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Exploring the feasibility of the 4IR integration in teacher training: Are we getting slower as we pick up more speed?

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BACKGROUND

- ✓ The role of teachers in any revolution is critical and the 4IR revolution is one such revolution.
- ✓ Teachers are in charge of shaping the minds of the young, a process whose outcomes are long living.
- ✓ In the 21st century the emphasis has been on the adoption of 4IR approaches in teaching and learning.
- ✓ For this to be successful, it has to start at teacher training.
- ✓ The stakes of knowledge possession at higher education in the 4IR era are high, and are an existing phenomenon to student teachers (STs) for effective teaching during teaching practice (TP) (Grossman 2018)
- ✓ Student teachers' knowledge during teaching practice becomes the contested phenomenon in the era of the fourth industrial revolution (4IR) (Mpungose, 2020).

BACKGROUND

- ✓ The starting point in understanding the roles and relevance of 4IR in facilitating teaching and learning practices is to have adequate knowledge of different components of 4IR, using the current categorizations in the literature.
- ✓ According to Rüßmann et al. (2015) there are nine pillars of digital innovation: (1) autonomous robots, (2) simulation, (3) horizontal and vertical system integration, (4) internet of things, (5) cybersecurity, (6) cloud, (7) additive manufacturing, (8) augmented reality, and (9) big data and analytics.
- ✓ There is compelling evidence to suggest that 4IR will disrupt and change the current approach to many operations processes, including presenting an opportunity to improve on how we teach, learn, work, and interact (Rüßmann et al.,2015; Tymon, 2013).
- ✓ While there are many discourses, interpretations, and conceptualizations of what 4IR entails depending on the discipline or sector, people mostly associate 4IR with technology (Xing, 2017; Marwala,2017).
- ✓ A similar angle is assumed in this study, where 4IR is associated with the various forms of technology that may be of essence in education.
- ✓ When fully matured, particularly in the education sector, 4IR innovation can augment human skills through artificial intelligence, data analytics, and algorithm, to reduce time-consuming and complex tasks through modelling and simulation (Oke & Fernandes,2020).

BACKGROUND

- ✓ In developing countries like South Africa, teacher training challenges are usually more severe and they hinder pre-service teachers' knowledge growth (Nkambule & Mukeredzi, 2017).
- ✓ Most of the school contexts in which students conduct their TP becomes an obstacle to students teachers' knowledge growth to meet the needs of recent paradigm shifts (4IR) in education.
- ✓ The South African government is developing curricula for coding and robotics for Grades R to 9.
- ✓ Such development suggests the need for universities to develop curricula that will train and equip pre-service teachers with advanced technological knowledge so that they can be useful; able to implement the newly developed coding and robotics curriculum.
- ✓ The question now hinges on the feasibility of the adaptation towards 4IR informed pedagogy by teacher training institutions.
- ✓ This studies focusses on a case study of one such institution in South Africa.

BACKGROUND

✓ Accordingly, the following research question is formulated:

To what extent is it feasible to integrate 4IR approaches in teacher training in
South Africa?

METHODOLOGY

- ✓ The study followed a qualitative case study approach.
- ✓ Data was collected from a convenient sample of administrators, lecturers and students within a teacher training faculty in an institution in South Africa.
- ✓ 10 students (5 males and 5 females) participated in the study.
- ✓ 5 of the students were 3rd years while the other 5 were 4th years.
- ✓ 5 lecturers participated.
- ✓ 3 administrators also participated in the study.
- ✓ 3 members from the Centre for ICT-Integration (CICTI) department also participated.
- ✓ Data from the students and the lecturers were collected using focus group interviews.
- ✓ Data from the administrators and the members from CICTI were collected using in-depth semi-structured individual interviews.
- ✓ Both the focus group and the in-depth individual interviews lasted approximately 30 minutes via Zoom.

METHODOLOGY

- ✓ The data collection was directed at exploring the participants' views regarding the feasibility of 4IR approaches in teacher training.
- ✓ Permission was sought from the participants to video and audio-record both the individual and the focus group interviews.
- ✓ The interviews were transcribed and the analysis followed Saldaña's content analysis approach (Saldaña, 2009:13) as illustrated in Figure 1 below.

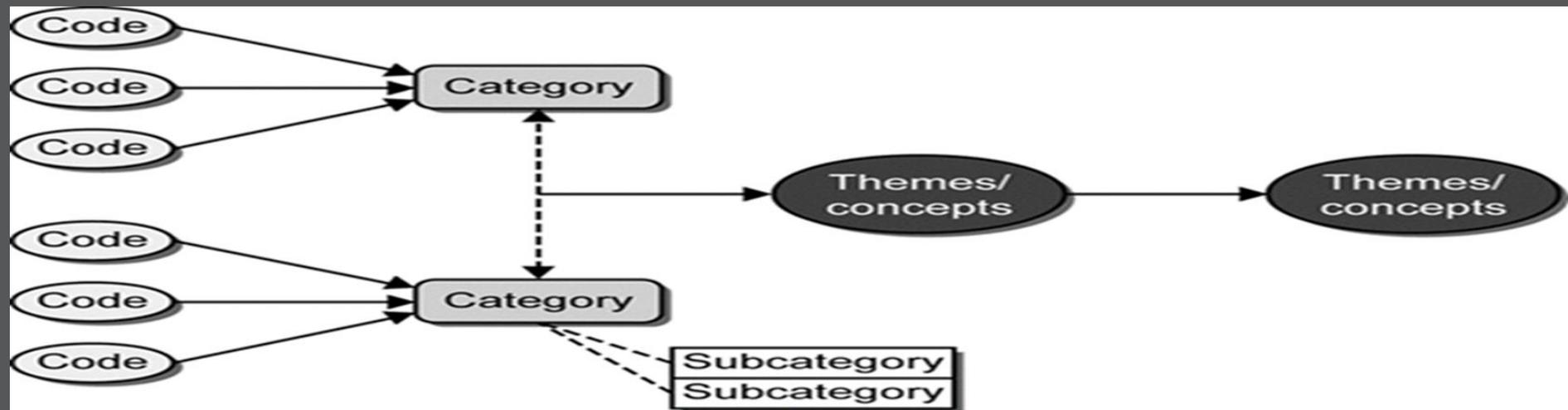


Figure 1: Content Analysis

METHODOLOGY

- ✓ In order to avoid any bias during the analysis of the data, the data from the interviews and the focus groups were read and coded several times.
- ✓ To improve the validity and reliability of the data analysis, five experienced senior researchers were asked to check the accuracy of the analysis process.
- ✓ The researchers suggested some modifications, which were implemented.

METHODOLOGY

- ✓ Several themes emerged from the data analysis, and all of the data was organised under these themes.
- ✓ The themes were then discussed in the form of assertions (Mamutse, 2015).
- ✓ Reporting findings in the form of assertions also allows the researcher to follow a systematic way of answering the research questions under investigation (Smith, 1987).

RESULTS AND DISCUSSION

The findings from the study are discussed thematically as follows.

(i) Lack of resources

- ✓ The general sentiment expressed by almost all of the participants was that the integration of 4IR methodology in teacher training was not going to be an easy task. Various categories of resources were implicated as barriers to the successful implementation of the approach.
- ✓ The administrators mentioned that the integration of the 4IR approaches would require that the budget be multiplied a number of times more than what it is currently is.

The budget needed for us to integrate this approach is going to be very expensive for the institution. We need to upgrade all our systems. Don't forget that fees has fallen. We no longer have access to elaborate funding.

Similar sentiments have been shared by Kayembe and Nel (2019) in their study of the challenges and opportunities for education in South Africa.

RESULTS AND DISCUSSION

- ✓ The administrators also mentioned that apart from the financial resources that are needed, there would also be need for an expanded base of human resources who would be knowledgeable about how to work with the new technologies.

Our current cohort of human resources have proved to struggle a lot every time that we have upgraded even our office software. This includes quite a number of our lecturers. What our we going to do with them. This is going to be very difficult for the institution to manage.

- ✓ The students also had their own input regarding the issue of resources. They raised issues regarding how the majority of them would not afford the required gadgets:

The majority of us are already operating under very tight budgets. Following this new approach would certainly put our training at risk.

The impact of 4IR on skill shortage has also been raised elsewhere (Butler-Adam 2018; Gray (2016).

RESULTS AND DISCUSSION

(ii) Overloaded Curriculum

The lecturers raised issues regarding how overloaded the curricula of teacher training was already.

In my view the students are already overloaded. I am not sure how this new approach is going to be integrated. It is my feeling that they won't manage all the content.

The sentiments of the lecturers were also raised by the students:

We feel overwhelmed by our current load. I think if this approach comes , the only way it would be successful would be perhaps if it reduces our load. In the case that it will increase our load, I believe we won't accept it.

The issues that are raised here have also been raised in a study by Meyer and Gent (2016) where they were analysing the Department of Basic Education's Action Plan, the National Development Plan, and the White Paper on e-Education.

RESULTS AND DISCUSSION

(iii) Discordant contexts between teacher training institutions and schools

Both the lecturers and the students have raised issues pertaining to how the feasibility of the 4IR approaches would be affected by the discordance between the teacher training curricula and the demands of teaching practice context including the school curricula. There were highlights that the 4IR would be a white elephant approach given that the context in the schools is not conducive to its application.

Based on my experiences of the resource situation in schools I am not sure whether there would be a need for use to learn about this approach. Some of the schools lack even chalk to write on the board. Where would we apply these 4IR approaches then (Student 1).

The student participant's views were shared by one of the lecturers.

Based on the resource context in most of the schools especially those in disadvantaged areas, a greater emphasis on the 4IR approaches might be off target to the needs on the ground. The schools lack the basic resources, I think we should rather emphasise on training our teachers to be more skilled in improvising in order to vert the resource shortage. We cant dream that our students will teach robotics in a school that has classrooms without doors an window panes.

The discordance of the two contexts has been implied as a critical aspect in the study by Kayembe and Nel (2019).

RESULTS AND DISCUSSION

(iv) Student Attitude

The lecturers have indicated that one of the critical challenges that the adoption of this approach would face is related to student attitudes. Students have been reported to be disinterested in the rapidly increasing use of technology in their learning.

The attitude of the students is going to play a critical role in this issue. The little of technology that we use currently has been resisted left right and centre by the students. They feel like it makes their learning much more complicated. A typical case is how students have responded to them being asked to submit their tasks on Turnitin.

The students themselves indicated the same.

Some of the technological demands imposed on us are simply meant to make our lives difficult.

The participants from the Centre for ICT-Integration (CICTI) department also highlighted the same issues. They talked about incidences where students show outright dislike of the technology integration.

Generally students have a negative attitude towards technology integration in their learning.

This view has also been raised in the study on innovations in teaching and learning by Oke (2020).

RESULTS AND DISCUSSION

(iv) Lecturer attitudes

The attitudes of the lecturers has also been highlighted as a critical aspect that might negatively affect the feasibility of the approach. Lecturers were found to be stuck in their old ways of doing their job. Participants from the Centre for ICT-Integration (CICTI) department which is responsible for assisting lecturers with technology related issues shared the following.

In my view the lecturers present one of the biggest barriers in the success of the wideout rolling of technology. Some of the lecturers that I have assisted indicated to me that they are not happy with the fast progression into technology-enhanced approaches that tend to disregard their usual ways of operations.

The essence of the attitudes of the lecturers has been highlighted in a study on technology-enhanced pedagogy by Razak, Alakrash and Sahboun (2018).

CONCLUSION

The conclusion is that whilst the adoption of 4IR approaches in teacher training is feasible, it however faces some daunting challenges. The adoption is possible by quite challenging to achieve. The following recommendations are made.

1. The adoption should be done in a well managed gradual process to make sure that it will not be imposed on the institutions. The adoption should further be context based and particular to each institution.
2. There has to be broadly planned training of both students and lecturers on how to work in this new dawn. More focussed training of lecturers on pedagogical approaches should be included..
3. Whilst preparations will be done in teacher training, parallel preparations should be under way in schools to make sure that the they will be ready. Otherwise the learnt skills would be wasted.
4. There is a need to relook at the teacher training curriculum in a very subtle manner so as to see and map out what 4IR approaches could be integrated and how this could be done.