Promoting Student Engagement In Soft Skills Practices With Science News Media In Physics Education- A Case Study Of Chiwala Technical Secondary School In Zambia

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Abstract: This study was a small attempt that was made towards bridging the gap between the skills that employers are looking for in Zambian Secondary School Graduates and the skills that are being developed in Physics Education at Chiwala Technical school in Masaiti district on the Copperbelt province. The study established that the existing skills gap could be bridged by promoting student engagement in soft skills practices with SNM in physics education. Two adapted lesson plans with similar pedagogical experiences based on electromagnetic waves were used. One lesson plan integrated science in the news on health risks associated with non-ionising radiations and was administered in three grade 12 classes with a total of 69 students at Chiwala Technical in Masaiti district. The other lesson plan lacked SNM and was administered in three different classes with a total of 66 students at the same school. The study employed a case study method and purposeful sampling technique with a mixed-method data collection approach and an analysis approach that was largely qualitative with some quantitative descriptive statistics. The study utilized a student open-ended questionnaire, a classroom observation protocol, and assessment rubrics to collect data. A pilot study was conducted in one grade 12 class in order to ascertain the reliability of both the lesson plans and research instruments for this study. The study established that student engagement levels in soft skills practices were higher in classes where SNM was integrated during the physics lessons than those in which it wasn't. It also established that SNM increased students' awareness and interest to participate in soft skills practices during physics education. Finally, it established that student engagement levels in soft skills practices were generally higher during debate and simulation than during lectures irrespective of the classes.

Keywords: Physics education, Science News Media (SNM), Soft skills Practices, Student engagement.

1.0. INTRODUCTION

'Soft skills' are currently among the major requirements for one to qualify for any specified job opportunity in developed countries. However, the trend is also mushrooming in developing countries as can be noticed in most Zambian job adverts. Even though most people do not associate soft skills with science-related subjects, courses and careers, 21st-century employers appreciate employees with strong soft skills regardless of their career (Cimatti 2016). For example, a look at the job announcement by Energy Regulation Board (application deadline: 9th March 2018) shows that required engineers were expected to have sound independent judgment, good communication skills, and interpersonal skills. Emerging evidence shows that there are optimal periods for developing soft skills for example, during the adolescent stage (Hackman & Kautz, 2013; Guerra et al, 2014). That does not mean skills cannot be learned in other periods, only that greater effort might be required. Even though LaFrance (2009) admits that some individuals exhibit soft skills naturally, she also points out that such skills can also be acquired and natured over time. For this reason, LaFrance (2009) advises teachers to help students acquire these skills early. On the contrary, the world bank report (Blom et al, 2017), reveals that soft skills are the skills that most secondary school graduates are lacking in Zambia because student engagement in such skills is not emphasized more especially in science education. This paper describes a case study on an adapted lesson plan designed to promote student engagement in soft skills practices with SNM which was undertaken in physics learning groups at a Zambian Technical Secondary School. The lesson plan focussed on integrating SNM in a physics topic about electromagnetic waves, thereby promoting students' engagement in communication and teamwork skills.

2.0. BACKGROUND AND FRAMEWORK

The Curriculum Review Conceptual Framework in the Zambia Education Curriculum Framework (2013) includes key competencies (soft skills) to be acquired by the learners such as critical thinking, creative thinking, problem-solving, effective communication, relationships with others, participation, teamwork, and innovation. The Framework does not streamline the specific subjects in which these competencies should be offered. This implies that the competencies are expected to be the package of each and every subject offered in Zambian schools. Even though studies show that teaching soft skills in physics education is rare (Renderski & Abdelhadi, 2017), soft skills have become highly valuable in all careers (Passow, 2002; Brown, 2016). As Brown (2016) comments "soft skills are highly important because we all have to communicate within our organizations". King (2012) asserts that mastering soft skills together with technical skills are becoming increasingly cardinal in science-related careers. According to Direito et al (2012), engineering graduates have an abundance of technical knowledge, but most lack the interpersonal and social skills required by Morden job settings. According to the world bank report (Blom et al, 2017), graduates can only be job-

ready if secondary education is inculcating soft skills. The Zambia Survey (2016) asked employers to rate the three most important skills, of which they ranked personal traits or generic employability skills (soft skills) to be the most important. Often employers in Zambia voice concern of the trainability of candidates and the poor practical quality of candidates. A World Bank report by Blom et al (2017) shows that even self-employed workers who encompass about three-quarters of the Zambian population of workers are expected to benefit from socio-emotional (soft) skills. Secondary education must first prepare graduates demonstrating the foundational and socio-emotional (soft) skills to be trainable for specific vocational skills later in life. However, secondary education in Zambia produces too many graduates who end up unemployed or economically inactive. A World Bank report by Blom et al (2017) shows that there were 302,000 (19%) of young secondary school graduates who were unemployed in Zambia. Labour market data suggests that it takes 10 to 15 years for youth to transition to employment after secondary education in Zambia, Botswana, and Lesotho. Also, the same data shows that approximately 10 % of these youth remain unemployed (International Labour Office, 2015). A key reason for this problem, as articulated by employers is that the form of secondary education in Zambia do not sufficiently prepare graduates with the 21st-century skills (soft skills) and vocational skills demanded in a 21st-century economy as is indicated by the World Bank Report (Blom et al, 2017). The world bank report shows that one of the four root problems is the process of instruction in most Zambian secondary school classrooms. The general situation according to the report is that: Classroom instructional activities are not student-engaging for both academic success and life-long skills development (Blom et al, 2017). This report agrees with the findings of the study entitled "Evaluation of Secondary Education in Botswana, Lesotho, and Zambia- The Alignment of Curriculum, Assessment, and Instruction with 21st Century Skills" (Goodman & Satterfield, 2017). The findings show that classroom observations conducted under this study in Zambia reveal the persistence of the practice of the traditional teacher-centred, knowledge-passing-oriented instructional methods in classroom teaching. The findings further reveal that during direct instruction, the learners track the teacher, raise hands to answer questions, take notes and listen. Student engagement in instructional activities for teamwork, collaboration, and active learning are generally absent. Learners are generally seated in rows, and not in heterogeneous groups to facilitate collaboration and communication. Teachers tend to give answers to learners' questions instead of pushing them further with guiding questions to foster critical thinking and problem-solving skills. The situation is worse with grade 12 students as physics teachers tend to rush in order to complete the syllabus, hence putting much emphasis on physics content and almost entirely neglecting the aspect of soft skills. There is a great need to employ pedagogical tools that can stimulate learners to engage actively in specific and appropriate experiences for soft skills practices in physics education. In this case study, integrating SNM in physics education was chosen to be that pedagogical tool. Internationally, there is little research on qualitative impacts of using media reports on learners in science education (Kachan et al., 2006; Jarman & McClunne, 2007). There was no specific study found on the role of SNM in promoting student engagement in soft skills practices in physics education in Zambian secondary schools. However, some studies show that when students are exposed to SNM, they easily relate what they learn to real-world issues and hence develop a keen interest in the topic at hand which is usually exhibited through open discussions and debates (Jarman & McClunne, 2010). For instance, research by Christensen (2011) reveals that young people between the ages of 18 and 26 were able to provide their own strong arguments for the issue of health risks associated with mobile phones presented through news media. SNM fosters active engagement of students as it raises an individual's interest and enthusiasm for school, which impacts their academic and behaviour (Gallup, 2013). Various research studies have linked positive student engagement to gain in skills for success in post-secondary programs and future careers (Skinner et al., 2008; Fredricks et al., 2004; O' Farrell & Morrison, 2003; Stout & Christensen, 2009; Wang & Eccles, 2012a, 2012b).

3.0. CONTEXT OF RESEARCH-Physics Lesson on electromagnetic waves, integrating SNM clips

According to Jarman and McClunne (2007), SNM, when used appropriately in the class "illustrates the 'relevance' of science, fosters students' engagement with science, supports learning in science, supports learning through science, encourages lifelong learning, promotes scientific literacy." The few recorded studies that have been done on the integration of science news reports in science lessons have focussed on promoting scientific literacy, supporting learning in science, illustrating relevance of science and fostering students' engagement with science (Heckler, 2015; Kechan et al., 2005 and 2006; Jarman & McClunne., 2001; Osborne & Collins, 2001; Halkia & Mantzouridis, 2005; Ratcliffe & Grace, 2003). However, Osborne and Collins (2001) have stated that science in the news provides occasions for discussion and space for students to express their personal points of view. Here, practices such as 'discussion' and 'expressing one's personal point of view' are evidence of students' engagement in soft skills practices. This gives a glimpse that integrating science in the news in science lessons might promote student engagement in soft skills practices. This was the basis for the conceptual framework of this study. In fact, this falls under an area which has not been stressed yet in studies on using science in the news in science classes, which is, using SNM to support learning through science. Learning through science refers to the concept that science can be used as a context to promote literacy (reading, writing and listening) and development of student' skills among them are soft skills (Jenkins, 2004; Ratcliffe & Grace, 2003). Another area of SNM use in science lessons which is in line with soft skill development in students is 'encouraging lifelong learning'. According to Jarman and McClunne (2007), this implies preparing students for learning more about science whenever throughout life. Fink (2013) calls this 'Learning How to Keep on Learning'. He further exemplifies that this is perhaps the most important skill in the 21st century. Jarman and McClunne (2007), also admit that science in the news catches students' interest and imagination by providing them with socio-scientific issues, thus prompting discussion and debate. The research employed a Case Study format as a framework for collection and analysis of data (Belova & Eilks 2015; Yin 2003). The case study

type chosen was multiple cases with embedded multiple units. Figure I. shows the research design.

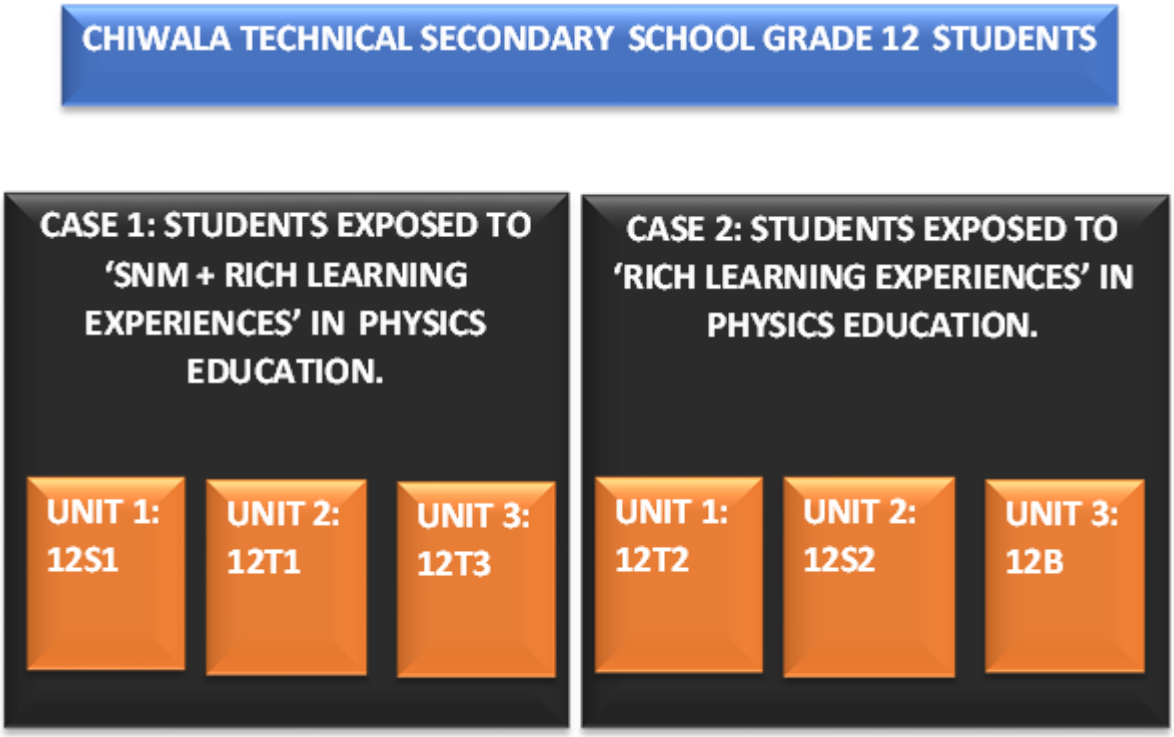


Figure I. Multiple case study with multiple embedded units

The study opted to use this design because the researcher intended to reflect on contextual situations in which student engagement in soft skills practices took place (Yin, 2003; Stake, 2003). A case study is an appropriate choice of research method for studying the changing process such as the stimulation of student engagement in soft skills practices (Gay, Mills & Airasian, 2009). The cases for this study were intact grade 12 classes at Chiwala Technical Secondary School in Masaiti District, Copperbelt Province, Zambia. These classes were selected as cases because of the vast experience of the students with teaching methods which do not promote student engagement in soft skills practices, and hence could easily tell the impact of integrating SNM with rich learning experiences in physics lessons. The other reason is that grade 12 students are the ones who are highly neglected when it comes to teaching methods involving student engagement in soft skills practices at Chiwala Technical. Teachers tend to concentrate much on physics content, as they are in a hurry to complete the syllabus. Two lesson plans on Electromagnetic waves were used. The lesson plans were designed with a variety of instructional activities. The only difference in the lesson plans was the integration of Science News Media related to electromagnetic waves. The lesson plan used in 12S1, 12T1, and 12T3 had SNM while the one used in 12T2, 12S2, and 12B had no SNM. In 12S1, 12T1 and 12T3, SNM clips were shown to the students just after the lesson introduction. This was to allow the news clips to determine the context of the entire lesson. Since the issue of health risks of phone radiations is highly controversial among experts, news reporters and the society at large, the clips raised emotions of reflection and debate among students thereby fostering their engagement in communication and teamwork skills. Students in each class were divided into two teams, that is A and B. In teams, students were given a task of simulating a fictional meeting representing 'the Radiation Protection Authority in Zambia' and 'the Phone Manufacturing Company'. They were later told to present their work in the form of a debate between the two teams. The lessons were accompanied by two physics teachers who were sitting close to the teams they were observing, focussing on students' active engagement in communication and teamwork skills practices.

The lesson phases were as follows:
Phase 1: (Activation of learners' prior knowledge).
Brief teacher-pupil discussion on electromagnetic waves.

Phase 2: (Minds-on).
-Introduction to the subject matter- Non-Ionising Electromagnetic Radiations.
Three broadcast science news clips on health risks of phone radiation are shown to the learners.

Phase 3: (Action)
-Lecture.
The teacher explains some terms and expressions from the clips such as 'Non-Ionising electromagnetic waves' and 'Carcinogenic'.

Phase 4: (Action).
-Simulation.
Have the students in two teams to mimic a fictional meeting.

Team A should mimic a fictional meeting in which representatives of a Radiation Protection Authority in Zambia evaluate use and health risks associated with phone radiation on the Zambian population. The students are to act as experts on mobile phone radiation and are to come up with points to support the following motion:

'Phone radiation is a real danger to the health of the Zambian population.'

Team B should mimic a fictional meeting in which representatives of a Phone Manufacturing Company should come up with points to oppose the motion above for economic reasons.

Phase 5: (Action)
-Debate.
Have members of team A and team B present their resolutions in the form of a debate.

Phase 6: (Consolidation).
Expert teacher to summarise and consolidate the subject matter.

Expert teachers to grade teams of learners basing on:
Understanding of the subject matter, Soft skills displayed during team discussions and presentations using Assessment Rubrics for communication skills and teamwork. In 12T2, 12S2 and 12B, phase 2 and 3 were a single-phase consisting of a lecture and class discussion on non-ionising radiations. SNM clips were not shown to the students.

4.0. METHODS AND SAMPLE

4.1. SAMPLE AND BACKGROUND

The lesson plan was piloted in one grade 12 physics class at Chiwala Technical School by the researcher. It was then revised according to the feedback provided by the accompanying two physics teachers. The revised lesson plan was then taught in different grade 12 physics classes at the same school by the researcher as case studies. The cases for this study were intact grade 12 classes at Chiwala Technical Secondary School in Masaiti District, Copperbelt Province, Zambia. These classes were selected as cases because of the vast experience of the students with teaching methods which do not promote student engagement in soft skills practices, and hence could easily tell the impact of integrating SNM with rich learning experiences in physics lessons. The other reason is that grade 12 students are the ones who are highly neglected when it comes to teaching methods involving student engagement in soft skills practices at Chiwala Technical. Teachers tend to concentrate much on physics content, as they are in a hurry to complete the syllabus. All participants were informed about the nature of this study before the intervention. They were all given choice to provide anonymous feedback or not to take part in the evaluation.

4.2. DATA COLLECTION

The **post-intervention open-ended student questionnaire** was an adaptation of the one administered by Belova and Eilks (2015) and contained three open-ended questions. In the first open-ended question, students had to describe what they perceived to have learned during the lesson. In the second open-ended question, students had to describe what they liked/disliked about the lesson. The other question focussed specifically on the aspect of SNM. Students were asked whether they would recommend the continuous use of SNM in the lesson and justification was required for their answer. The **classroom observation protocol** was administered by two physics teachers. The two physics teachers accompanied each lesson and contributed to the study by filling a classroom observation protocol. Since each class was divided into two teams (Team A and Team B), the observers were allocated specific teams and selected a strategic point where they viewed the behavioural engagement of students in soft skills practices. The classroom observation protocol was an adaptation of BERI (Behavioural Engagement Related to Instruction) protocol created by Lane and Harris at the University of British Columbia in Vancouver, Canada. BERI has achieved excellent interrater agreement of greater than 95%. It has also shown consistent patterns of variation in engagement with instructor actions and classroom activity (Lane & Harris, 2015). The modification of the protocol was done with the approval and assistance of Sara Harris. This protocol focussed on identifying student on-task behaviours as evidence of engagement or disengagement in soft skills practices. **Assessment Rubrics** were designed to grade teams of learners in their engagement in teamwork and communication skills. They were also used as sources of data. The rubrics focussed on a few specified items showing evidence of teamwork and communication skills among students.

4.3. DATA ANALYSIS

Descriptive statistics- it deals with the presentation of numerical facts, or data, in either tables or graphs form, and with the methodology of analysing the data (Cohen et al, 2007). The classroom observation protocol was analysed using descriptive statistics. The Observation Protocol was administered in all the six classes with a total of 135 students as participants. Each class was divided into two teams. Two Regular physics class teachers sat at one position in the classroom close to the team they were observing. A total of 234 engagement observation points was recorded within a period of six weeks. Engagement observation points were done at 2 minutes intervals throughout the lessons. The focus was on reporting the average student engagement scores in soft skills practices for the different classes and for specific instructional activities. For this reason, MS Excel was used to generate descriptive statistics. Firstly, the percentage of student engagement scores for specific engagement observation points per class was generated. Then, the average student percentage engagement scores for specific pedagogical experiences per class were generated. It is from these scores that a graph comparing student engagement levels for those classes where SNM was used to those in which SNM was not used was generated using Microsoft Excel and descriptive analysis was done. The data from assessment rubrics were scores which were used to grade teams of students on how the members were engaged in soft skills practices (dimensions of communication and teamwork skills). Communication skills and teamwork skills were each sub-divided into three dimensions which were further broken down into levels that were showing the extent to which the students were engaged in specified soft skills practices. The scoring system was as follows: Excellent (4); Good (3); Satisfactory (2); Poor; (1). A table of teams' scores based on specific soft skills dimensions was created in MS Excel and it was used to generate a Stacked Bar Chart from which descriptive analysis was done. **Qualitative content analysis**- Open-ended questions of the student questionnaire were analysed using Qualitative Content Analysis (Marrying, 2000; Belova & Eilks, 2015). NVivo Pro Version 11 software was used to facilitate the content analysis. Only 30 students

out of 69 students from the three grade 12 classes in which SNM was incorporated during the lessons participated in filling the open-ended questionnaires. The selection was purposeful based on the willingness of the students to fill the questionnaires and also based on the goal of obtaining cases deemed rich in information for the purpose of saturating the data (Stake, 2006; Yin, 2011). According to Marrying (2014), Qualitative Content Analysis is widely used in the analysis of recorded communication (transcripts of interviews, discourses, protocols of observations, videotapes, documents, open-ended questionnaires…). Marrying (2014) further explains that QCA is a process by which many words of texts are classified into much fewer categories. Categories are usually derived from theoretical constructs or areas of interest rather than developed from the material itself in Descriptive Case studies. Qualitative content analysis was chosen because it is systematic and verifiable in its use of codes and categories and the rules of analysis are explicit, transparent and public (Marrying, 2014). It was also possible to describe the student engagement levels in pedagogical experiences and soft skills practices from the relative frequency and importance of particular practices during the lesson as stated in student responses. To show the students' perceptions about the impact of using SNM on their engagement in soft skills practices, percentages of the number of coding references were generated for the child nodes/codes. The percentages had to reveal the content of students' perceptions on the impact of using SNM on their engagement in pedagogical experiences and soft skills practices in the responses given to open-ended questions.

5.0. RESULTS

5.1. STUDENTS' PERCEPTION OF THE LESSON

In the first open-ended question, students had to describe what they perceived to have learned during the lesson. The intention was to reveal whether the aspects mentioned by the students mainly focussed on science content, or if soft skills practices would also be mentioned. About 89% of the statements were purely science content-based or somehow related to science content. Typical responses were as follows: 'I have learned how to use phones, the movement of electromagnetic waves and the effect of phones during the phone call.' Another responded: 'I learned about how radiation affects our bodies, how to prevent the radiation from our bodies and their effects on us. In addition, I also learned on the precaution on how to use phones and preventing radiation from our bodies that may cause brain cancer and may reduce sperm count in males.' Other responses were: 'We should keep cell phones away from our body and when talking to someone using a cell phone, we must not put a phone closer to the ear or brain, there must be a space/gap.'; 'I have learned about electromagnetic waves and the dangers of using phones.'; 'I have learned that phones are not safe for someone's health when they are being used without any information.'; 'Well, I have firmly understood more on electromagnetic waves and the dangers they might cause.' Only 11% of the students' comments were directly or indirectly related to soft skills practices ('I had learned good communication skills and teamwork skills as I was allowed to express my views and contribute to the lesson. Apart from that, I had learned problem-solving skills which would help me in future.' 'I have learned that research is very important and listening to other people's views is very beneficial.' 'Making group discussion to increase the thinking capacity of each and every pupil to make each and every pupil participate in all activities. The best thing that I have observed is that it is important to make the debate on an activity.'). The students were much more aware of their personal learning outcomes concerning science content than soft skills practices. In the second open-ended question, students had to describe what they liked/disliked about the lesson. The most frequently mentioned aspect was the incorporation of science news media in the lessons. All of the responses contained positive statements about the use of science news media in the lessons. ('Using science news media in the lesson was excellent. It was interesting watching other peoples' views on television news channels like CNN and asking questions and doing group work because it helps to learn and know interesting things related to physics.'). The reasons given for liking the use of science news media were broadly divided into two categories: (1) science news increased students' awareness of the lessons' science content and (2) science news increased the students' interest in soft skills practices. About 37% of the comments revealed that the use of SNM had a positive impact on students' awareness of the lessons' science content. Typical responses showing the influence of SNM on students' awareness of the lesson's science content were: 'it made me understand the topic.'; 'I saw what happens when someone is using a phone in contact with his/her body.'; 'I liked the use of science news. I learned things I never knew and things I was educated about are memorable and I can also help others who don't know.'; 'The use of science news media made me participate actively because when we are learning we know what the teacher is saying. In other ways, it's like we are doing experiments while learning. We see what really happens in real life.'; 'I never knew that the news contained what we learn in physics.'; 'It is easy and quick to understand through media than books.'; 'Science news gave me an idea of what the lesson was all about.' On the other hand, 63% of the statements mentioned the positive influence of SNM on students' interest in their participation in experiences of soft skills practices. The following were some of the typical responses: 'It gave me the interest to **socialize** with other members of the class. It made me improve my **public relations** by **standing in front of the people** and **act as a presenter**.'; 'Science news which influenced me to participate in the **contribution of ideas** to others on the given question and **opposing other groups' views** on the same issue.'; 'In fact, it really helped me in **contributing when discussing** with my group members and I was **answering some questions** that pupils from other groups asked after our presentation.'; 'I liked the science news. It leads someone to know the importance of **passing information** and the way he/she will **communicate with others**. It makes me have an interest in **researching more** about the dangers of phone radiation and **coming up with a solution** to it. It has influenced me to **communicate with others** and **pass information**.'; 'I believe science news media made it easy for me to participate actively because it made me **more attentive** to whatever was said so that I got the full information that helped me participate in the **presentation and asking questions**. In **group discussion** I participated as well, **working together with my colleagues**.'; 'I was probably influenced by science news media to actively participate in **presenting my views over the topic.'**; 'I liked **contributing to group discussion** and **presenting the group**

work because science news gave me more information on the topic.'; 'I liked the use of science news media by the physics teacher. It made me want to actively participate in **supporting my team** by **answering the questions** from other teams. I also helped my team **come up with ideas for the presentation**.'; 'I liked the use of science news media in the lesson because it influenced me to **debate** on the continued use of cell phones by the young on which **I opposed** because science in the news gives a platform to those learners who are blank minded and enables them to use their basic knowledge in connection with science.'; '… (science news) gave me the courage to actively participate in **asking questions** in the form of interjection in order to make the presenter **justify** a certain point for me to be cleared.'; 'It makes you want to **research more** and **present your findings**.' The aspects which were viewed as negative about the lessons by the students were very few. The most outstanding negative comments reveal that a few students were uncomfortable with criticizing other teams' views (for example one student stated: 'However, I disliked criticising other groups.' Another one stated: 'I didn't like criticising the work of other teams and arguments on the topic.' Two others made the following comments: 'I was not very interested in criticising the work of other teams**';** 'However, I didn't like the way some pupils were criticising the work of other groups.') and some were nervous to take part in presentations of their teams' work in front of the class (one student commented: 'I was, however, nervous about taking part in presentations.' Another one stated: 'To be honest, at first, I was not comfortable doing the presentation in front of the class. Another statement was: 'I was a bit nervous doing the presentation.'). The other question focussed specifically on the aspect of Science News Media. Students were asked whether they would recommend the continuous use of Science News Media in the lesson and justification was required for their answer. 29 out of 30 students strongly recommended the continuous use of SNM in physics education. Only one student moderately agreed to the continuous use of SNM in physics education citing its influence to make others (students) criticise what their friends perceive to have learned. ('I moderately agree to the use of science news media in physics education (because) what you learn may be opposed by other learners.'). The students' justifications for recommending SNM use in physics education were categorized (coded) in two: (1) SNM promotes engagement in science content learning, and (2) SNM promotes engagement in soft skills practices. About 48% of the statements directly or indirectly revealed that SNM should be recommended to be a continuous part of physics education because it would promote student engagement in content learning. Typical statements were: 'it makes many people learn the side effects of things that seem to look good in the eyes of people such as the effects of using phones and about ionising and non-ionising radiations.'; 'pupils have to learn the dangers of phone radiation and the long-time effects it has. They also have to know how to use the phone correctly and also warn others about.'; 'pupils like me are able to understand things easy in the news media. It can also help one to know things he/she had never known. It contains things that some books do not contain.'; 'It also helps pupils to understand very fast since what they are learning is in the news. To simplify, it's like an experiment goes on while learning.'; 'because it helps us to know more.'; 'it would give learners a better view of perspective on what a particular topic is about and give them the interest to know more.' On the other hand, 52% of the statements directly or indirectly revealed that SNM should be recommended to be a continuous part of physics education because it would promote student engagement in soft skills practices. Typical statements include the following: '…it promotes **participation in communication skills**, **working in groups** and **solving problems.'**; 'Science news media is good because people from across the world have different views which are interesting to pupils for **debating** in class.'; 'It will make pupils like **discussing** what they learn other than spending time talking about irrelevant things.'; 'pupils would be **concentrating** in class and they would be active in-class activities.'; 'I have been working with my colleagues but not to full capacity. Influence of science news media helped me to **work to full capacity with my colleagues**.'; 'Pupils can have different views on the topic to **discuss with colleagues**.'; 'I felt like I was also a teacher when **presenting my views** because I was very sure.' ; '…it makes you **discuss with friends** and **research more** than just listening to a teacher who can easily forget during his/her teaching.'; 'it allowed my colleagues and me to **work hand in hand** as well as participate **in group discussions**, **asking questions** as well as **responding to questions**. It even makes one **criticise** an issue and **defend** criticism from other groups confidently and as a group. You want to **support each other**.'

5.2. TEACHERS' OBSERVATIONS

Results from the Classroom Observation protocols revealed generally higher student engagement levels in soft skills practices in classes where SNM was integrated (Fig. II.). For instance, during the lecture that just followed the use of SNM in 12S1, 12T1 and 12T3, the student average percentage engagement in soft skills practices were 61%, 71% and 72% respectively while in 12T2, 12S2 and 12B (classes where SNM was not used), the engagement levels were 47%, 48%, and 39% respectively. The trend was the same even in other pedagogical experiences such as Simulation, where the average percentage engagement levels were 97%, 88% and 88% for 12S1, 12T1, and 12T3 respectively while for 12T2, 12S2 and 12B they were 52%, 65%, and 65% respectively; Debate, where the engagement level was 81% for 12S1, 89% for 12T1 and 87% for 12T3 while on the other hand, it was 55% for 12T2, 61% for 12S2 and 56% for 12B.

	% STUDENT - ENGAGEMENT 12S1	% STUDENT - ENGAGEMENT 12T1	% STUDENT - ENGAGEMENT 12T3	% STUDENT - ENGAGEMENT 12T2	% STUDENT - ENGAGEMENT 12S2	% STUDENT - ENGAGEMENT 12B
	USED SNM JUST AFTER LESSON INTRODUCTION			NO USE OF SNM THROUGHOUT THE LESSON		
QUESTION AND ANSWER (LESSON INTRODUCTION)	43%	25%	42%	30%	44%	39%
LECTURE	61%	71%	72%	47%	48%	39%
SIMULATION	97%	88%	88%	52%	65%	65%
DEBATE	81%	89%	87%	55%	61%	56%
SUMMARY	76%	80%	73%	48%	64%	61%

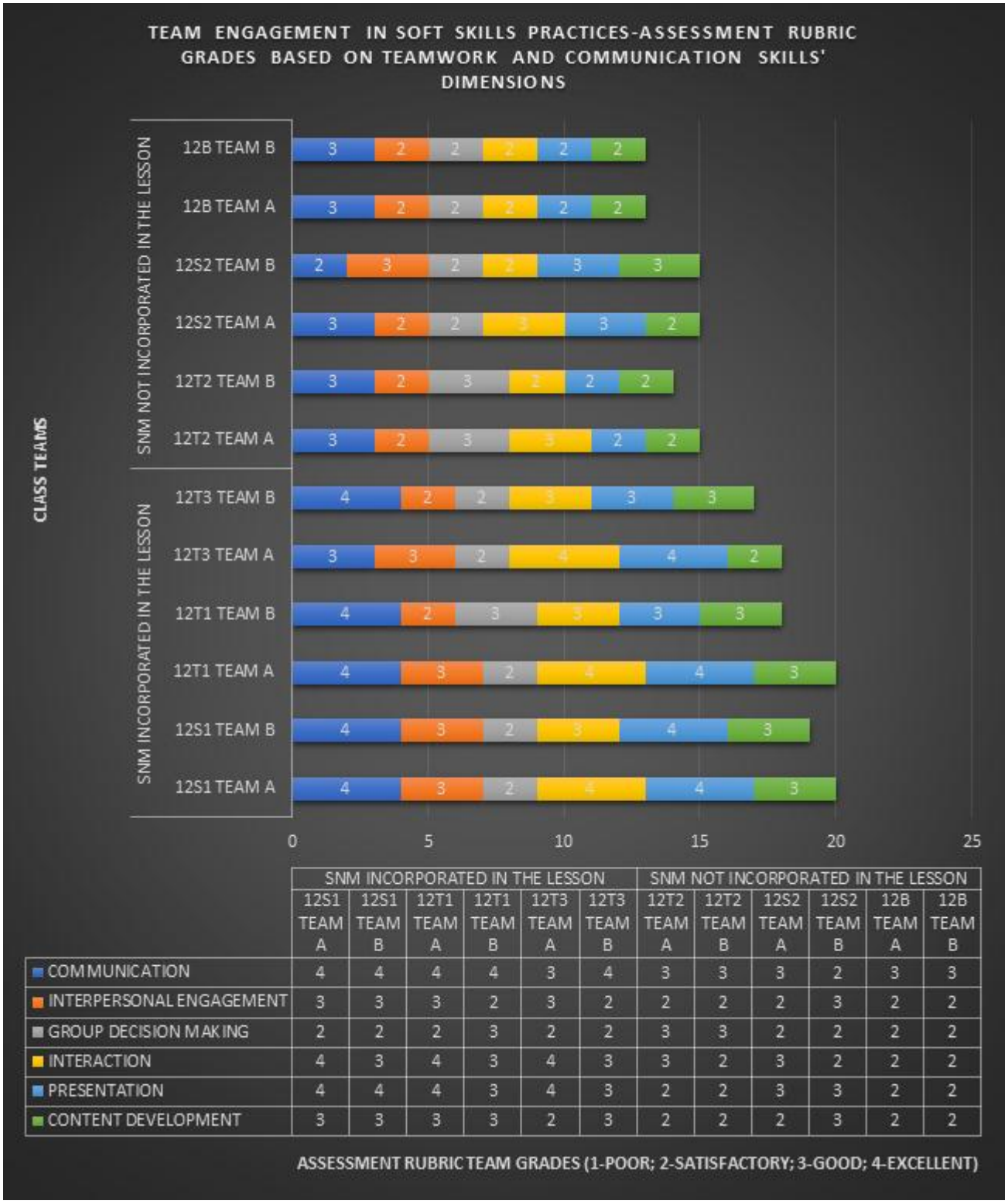
***Figure II**: Results from classroom observation protocols (6 classes; 12 teams; 135 students; 234 engagement observation points)*

The accompanying teachers mentioned the use of SNM in the lessons as having a positive influence on students' engagement levels in soft skills practices. They all liked it. One teacher stated: 'I have tried to use the projector to show a lesson I downloaded from YouTube to the students but most of the students seemed not to be interested as much. At first, they all wanted to watch but after some minutes, others were even dosing. I have never used such a method again. However, I am surprised at the interest the students developed in this lesson after listening to the news clips. You

can see it from their **lively discussions in teams**, the way they **presented their points of view** and how they strongly **defended their teams**. I enjoyed the **debate**. I have never seen these students with such eagerness to **express themselves**. I really want to try it myself.' However, the accompanying teachers noted that time management is an issue when SNM is incorporated in the lesson ('I am worried about time management as the students had no intentions of stopping not until they express their views. Even those students who don't usually contribute to lessons were eager to present their opinions. Thus, one needs to be sensitive and strict with time.'). During lesson introductions, the average student engagement levels in soft skills practices were generally low for all the six classes-43% for 12S1, 25% for 12T1, 42% for 12T3, 30% for 12T2, 44% for 12S2 and 39% for 12B. The common reason mentioned by observing teachers was that most students were still showing behaviours of settling in. From the classroom observation protocol results, it also became apparent that student engagement levels in soft skills practices were generally lower during the Lecture as compared to other pedagogical experiences (i.e. Simulation and Debate). The comments accompanying the engagement observation points from the protocols revealed that most students who were engaged during the lecture displayed behaviours of listening while a few were asking questions for clarifications. However, the comments accompanying the engagement observation points showed that during simulations of an expert meeting and debates, most students were engaged in lively discussions, arguments, listening, asking questions, expressing views, presenting and defending teams' work and exchange of ideas. Student engagement levels during the lesson summaries were relatively good. The accompanying teachers' comments revealed that most students were attentive, listening or asking questions to seek clarifications. Other students still wanted to continue justifying their views. The results from classroom observations also revealed the differences among classes in terms of student engagement levels in soft skills practices. One notable observation is that the engagement levels for students in 12T2 were relatively lower as compared to other classes (Fig. II.).

5.3. RESULTS FROM ASSESSMENT RUBRICS

The grades from assessment rubrics revealed that teams from 12S1, 12T1, and 12T3 (classes where SNM was incorporated in the lessons) were much more engaged in soft skills practices than those from 12T2, 12S2 and 12B (classes where SNM was not incorporated in the lessons) with a minimal difference in some cases (Fig. III.). Students in teams from 12S1, 12T1, and 12T3 were observed to be highly engaged in an exchange of ideas (communication) during the simulation of an expert meeting. They were also engaged in sophisticated arguing and turn-taking. Even though students in teams from 12T2, 12S2, and 12B were also observed to be engaged in an exchange of ideas during the simulation experience, some were not fully engaged. In fact, some in Team B from 12S2 were observed to be distracted by initiating a discussion which was off the topic under discussion. Some from 12T2 Team B, 12S2 Team A, and B, and 12B Team A and B were observed to have some difficulty keeping up with the discussion. Another notable difference observed was that students from 12S1, 12T1, and 12T3 were much more eager to ask and contribute than those from 12T2, 12S2, and 12B. During the debate, students in teams from classes in which SNM was incorporated were observed to respond confidently to questions from other teams. On the other hand, most of the students in teams from classes without the use of SNM had difficulties presenting their work and answers convincingly. Some were even observed to experience difficulties in structuring the presentation in a good way. A few did well though. Another observation during the debate was the difference in the content development between the two groups (those with SNM and those without SNM).



	SNM INCORPORATED IN THE LESSON						SNM NOT INCORPORATED IN THE LESSON					
	12S1 TEAM A	12S1 TEAM B	12T1 TEAM A	12T1 TEAM B	12T3 TEAM A	12T3 TEAM B	12T2 TEAM A	12T2 TEAM B	12S2 TEAM A	12S2 TEAM B	12B TEAM A	12B TEAM B
COMMUNICATION	4	4	4	4	3	4	3	3	3	2	3	3
INTERPERSONAL ENGAGEMENT	3	3	3	2	3	2	2	2	2	3	2	2
GROUP DECISION MAKING	2	2	2	3	2	2	3	3	2	2	2	2
INTERACTION	4	3	4	3	4	3	3	2	3	2	2	2
PRESENTATION	4	4	4	3	4	3	2	2	3	3	2	2
CONTENT DEVELOPMENT	3	3	3	3	2	3	2	2	2	3	2	2

Figure III. *Results from assessment rubrics*

Generally, students in teams from classes with SNM were observed to communicate material which was related to the dangers of non-ionising electromagnetic radiations. Students from the other group were trying to tie in issues of non-ionising electromagnetic waves but the relevance to the topic was not always apparent. Team decision making was observed to be a problem in all the teams. None of the teams was observed to establish clear procedures for decision making. Those that attempted to do so were establishing informal procedures. However, once the decision is made, students in teams from classes with SNM use were observed to be much more eager to defend the teams' decision than those from classes without SNM. Lectures were characterized with relatively low student engagement levels in soft skills practices and the most frequently observed practices were listening and asking questions of which students from classes with SNM did better than those from classes without SNM.

6.0. DISCUSSION OF FINDINGS

In this case study, a physics lesson plan was designed incorporating SNM on dangers of non-ionising electromagnetic radiations. The aim was to promote student engagement in soft skills practices in physics education. The lesson plan was implemented in three grade 12 classes at Chiwala Technical Secondary School and a similar lesson plan was taught in three other grade 12 classes but without the use of SNM. The entire implementation period was six weeks. This descriptive case study provides the students' perceptions of the lesson and of the impact of the incorporation of SNM on their engagement in soft skills practices. It also gives insight into the teachers' observations of students' engagement levels in soft skills practices and what the assessment rubrics reveal about students' engagement in soft skills practices. The students' perceptions in this study show that students regarded the use of SNM in physics lessons positively. They found SNM to be very interesting, mind-capturing, informative and as raising their eagerness to research more, exchange ideas, present their findings, share what they learn, express and defend their views and criticize other points of view. Simply put, the students' perceptions reveal a positive impact of SNM to increase the interest of students to participate actively in instructional activities and hence, engage in soft skills practices. Even though students were much more aware of acquiring content in the physics lessons, they also acknowledged the potential of SNM to boost their eagerness to engage more in soft skills practices. These findings agree with similar findings of the use of SNM. According to Jarman and McClunne (2007), studying science in the news has the potential to foster students' engagement with science and encourage lifelong learning. Science-related news themes can provide occasions for discussion and space for students to express their personal points of view (Osborne & Collins, 2001). These occasions, rich in SSIs in most cases, can be an excellent base for soft skills practices. This is because, working with SSI involves a more interactive and dialogic pedagogy (Sadler, Barab & Scoff, 2007). Also, according to Sadler (2004), research reveals that SSIs challenge students' rational, social and emotional skills. However, a few students' statements reveal that they were not happy about the fact that the integration of SNM drove them to criticise each other. Such statements though, show 'ambivalence rather than negativity' as noted by other studies (Belova & Eilks, 2015; McSharry & Jones, 2002). A few were still uncomfortable to take part in class presentations during debate despite being exposed to SNM. Such nervousness confirms that the students have not been engaged in soft skills practices during most of their previous lessons. Classroom observations and results from assessment rubrics are also in line with these findings as they reveal that student engagement levels were high in classes where SNM was integrated during physics lessons. In fact, the observations reveal that student engagement levels in soft skills practices rose just after the use of SNM in the lessons. These observations are in line with a good number of studies which reveal that student engagement levels depend on how teachers promote sustained student interaction over academic content (Cooper, 2014; Kelly & Turner, 2009). This correlates with Sadler (2011), who concluded that SSI, when placed at the beginning of instruction, serves as a true context for learning. When SNM was integrated, the entire classroom atmosphere changed. It affected the students' engagement behaviour for the rest of the pedagogical experiences as they realised the relevance of the lesson in everyday life- it was truly an SSI. This is similar to the reports we find in similar studies: Students are more likely to engage when they perceive the relevance of the task (Davis & McPartland, 2012; Walker & Greene, 2009). Classroom observations also reveal another major factor in promoting students' engagement in soft skills practices. The observations reveal that instructional activities or pedagogical experiences also matter. Some instructional activities were more student-engaging than others. For instance, despite being used after SNM, the Lecture method did not engage students in soft skills practices as did Simulation and Debate. These findings agree with studies which have focused on identifying classroom instructional factors associated with greater behavioural student engagement, that is, students interaction with the teacher, students interaction with peers and students interaction with content (Kelly & Turner, 2009; Birch & Ladd, 1997; Cooper, 2014; Crosnoe, Johnson, & Elder, 2004; Valeski & Stipek, 2001). Students also report that class discussions excite and engage them as shown in some studies (Yazzie-Mintz & McCormick, 2012). Similarly, student interactions with their peers are also important for student engagement as a positive interpersonal climate is positively associated with engagement (Davis & McPartland, 2012). Studies also show that authentic tasks are associated with higher behavioural engagement (Blumenfeld et al., 2004; Fredricks et al.,2004; Marks, 2000; Shernoff et al.,2003). Therefore, even when SNM is integrated into a physics lesson, student engagement in soft skills practices can only be maximized with the selection of 'rich' pedagogical experiences. Fink (2003) suggests examples of 'rich' pedagogical experiences as debate, authentic activities, simulations, and role-plays. Schwartz (2012), had a similar view when he suggested that teachers should always strive to improve every aspect of the learner's education by placing strong emphasis on the role experiences play in the learning process and pointed out that classroom-based experiential learning can take a multitude of forms, including role-playing, games, case studies, simulations, presentations, and various types of group work.

7.0. CONCLUSIONS

The study had three objectives, that is: To determine the impact of SNM on students' engagement in soft skills practices in physics education, to determine the difference in students' engagement levels in soft skills practices between classes with SNM and those without the use of SNM during physics education and to determine how students' engagement levels in soft skills practices vary with pedagogical experiences in physics education. The findings from student questionnaires, classroom observation protocols and assessment rubrics all confirm that integrating SNM in physics lessons increased the active engagement of students in soft skills practices. The students' own responses show that the use of SNM raised their interest in participating in soft skills practices. Most of the students' comments reveal that SNM was informative and hence made them get a clear picture of what the whole lesson was all about. This widened the students' minds raising their passion to research more and express themselves. Analysis of classroom observation protocols and results from assessment rubrics show that students from classes where SNM was integrated were much more engaged in soft skills practices than those from classes

where SNM was not integrated during the physics lessons. This confirms the students' questionnaire responses in which students claim to be highly influenced by SNM to participate in soft skills practices. Analysis of classroom observation protocols also reveals that student active engagement in soft skills practices is dependent on the nature of pedagogical experiences being employed during a physics lesson. The findings reveal that some pedagogical experiences were more student engaging than others. For instance, students were much more engaged in soft skills practices during the Simulation and Debate stage than during the Lecture stage even though all these stages came after the integration of SNM.

REFERENCES

[1] Belova, N., &. Eilks, I. (2015). Learning with and about advertising in chemistry education with a lesson plan on the natural cosmetics-a case study. Chem. Educ. Res. pract., 578-588. doi:10.1039/c5rp00035a

[2] Birch, S. H., & Ladd, G.W. (1997). The teacher-child relationship and children's early school adjustment. Journal of school psychology, 35, 61-79.

[3] Blom, A., et al. (2017). Job-ready graduates of secondary education in Botswana, Lesotho and Zambia-reforming instruction, curriculum, assessment, and structure to teach vocational and 21st-century skills. World Bank Group report, 3-27.

[4] Blumenfeld, P. C., et al. (2004). School engagement of inner-city students during middle childhood. Hills of gold, 145-170.

[5] Brown, M. (2016). Five skills hiring managers look for in engineering grads. Job Articles.

[6] Christensen, C. K. (2011). Young adults' accounts of scientific knowledge when responding to a television news report of contested science. Int. J. Sci. Educ., 1(2), 115-145.

[7] Cimatti, B. (2016). Definition, development, assessment of soft skills and their role for the quality of organizations and enterprises. International journal for quality research, 97-130. doi:10.18421/ijqr10.01-05

[8] Cohen, L. et al. (2007). Research methods in education (6th ed.). London and New York: Routledge/ Taylor & Francis Group.

[9] Conn, K. M. (2017). Identifying effective education interventions in sub-Saharan Africa: A meta-analysis of impact evaluations. Review of educational research, 863-898, doi:10.3102/0034654317712025.

[10] Cooper, K. S. (2014). Eliciting engagement in the high school classroom-a mixed-methods examination of teaching practices. American educational research journal, 51, 363-402.

[11] Crosnoe, R., et al. (2004). Intergenerational bonding in school: The behavioural and contextual correlates of student-teacher relationships. Sociology of education, 77(1), 60-61.

[12] CSO (2012). Living conditions monitoring survey 2010. Lusaka: Living conditions monitoring branch.

[13] Davis, M. H., & McPartland, J.M. (2012). High school reform and student engagement. In: Christenson S., Reschly A., Wylie C. (eds). Handbook of research on student engagement, 515-539.

[14] Denzin, N. K., & Lincoln, Y.S. (ed.).(2003). Strategies of qualitative inquiry. Sage: Thousand Oaks.

[15] Direito, I., et al. (2012). Engineering undergraduates' perceptions of soft skills: Relations with self-efficacy and learning styles. International conference on new horizons in education (pp. 843-851). Procedia-social and behavioural sciences. doi:10.1039/c5rp00035a

[16] Driscoll, M. (2017). Six soft skills engineers need to succeed in 2017.

[17] ERB. (2018). Job announcement: Application deadline-9th March 2018. Lusaka. www.erb.org.zm/jobs/vacanciesFeb2018.pdf.

[18] Faure, E., et al. (1972). Learning to be: The world of education today and tomorrow. Paris: Edgar Faure Commission.

[19] Fink, D. L. (2003). Creating significant learning experiences. San Francisco: Jossey-Brass.

[20] Fink, D. L. (2013). Creating significant learning experiences. An integrated approach to designing college courses, revised and updated. San Francisco: Jossey-Bass.

[21] Fredricks, J. A. et al. (2004). School engagement: Potential of the concept, state of the evidence. Review of educational research, 74(1), 59. doi:10.31102/00346543074001059

[22] Gallup, Inc. (2013). U.S. overall: Gallup student poll results.

[23] Gay, L. et al. (2009). Educational research competencies for analysis and applications. NJ. Pearson Education.

[24] Goodman, R., &. Satterfiled, R. (2017). Evaluation of secondary education in Botswana, Lesotho, and Zambia: The alignment of curriculum, assessment, and instruction with 21st-century skills.

[25] Guerra, N., et al. (2014). Developing social-emotional skills for the labour market. World bank policy working paper, 7123.

[26] Hackman, J. J., & Kautz, T. (2013). Fostering and measuring skills: Interviews that improve character cognition. National Bureau of economic research.

[27] Halkia, K., & Mantzouridis, D. (2005). Students' views and attitudes towards the communication code used in press articles about science. International journal of science, 27.

[28] Heckler, K. M. (2015). Using science news articles in the secondary science classroom: The effect on students' summative assessment scores and attitudes toward science. Ohio University.

[29] Jarman R., &. McClunne, B. (2007). Developing scientific literacy. Using news media in the classroom. Open university press.

[30] Jarman, R. & McClunne, B. (2001). Use the news: A study of secondary teachers' use of newspapers in the science classroom. Journal of biological education-J BIOL EDUC, 69-74.

[31] Jarman, R. & McClunne, B. (2010). Developing students' ability to engage critically with science in the news: Identifying elements of the 'media awareness' dimension. The curriculum journal, 47-64. doi:1080/09585170903558380

[32] Jenkins, E. (2004). Science, in J. White (ed). Rethinking the school curriculum. Values, aims, and purposes. London: Routledge.

[33] Kachan, M. R., et al. (2006). Do teachers ask students to read the news in secondary science? Evidence from the Canadian context. Science education.

[34] Kelly, S., & Turner, J. (2009). Rethinking the effects of classroom activity structure on the engagement of low-achieving students. The teacher's record., 111, 1665-1692.

[35] King, C. J. (2012). Restructuring engineering education. Journal of engineering education., 1-5.

[36] Kolb, A. D. & Kolb, A. Y. (2011). Experiential learning theory: A dynamic, holistic approach to management learning, education, and development. 42-68 doi:10.4135/9780857021038.n3

[37] Lafrance, A. E. (2009). Helping students cultivate soft skills. www.aricialafrance.com

[38] Lane, E. & Harris, S. (2015). A new tool for measuring student behavioural engagement in large university classes. J. Coll.Sci. Teaching, 83.

[39] Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. American educational research journal., 37, 153-184.

[40] Marrying, P. (2000). Qualitative content analysis. Forum qual.soc.res.

[41] Marrying, P. (2014). Qualitative content analysis: Theoretical foundation, basic procedures, and software solution. SSOAR. Open Access Repository.

[42] McSharry, G., & Jones, S. (2002). Television programming and advertisements: Help or hindrance to effective science education? Int. J. Sci. Educ.

[43] Osborne, J., & Collins, S. (2001). 'Pupils' views of the role and value of the science curriculum: A focus-group study'. International journal of science education., 5, 441-67.

[44] Passow, H. J. (2012). Which ABET competencies do engineering graduates find most important in their work? Journal of engineering education., 101(1), 95-118.

[45] Ratcliffe, M., & Grace, M. (2003). Science education for citizenship. Teaching socio-scientific issues. Maidenhead: Open university press.

[46] Renderski, S. J., & Abselhadi, A. (2017). Teaching and learning soft skills in university physics courses: Perspectives of the UEA higher colleges of technology. International journal of physics and chemistry education., 9(4), 1-8.

[47] Republic of Zambia, CSO. (2016). 2015 living conditions monitoring survey report.

[48] Sadler, T. D. (2004). Informal reasoning regarding socioscientific issues: A critical review of research. Journal of research in science teaching., 41, 513-536.

[49] Sadler, T. D. (2011). Situating socio-scientific issues in classrooms as a means of achieving goals of science education. Springer, 1-9.

[50] Sadler, T. D., et al. (2007). What do students gain by engaging in socio-scientific inquiry? Research in science education., 37(4), 371-391.

[51] Schwartz, M. (2012). Best practices in experiential learning. Ryerson University.

[52] Shernoff, D. J., et al. (2003). Student engagement in high school classrooms from the perspective of flow theory. School psychology quarterly., 18, 158-176.

[53] Skinner, E. et al. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic. Journal of educational psychology., 100(4), 765.

[54] Stake, R. E. (2003). Case studies. In: Denzin, N.K. and Lincoln, Y.S. (ed) (2003) Strategies of qualitative inquiry, 2nd edition. London: Sage publications.

[55] Stout, K., & Christensen, S. (2009). staying on track for high school graduation: promoting student engagement. The prevention researcher., 16, 17-20.

[56] Valeski, T. N., & Stipek, D. J. (2001). Young children's feelings about school. Child development. 72, 1198-1213.

[57] Walker, C. O. & Greene, B. A. (2009). The relations between student motivational beliefs and cognitive

engagement in high school. The journal of educational research., 102, 463-472.

[58] Wang, M. T., & Eccles, J. S. (2012b). Social support matters: Longitudinal effects of social support on three dimensions of school engagement from the middle to high school. Child development., 83.

[59] Wang, M. T., & Eccles, J. S. (2012a). Adolescent behavioural, emotional, and cognitive engagement trajectories in school and their differential relations to educational success. Journal of research on adolescence., 22.

[60] Yazzie-Mintz, E., & McCormick, K. (2012). Finding the humanity in the data: Understanding, measuring, and strengthening student engagement. In S.L. Christenson, A.L. Reschly, & C. Wiley (Eds.). Handbook of research on student engagement., 743-761.

[61] Yin, R. K. (2003). Case study research: Design and methods. London: Sage Publications.

[62] Yin, R. K. (2011). Qualitative research from start to finish. New York and London: The Guilford Press.

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