should serve the needs of society and is thus indispensable for society to survive. It should be noted that education must evolve in order to remain up to date and relevant in order to be able to meet the challenges of society. Theodore Levitt posits that to innovate is to do new things (Serdyukov, 2017). Serdyukov (2017) further explains that innovation

involves looking beyond what is currently obtaining and developing new ideas that enable the job to be done in a new way. In Zimbabwe, the government has funded the establishment of Innovation Hubs where new inventions are incubated before they are implemented and commercialized. The efficiency and effectiveness of innovation in higher education is a product of the invested time and cost (Serdyukov, 2017). It is without doubt that for students in higher education to be innovative, they need adequate time to critically assess the practical environment, identify challenges being faced and therefore suggest solutions. Feeman and Thomas (2005) suggest that some of the success factors for innovation in higher education include the existence of positive support from society and the implementers. Society and implementers will only be able to support the innovations if they have adequate time to engage with the innovators so that they have a sense of belonging with regards to the new ideas. However, there is a dearth of knowledge with regards to the amount of time that is required for the inventors, in the Zimbabwean case being the students, and the environment in order for them to be able to effectively innovate.

In a broad sense, industrialization is the process of transforming the economy from a focus on primary production to a reliance on manufacturing. It is the development of industries in a country. Education 5.0 aims to cause tertiary education to focus on the direct development of industries in the country (MHTEISTD, 2018). The prototypes that are developed and incubated in Innovation Hubs are transferred to industrial parks, which constitute the final stage of the production of goods and services.

A module is a course that, together with other related courses, constitutes an area of specialization. In the modularised instructional process in higher education, the programme of study is divided into small, discrete units (modules) that are standalone and non-sequential. The instructional process is also shortened and intensive. In the current modularised mode of delivery in Zimbabwe's state-funded universities for example, a single module is taught over an intensive and shortened period of 26 consecutive days. Modularisation has been successfully implemented in many parts of the world including, Scotland (Pilz, 2005), Australia, United Kingdom and Ethiopia (Pilz, 2005). One of the advantages of modularization is that it puts students at the centre and both students as well as employers are given the opportunity to identify their needs and these will be the focus of the instructional process (Ali, Ghazi, Khan, Hussain, & Faitma, 2010). It therefore follows that if done properly, modularized instruction can be an effective model to meet student and industry requirements. However, as observed by Ali et al. (2010) among Ethiopian universities, modularisation in certain parts of the world remains below expectation with the teaching and learning process still being largely teacher-centred. As far as this literature review could ascertain, it appears information pertaining to innovation under modular teaching and learning is lacking.

4.3 Coupling of Education 5.0 and Modularisation

As mentioned earlier, Education 5.0 was first implemented in state-funded universities in 2020 in Zimbabwe and this coincided with the outbreak of the COVID-19 pandemic which affected instructional delivery in the education system starting in March 2020. Similar to modularisation, Education 5.0 is regarded as a student-centred concept that points to problem-solving at university level (Siyakwazi & Machingura, 2021). In a study using the University of Zimbabwe as a case study, it was observed that Education 5.0 gives universities an opportunity to work with policymakers in implementing goals such as the SDGs (Togo & Gandidzanwa, 2021). Some successes have been recorded in the implementation of Education 5.0 including the production of products used in fighting the COVID-19 pandemic by most state-funded institutions, the production of electricity transformers by Harare Institute of Technology and the construction of functional innovation hubs at all universities. In the current instructional model at state-funded universities, students are having a 50:50 sharing of the available time between practical activities and theory.

After implementing Education 5.0 in 2020, the government of Zimbabwe also introduced modularised teaching and learning (modularisation) at state-funded universities in 2022. Unlike Education 5.0, modularisation as a policy in MHTESTD is not well documented. In fact, literature on the subject pertaining to how it is being implemented in state-funded institutions is hardly available. What is known, through experience with the institutions, is that modularisation is being implemented simultaneously with Education 5.0. Evidence shows that modularisation in higher education has been a common practice in many parts of the world for more than 30 decades (Crossley, Clarke, Tabi, & Thomas, 1993). However, there seems to be lack of literature regarding the compatibility of Education 5.0 and modularisation.

4.4 Knowledge gaps identifiable from literature

Based on evidence from literature review, it appears there is no documented record of simultaneous implementation of modularisation and Education 5.0 in a single education system. As such, the potential challenges that could be associated with the coupling of the two policies are not fully understood.

5. METHODS

This mixed methods study employed the pragmatism research philosophy's Concurrent triangulation research design. Permission to carry out the research was granted by the university authorities. After piloting the semi-structured questionnaires simple random probability sampling was used to select respondents from educators in the Schools of Agricultural Sciences, Technology,

Engineering Sciences, Natural Sciences and Mathematics, and School of Wildlife Ecology and Conservation at Chinhoyi University of Technology. Data were collected using a semi-structured questionnaire. The data were entered into Excel spread sheet and then analysed using the Statistical Package for Social Science, SPSS (IBM-Corp., 2017) to determine frequency of respondents' opinions. Pearson correlation analysis was done using the Paleontological Statistical (PAST) package (Hammer, Harper, & R., 2001) to investigate the relationship between gender, age, qualification and tenure of employment of the educators and their opinions regarding modularisation and Education 5.0. The relationship was considered to be weak if $r < 0.2$, moderate if $r = 0.2$-0.4 and strong if $r > 0.4$; p values ≤ 0.05 were considered to be statistically significant. Braun and Clarke's (2006) thematic analysis was performed by coding the qualitative responses that were given by the responses when they were asked to write their opinions on posed questions... The qualitative data were, thus, sorted into themes based on repeated patterns that were observed in these responses. Overall, the findings were, discussed in the context of the conditions of the study, existing theories and in comparison with the findings of previous researchers.

6. RESULTS AND DISCUSSION

6.1 Respondents' demographic profile

Twenty-two respondents (68.8%) were males while ten (31.3%) were females. The respondents were drawn from the School of Agricultural Sciences and Technology (56.3%), School of Engineering Sciences and Technology (25.0%), School of Natural Sciences and Mathematics (12.5%) and School of Wildlife Ecology and Conservation (6.3%). These results, which agree with the findings of Muzira and Bondai (2020) in their study at a state university in Zimbabwe, show that there is gender disparity among the educators in the schools of engineering and natural sciences at the university. With regards to age of the respondents, the majority (43.8%) were 36-45 years while only 9.7% were aged between 35-65 years (Figure 1). None of the respondents fell within the ages of less than 25 years and more than 60 years. The World Health Organisation of the United Nations considers people aged 25-44 years to be in the young age group (Dyussenbayev, 2017), and in the present study, this age group constituted 75.7% of respondents. It can therefore be said that the majority of the respondents in this study were young. On the basis of these findings, it can be inferred that CUT has a favourable environment for implementing the recently introduced curricular changes in the form of Education 5.0 and modularisation as young people have been found to be ready to embrace change (Paul & Stegbauer, 2005). In fact, Sebba, Flowers, Griffiths, and Hunt (2009) explained that young people are driven by curiosity and eagerness to engage with the world around them and if they get the necessary support, they can be instrumental in implementing changes.

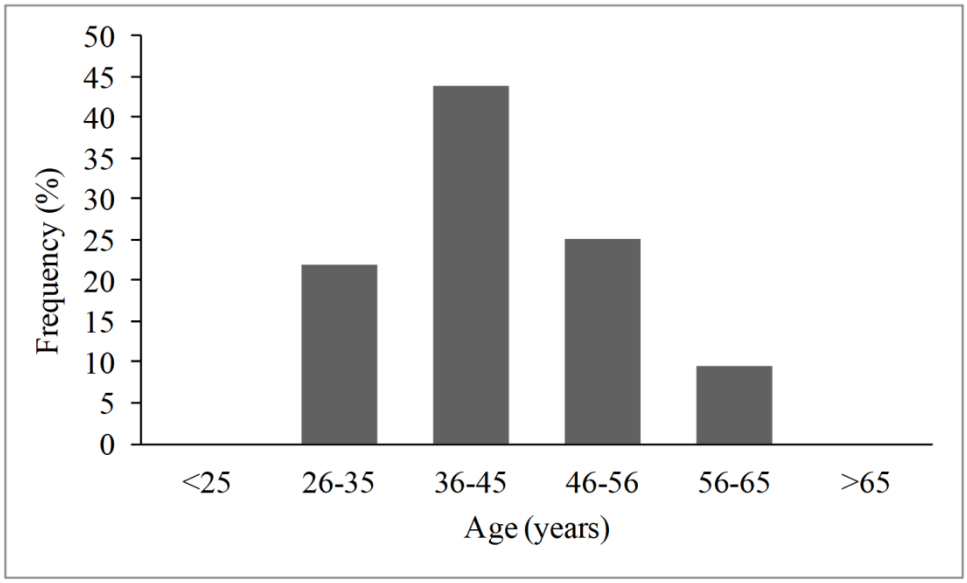

Figure 1: Age distribution of educators in the engineering and natural sciences at Chinhoyi University of Technology

Sixty-one percent of the educators who were interviewed held a master's degree as their highest qualification while 38.7% had PhDs. This means that the university has the critical mass among its academic staff to execute its mandate since the minimum qualification for lectureship at universities in Zimbabwe is a master's degree. Twenty-one respondents (67.7%) were in the lecturer grade, 25.5% in the senior lecturer category and 6.5% were associate professors (Figure 2). In terms of tenure of employment, 21.9% had served in the higher education system for a period of less than two years, 15.6% for 3-5 years, 15.6% for 6-10 years, 32, 3% for 11-15 years while only 3.2% had served for more than 20 years (Figure 6.3). Tenure of employment can be classified into low-tenured for periods up to 5 years, medium-tenured for 6–11 years, and high-tenured for 12 years or more (Gagliardi, Grinza, &

Rycx, 2023). Since more than two thirds of the respondents were medium- (15.6%) to high-tenured (46.9%), it can be suggested that the educators have potential to positively contribute to the performance of the university in terms of achieving its goals. This is because workers gain job-specific expertise through training and on-the-job learning.

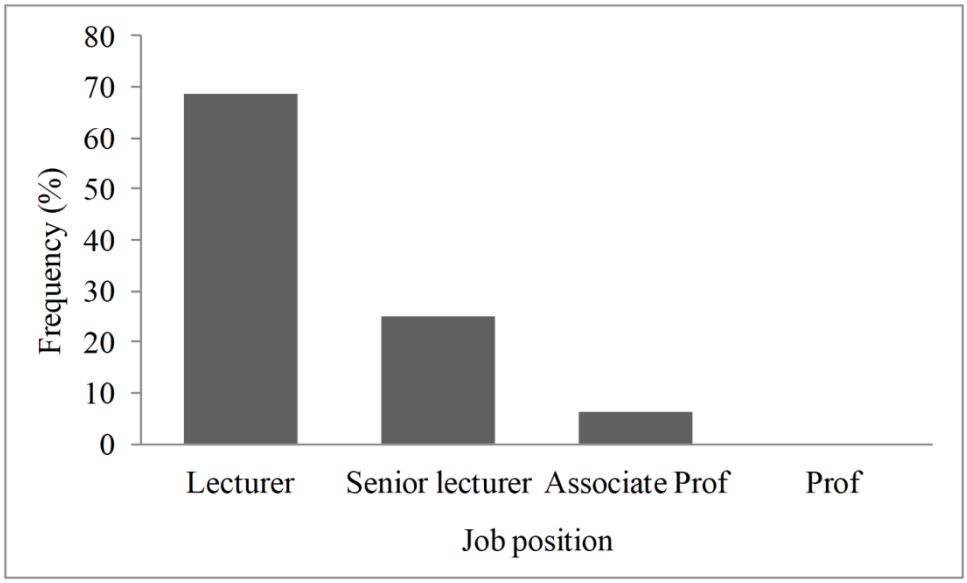

Figure 2: Promotional grade distribution of educators in the engineering and natural sciences at Chinhoyi University of Technology

Figure 6.3: Tenure of employment of educators in the engineering and natural sciences at Chinhoyi University of Technology

6.2 Benefits of modularisation to students

As shown in Table 1, the majority (62.5%, combined for agree and strongly agree) of the respondents agreed that modularisation gives students time to concentrate on one module and master the content. With a mean score of 3.41 (Table 1), it can be said that educators in the schools of engineering and natural sciences at CUT regarded modularisation as being beneficial in terms of giving students more time for the module that will be on offer. This finding agrees with an early study on modularisation by Dochy (1989) who concluded that one of the advantages of this mode of teaching and learning is that it allows self-pacing as students will be concentrating on just one module at a time. This view was also evident in the comments that were expressed by the respondents in the present study. For example, one of them noted that,

From an administrative point of view, students concentrate on a single subject as opposed to several subjects being offered at the same time.

Other respondents suggested that with modularisation, students have more time to engage in practical activities, and also that students have an opportunity to write examinations before they forget what they have learnt. Respondent 22 suggested that,

If properly implemented, modularisation may create a favourable environment for research and innovation to the students.

These assertions by the educators in the present study also agree with those of French (2015) who posits that with modularisation, students are able to 'walk through' the module at their own pace, and revise or alter the learning mode. This will assist them in identifying their weaknesses and strengths, and thus they manage to finish the module with a fuller understanding. This was also observed by Serdyukov, Subbotin, and Serdyukova (2003), who concluded that the modular teaching and learning model helps to unshackle students' minds and focus their attention and energy on a single subject. With modularisation, students are focusing on only one module at a time and they have ample time to interact with the learning materials as well as with their educators, implying that any challenges being faced by the former can be adequately addressed. In fact, modularisation reduces learning material into bite-sized content which can be comfortably handled by students of different intellectual capabilities.

The results of Pearson's correlation analysis are presented in Table 4. Correlation analysis revealed that there was a weak negative correlation between educators' opinion on whether or not modularisation allows students to concentrate on one module and master the content and the educators' gender and tenure of employment ($r = -0.12$ and $r = -0.08$ for gender and tenure of employment, respectively; $p > 0.05$). The relationship was moderate and negative for educators' age ($r = -0.30$, $p > 0.05$), and moderate and positive for educators' academic qualifications. An almost similar trend was observed relating to the question, "*Does modularisation allow students to relate the content learnt in the current module with other previously learnt modules?*" Notably, the relationship between the educators' response to this same question and their age was significant ($p < 0.05$), strong and negative ($r = -0.52$).

Table 1: Perceptions of educators in the schools of engineering and natural sciences at Chinhoyi University of Technology regarding the benefits of modularisation to students.

Indicators	Frequency					Mean score	Std. dev.
	SD	D	U	A	SA		
Modularisation gives students time to concentrate on one module/subject and master the concepts.	12.5	12.5	12.5	46.9	15.6	3.41	1.27
Modularisation allows students to make use of limited resources in their university	9.4	18.8	18.8	34.4	15.6	3.29	1.24
Modularisation allows students to relate the content learnt in the current module with other previously learnt modules	15.6	25.0	21.9	28.1	9.4	2.91	1.25
Modularisation allows students to think critically and proffer solutions to societal problems	9.4	25.0	37.5	18.8	9.4	2.94	1.01
Students perform better under Education 5.0 and modularization than the former teaching and learning model (non-modularised Education 3.0)	21.9	21.9	34.4	9.4	12.5	2.69	1.28

Key: Strongly disagree (SD), disagree (D), Unsure (U), agree (A), strongly agree (SA), and, standard deviation (Std. dev.)

Meanwhile, 51.6% of the educators agreed that modularisation allows students to make use of the limited resources in the university. Based on the mean score of 3.29, it can be interpreted that educators had a positive attitude regarding the ability of modularisation to engender effective utilisation of resources by students. Modularisation relieves pressure on resources as the students will be focusing on a single module, as opposed to the non-modular mode where several modules will be running concurrently. In this regard, there are savings in the costs of general course administration under modularisation as opposed to the non-modular instructional mode. The relationship between the educators' responses and all their demographic characteristics was non-significant ($p > 0.05$), weak and positive (for gender, $r = 0.01$, and tenure of employment, $r = 0.15$), and weak and negative for all other parameters (Table 4).

On the other hand, the results of the present study revealed that a greater number (40.6%, mean score = 2.91) of the educators disagreed with the view that under modular teaching and learning, students are able to relate the content learnt in the current module with other previously learnt modules, than those who agreed with this view (36.5%). Generally, most respondents were of the view that under modularisation students are always in the examination mode and are therefore more concerned with learning to pass examinations than gaining the lifelong skills. These findings agree with some earlier concern raised against modularisation to the effect that the model encourages fragmentation of knowledge and leads to more knowledge rather than deeper knowledge (Wayte & Wayte, 1990). In this regard, one of the respondents commented:

The limited time (three weeks of learning) compels educators to streamline the content from application to recall. Students develop recall skill rather than application, and examination questions trivialise the content. ..... Modularisation results in fragmented learning which contradicts reality of life where different skills are demanded simultaneously."

It therefore follows that in implementing the modular scheme, institutions of higher education need to create an environment that will effectively blend flexibility and progression.

The number of respondents relating to the question whether or not modularisation allowed students to think critically and proffer solutions to societal problems increased in the order agree (28.2%) < disagree (34.5%) < unsure (37.5%), with a mean score of 2.94 (Table 1). From these observations, it can be inferred that educators in the engineering and natural sciences at CUT were inclined towards disagreeing with this notion. The results showed that, except for tenure of employment with a weak positive relationship between educators' responses to the notion that modularisation allows critical thinking and ability to proffer solutions to problems, all other demographic characteristics of the educators had a weak negative relationship to the responses given ($r = -0.08$ to -0.21, $p > 0.05$, Table 4).

Additionally, a large number (43.8%) of educators disagreed with the notion that students perform better under Education 5.0 and modularisation than under non-modularised Education 3.0. It should however be noted that Education 5.0 and modularisation are new policies in the higher education system in Zimbabwe, and the evaluation of these policies by the educators may not be the same if another assessment is to be done when they have run for a longer time. Muzira and Bondai (2020) observed a high number of neutral responses for educator's opinions on the benefits of Education 5.0 and also suggested that educators probably needed more time before they could make accurate judgement on it. This is buttressed by the higher numbers of neutral responses (34.4 and 37.5%) for the fourth and fifth indicators, suggesting that respondents were not yet sure about the aspects being asked (Table 1). In fact, some respondents contended that the two new policies were quite relevant provided they were run in a favourable environment.

Overall, it can be said that the present study revealed that educators at CUT have a generally positive perception towards the first and second indicators and negative perception toward the other three aspects. The relationship between the educators' opinion on the question "*What is your opinion regarding the notion that students perform better under Education 5.0 and modularization than non-modularized Education 3.0*" was consistently weak and non-significant across all the demographic characteristics ($r < 0.2$, $p > 0.05$, Table 4).

6.3 Benefits of modularisation to educators

Overall, the results of this study suggest that respondents in the engineering and natural sciences regard modularisation as being beneficial to the educators (Table 2). The number of respondents who agreed (41.9%) with the view that modularisation allows educators to conduct formative assessment on their students was almost equal to those who disagreed (40.6%) with this view. Again, since modularisation is a newly introduced policy in the higher education system in Zimbabwe, the educators probably require more time in order for them to judge it correctly. Formative assessment is a continuous process throughout the course, usually interspaced with lectures and other teaching and learning sessions. These teaching and learning sessions include various assessment activities, which however may not be implementable in their entirety due to the short period of teaching and learning that is assigned to each module. This could be the reason why a sizeable number of educators who were interviewed in this study thought that formative assessment was not possible under modularisation.

Table 2: Perceptions of educators in the schools of engineering and natural sciences at Chinhoyi University of Technology regarding the benefits of modularisation to educators.

Indicators	Frequency					Mean score	Std. dev.
	SD	D	U	A	SD		
Modularisation gives adequate time for educators to conduct formative assessment	12.5	28.1	15.6	37.5	6.3	2.97	1.20
Modularisation frees time for educators to do other activities within their mandate	3.1	6.3	3.1	53.1	34.4	4.09	0.96
Modularisation creates more time for the educator to interaction with her/his students	12.5	21.9	9.4	46.9	9.4	3.19	1.26
Modularisation allows educators to employ different teaching methods and strategies	6.3	18.8	21.9	37.5	15.6	3.38	1.16

Key: Strongly disagree (SD), disagree (D), Unsure (U), agree (A), strongly agree (SA), and, standard deviation (Std. dev.)

A very high number of educators (87.5, mean score = 4.09) agreed that modularisation frees time for educators to do other activities that are within their mandate. A common expression by most educators was that once one finishes teaching her/his module, one will

have more time to engage in other activities such as research, innovation and consultancy. These expressions are logical considering that in a semester of 16 weeks, the educator will be engaged in teaching only two modules for a maximum period of eight weeks. In addition, more than half (56.3%, mean score = 3.19) of the respondents agreed that modularisation creates more time for the educator to interact with her/his students. Under modularisation, an educator would teach only one module at a time, implying that he/she will be interacting with students he/she is teaching. This creates more contact time for students and educators. In fact, some respondents contended that even slow learners will be able to catch up since they have more time to consult their educator. Similarly, 53.1% of the respondents shared the view that modularisation allows educators to employ different teaching methods and strategies, with a mean score of 3.38. Under modularisation, students have a full day for teaching and learning of a single module for a continuous period of 7.65 weeks. This means that if properly planned, the educator can engage her/his students in different teaching and learning activities including field visits, industrial tours, practical sessions, and group discussions, among others.

6.4 Duration of teaching/learning and ability to innovate and industrialise

Evidence from this study suggests that educators in the engineering and natural sciences are of the view that modularisation is not compatible with the innovation and industrialisation tenets of Education 5.0 (Table 3). The majority (62.5% combined for disagree and strongly disagree, mean score = 2.44) of the respondents disagreed with the notion that duration of teaching and learning under modularisation is adequate for students to master content and identify practical challenges pertaining to the module's area of focus. These results agree with the findings of Serdyukov (2017) who suggests that students need extended periods of exposure to a practical environment in order for them to be able to appreciate the challenges relating to a subject of focus. To support this, most of the educators expressed the view that the learning time under modularisation (3.75 weeks) was not enough for students to interact with the environment and identify problems associated with the module on offer. The low mean score of 2.44 suggests that the educators were of the general view that the duration of teaching and learning of a single module was not adequate for students to identify practical challenges associated with it.

Moreover, 71.9% (mean score = 2.15) also disagreed with the assertion that modularisation gives students adequate time to innovate within the scope of the module on offer. Similarly, 72.9% of the respondents did not agree that students have adequate time to try out their innovations during modularisation. These findings suggest that for a given module, modularisation may not give students an opportunity to think critically and consider the subject content as an ecosystem and therefore be able to see the relatedness of the different modules that make up their programmes of study. If students were able to do this, they would think holistically and come up with innovations within their fields of specialisation. Some educators who were interviewed expressed the view that modularisation results in fragmented learning, implying that students may not view the individual modules as complementary subunits of their programme of study. In fact, French (2015) predicted that one danger of modularisation is the possibility of fragmentation and incoherence of the educational experience, which can potentially weaken learning outcomes. A common expression by the educators was that innovation is a process that requires time and the 3.75-week period allocated to each module was too short for the students to develop a thought process while at the same time trying to understand the rest of the module. The majority (64.6%, mean score = 2.37) of the respondents did not agree with the notion that under modularisation, students have time to engage in the industrialisation tenet of Education 5.0 and that they have more time to work at the industrial parks. In fact, most educators pointed out that most students are concerned with studying to pass examinations and proceed rather than the practical aspects of their studies. It can therefore be inferred that the academic timetable needs to be realigned in order to create time for the students to be engaged in innovation, trying out their innovations and also working at the innovation hub/industrial parks. Some educators commented that,

- *Time is limiting. There are at most 20 working days allocated to each module for lectures, laboratory practicals, field tours, industrial park work sessions, formative assessment and final examinations. This leaves inadequate time for the industrialisation tenet of Education 5.0."*
- *Maybe, innovation should be allocated a slot in the modularisation calendar. If not, there will be no time for it with the current way of modularisation."*

Additionally, only 31.3% of the respondents agreed that modularisation is compatible with innovation and industrialisation while close to half (46.9%) did not agree with this notion. Some of the educators expressed the view that there is no direct relationship between modularisation and research/innovation and industrialisation and that there was always a rush to finish the current module and be ready for the examination. Based on these findings, it can be argued that as currently configured, modularisation gives limited time for students to fully understand concepts and also to identify problem areas in order to come up with innovative solutions. The researchers are of the view that from an administrative point of view, there may be need to factor innovation and industrialisation sessions in the modular teaching and learning timetable in order to orient both educators and students to view Education 5.0 and modularisation as complementary policies that rely on and support each other.

Table 3: Effect of duration of teaching a module on the students' ability to identify challenges and proffer innovative solutions.

Indicators	Frequency					Mean score	Std. dev.
	SD	D	U	A	SD		
Duration of teaching and learning under modularisation is adequate for students to master content and identify practical challenges pertaining to the module's focus area	21.9	40.6	6.3	28.1	3.1	2.44	1.25
Modularisation gives students adequate time to innovate within the scope of the module on offer	21.9	50.0	15.6	12.5	0.0	2.15	0.95
Students have adequate time to try their innovations/ inventions/ prototypes during modularisation	15.6	56.3	18.8	9.4	0.0	2.15	0.82
What is your opinion on the notion that under modular teaching and learning (modularisation) students have adequate time to engage in the industrialisation tenet of Education 5.0 by providing more time for the students to work at the industrial parks?	18.8	43.8	18.8	15.6	3.1	2.37	1.04
What is your opinion pertaining to the view that modularisation is compatible with the two latest tenets (Innovation and Industrialisation) of the mandate of institutions of higher education, Education 5.0?	15.6	31.3	21.9	25.0	6.3	2.70	1.24

Key: Strongly disagree (SD), disagree (D), Unsure (U), agree (A), strongly agree (SA), and, standard deviation (Std. dev.)

Results of Pearson's correlation analysis showed that the relationship between educators' opinion regarding the benefits of modularisation to educators and the respondents' demographic characteristics ranged from moderate negative to moderate positive ($r = -0.33$ to 0.29, $p > 0.05$, Table 4) for most of the questions except for one. For the relationship between educators' age and their opinion on the notion that modularisation frees time for educators to do other activities, there was a significant strong negative relationship ($r = -0.47$, $p < 0.05$). A similar observation was made for the educators' response to the notion that modularisation allows students to engage in industrialisation through working at the industrial parks ($r = -0.36$, $p < 0.05$).

Table 4: Correlation (Pearson r) between opinions of educators in the engineering and natural sciences at Chinhoyi University of Technology and their demographic parameters

	Gender	Age	School	Qualif.	Position	Tenure
Modularisation and students' ability to concentrate on module and master concepts	-0.17	-0.30	-0.026	0.37	0.26	-0.08
Modularisation and students' ability to relate the module content with other modules	-0.06	-0.52**	-0.08	0.11	0.13	-0.26
Modularisation and students' use of limited resources in university	0.10	-0.15	-0.17	-0.04	-0.08	0.15
Modularisation and students' ability to think critically and proffer solutions to problems	-0.15	-0.211	-0.08	-0.14	-0.11	0.06
Students' performance under Education 5.0 and modularization versus non-modular Education 3.0	-0.05	-0.22	0.02	0.24	0.24	0.03
Modularisation gives adequate time for educators to conduct formative assessment of their students	0.13	-0.11	0.05	-0.03	-0.16	0.13
Modularisation frees time for educators to do other activities within their mandate	0.29	-0.47**	-0.11	-0.08	-0.23	-0.03
Modularisation creates more time for the educator to interact with her/his students	0.28	-0.24	-0.33	-0.07	-0.14	0.13
Modularisation allows educators to employ different teaching methods and strategies	0.01	-0.30	-0.19	-0.03	-0.07	0.12

Adequacy of teaching and learning duration under modularisation and students' ability to master content and identify practical challenges	0.22	-0.04	-0.17	0.05	0.17	0.09
Adequate time under modularisation for students to be able to innovate	0.16	-0.28	-0.08	-0.23	-0.30	0.01
Adequate time under modularisation for students to try their innovations	-0.10	-0.19	-0.03	-0.21	-0.17	0.12
Adequacy of time under modularisation for students to engage in industrialisation through working at the industrial parks	-0.00	-0.36*	0.03	-0.11	-0.34	-0.20
Compatibility of modularisation with Innovation and Industrialisation under Education 5.0	0.09	-0.13	-0.04	-0.06	-0.09	-0.08

Tenure of employment (Tenure); Highest qualification (qualify.); Promotional grade (Position); *Significant at $P < 0.05$; **Significant at $P < 0.01$

6.5 Themes emerging from educators' expressions

When responses to self-administered interviews were recorded and sorted based on repeated patterns, three main themes were deduced. Firstly, the educators felts that the students were always in the examination mode and there was a tendency for them to study for the sake of passing and proceeding rather than gaining skills. One educator expressed the view that there was need to increase the time between module sessions. Another educator suggested that,

"Having examinations four times a semester psychologically affects students since they experience examination hangover several times. More so, students who fail a module may be affected when learning the subsequent module."

Secondly, one repeated expression was that there was inadequate time for students to be engaged in both innovation and industrialisation, and that the learning timetable was so packed that it does not allow for other activities that are relevant for the advancement of Education 5.0 including educational trips, practicals, industrial visits, working at the industrial park and development of prototypes. During any teaching and learning session, students are busy with module-specific activities such as assignments, tests, practicals and then preparation for end of module examinations. However, an important suggestion was that innovation should be demonstrated in the capstone final year projects where the students should apply the knowledge gained across the difference modules during the course of their studies. It therefore follows that there is need to emphasise on innovation and industrialisation aspects in the students' final year research projects.

Lastly, educators expressed the view that coupling of modularisation and Education 5.0 was a positive development in the transformation of the higher education system in Zimbabwe but there was need for supporting it with the provision of resources. These include financial resources to fund trips for experiential learning as well as construction and equipping of laboratories. It was pointed out that if all the classes within a single department are to do practicals every day, then there was need for more facilities in order for this to be made possible.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

Based on the findings of this study, it can be concluded that:

- With respect to the demographic profile, the educators were dominated by males who made up 69% with females comprising 31%. Almost 75% of the educators in the engineering and natural sciences came from the 25-44 year age bracket, which is regarded as young and ready to embrace changes. Just less than half of them held PhDs and belonged to the senior lecturer grade while the rest held masters' degrees, with most of them belonging to the long-tenured (>5 years) period of employment.
- With respect to the first research question, the educators were of the opinion that modularisation was beneficial to students for two of the five aspects that were asked: (1) modularisation gives students time to concentrate on one module at a time and master the content, and, (2) modularisation allows students to make use of the limited resources in the university. However, it was noted that under modularisation, (1) students are not able to relate the content learnt in the current module with other previously learnt modules, (2) students are not capacitated to think critically and proffer solutions to societal problems, and, (3) students do not perform better than under non-modularised Education 3.0. Meanwhile, modularisation was perceived to be beneficial to the educators especially in terms of freeing time for them to engage in other activities such as research, innovation and community service.
- The study revealed that most of the educators felt that the teaching and learning timetable needed to be reconfigured in order to accommodate innovation and industrialisation, which are key tenets of Education 5.0.

7.2 RECOMMENDATIONS

This section provides a snapshot of the recommendations that can be drawn from the major findings of this study. Precisely, based on the results of this study, the researcher recommends that:

- There is no need to uncouple modularisation and Education 5.0 as the two have potential benefits for both educators and students. However, there is need for improvements in certain areas as shown below.
- The is need to tweak the teaching and learning timetable under modularisation in order to include activities of innovation and industrialisation as the educators felt that in its current format, the timetable does not give time for students to innovate, try their innovations and also spend time at the industrial parks.
- There is need to avail resources including modernising infrastructure such as laboratories and also funds for innovation.
- Further research should be focused on the perceptions of all other stakeholders involved in the implementation of the two new policies including students and administrators.

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