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Title: **The 21st Student-Teacher and the use of Open Educational Resources at the University of Education, Winneba**

As new technologies continue to advance, and the learning process becomes information-rich, new types of instructional opportunities exist for teachers to adapt to improve their classroom practices. This paper seeks to capture the experiences of student-teachers' adaptation and integration of open educational resources (OERs) in their classroom-based teaching internship. Mixed methods of survey and interviews using questionnaires and semi-structured interview guides were used in collecting data from 30 student teachers who carried out their internship in six basic schools around the University community in Winneba. Statistical Package for Social Science (SPSS) software was used in analyzing the quantitative data while the qualitative data was analysed manually. It emerged from the study that most respondents have positive attitudes towards the use of OERs in lesson preparation and delivery as they added value to the learning and teaching environment. Again, the resources have positive impact on learners as they participated, shared ideas and got involved in the learning process. Respondents also found themselves as reflective practitioners during the use of the resources. However, the lack of support structures such as internet access, limited scope of modules and funds for material development, lack of continuous staff development and the absence of lecturers to monitor them in the schools during their practice was a worry. Respondents requested that there should be opportunities for them to learn, relearn and use new approaches and strategies in teaching and learning as new technologies emerge. They should also be encouraged to adapt and adopt best practices from other contexts.

Introduction/ Background to the Study

Presently, teaching seems to have moved from the classroom to the real world via albeit the virtual world. The challenge is that as technology advances, at a very fast rate, and the learning process becomes increasingly information-rich, the role of the teacher has to undergo a major change to integrate these technologies in the teaching and learning environment. It is evident in the literature that new technologies have challenged the way in which education is delivered, but newer technologies are now challenging how people process information and what they expect to be able to do with that information. Cognitive psychologists, for example the work of the Vanderbilt Cognition and Technology Group have discussed how people process information differently and its effect on learning (Scardamalia & Bereiter, 2003). Teachers are being called upon to find out what students do and can do with technology outside the classroom in order to inform their teaching. Open educational resources (OER), which are teaching, learning and research resources that reside in the public domain or have been released under an intellectual property license and permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials or techniques used to support access to knowledge. (UNESCO, 2002). Considering this focus and purpose of OERs, it is deemed sensible that the copyright licenses that are non-commercial such as Creative Commons license with Share Alike and Non Commercial restrictions have to be used to redistribute the resources. Several reasons have been advanced for the use of OERs in developing countries. The University of Education, Winneba adopted the concept and introduced some student teachers to it. This study in particular, sought to explore students' experiences with using the resources while they were on their usual teaching practice or internship.

The phenomenal increase in knowledge and technological advancement that are fast changing in the 21st century are impacting on our lives making it dependent on technology. This has made learning in recent times also changed a lot making it easier with new technologies. It is argued that tomorrow's children will require a new set of skills to meet the demands of the learning environment and the workplace. From the perspective of learning, skills considered most essential for learners then include: collaboration, systems thinking, technological, civic engagement, interpersonal intelligence, communication and others. Again, in an age where

students tend to discover their own deepest longings and strengths, learning has become individualistic and student-centered. The impression created is that 21st century learning is considered as integrated and interdisciplinary requiring specific skills with emphasis on flexible mindset (Kennisnet, 2010). Therefore, who qualifies to be a 21st century learner and what are the characteristics expected to be possessed by the literate of the 21st century? Again, who qualifies to teach in the 21st century classroom and with what technologies? This paper seeks to explore the experiences of some pre-service teachers who were supposed to have been exposed to the use of open educational resources and how they used them during their school-based teaching internship.

INSERT PHOTO of challenge

Fig.1: Innovative strategies and competencies are challenges for the 21st century teacher to overcome

The challenge is that teachers are expected to master several creative ways of engaging their pupils in learning, be conversant with the new skills and adapt to the fast growing needs of pupils. The characteristics expected of the 21st century teacher are enormous. Globally, teachers in this era are expected to be collaborative, adaptive, information/media and technology savvy, communicators, visionary, risk takers and require immediate and instant gratification (Thomas & Knezek, 2008). They are also required to understand and apply different teaching and learning strategies and to have inclusive modes of learning in their lesson delivery. In addition, they are to see the potential in the emerging tools and web technologies, grasp them and be able to manipulate them to serve the needs of their learners. So the issue is: how do we prepare teachers for the 21st century classroom? how do we get teachers in sub-Saharan Africa, particularly those in difficult-to-reach or remote areas to acquire these requisite skills to support their learners? Or are there alternatives to assist such teachers reach out to their pupils? It is clear that there is a real

need for a paradigm shift in teaching approaches and resource availability for teachers in the African context. It is in this vein that new technologies including the internet or the World Wide Web is seen as an avenue that provides opportunity for free access to and use of 'open' educational resources (OERs); which are available for free consultation, use and adaptation by both teachers and students to support teaching and learning. The key issue is whether or not OERs are useful and can effectively be used in equipping modern students with the necessary competences and skills for personal and professional achievements in the emerging knowledge-based societies and economies.

Purpose of the Study
With the introduction of OERs to students for one semester the main aim of this study is to establish how satisfying or dissatisfying they find the materials in their classroom practices. This is to identify the impact of OERs' adaptation and integration into student teachers' teaching and learning situations and consider an improvement plan for their use.

Research Objectives

The objectives of this exploration are to:

1. establish the nature of student teachers' adaptations of OERs in their classroom practice.
2. ascertain the conditions that support teachers' use of the OERs
3. determine the impact of the OERs on their teaching and learning situations
4. establish the kind of challenges students encounter during the use of OERs
5. determine conditions that will sustain students' use of OER.

Research Questions
The research questions set out for the exploration are:
1. In what ways do student teachers integrate TESSA OERs into their teaching and learning?
2. What conditions support teachers' use of OERs in their teaching and learning situations?
3. How beneficial are OERs to teachers when adapted into their teaching lessons?
4. What challenges do student teachers encounter when adapting OERs in their teaching?
5. How can students' adaptations of OERs by teachers in the classroom be improved and sustained?

Review of Literature

It is the generally accepted belief that society is changing from an industrial towards an information or knowledge society and this change implies that students need to be prepared for jobs in the market economy. Being able to use technologies in one's practice is seen as one of the core competencies for the 21st century. The 'will, skill and tool' (WST) model, which includes classroom technology integration is considered as one of the key 21st century competency; where 'will' is attitude (of the teacher), 'skill' is technology competency, and 'tools' is access to technology tools (Knezek & Christensen, 2008). Secondly, it is also believed that ICT has the potential to enhance teaching and learning processes in the modern learning environment (Voogt & Knezek, 2010). Previously, literacy was defined by society as the ability to read and write. However, in the 21st century, a literate is required to possess a wide range of abilities and competencies which when put together include the ability to participate in a virtual classroom and read and write on-line. Multiple literacies including, language literacy, spatial literacy, visual literacy, information literacy, technological literacy, digital literacy, cultural, mathematical, scientific and ICT literacy have been described as some of the literacies of the 21st century, with some explanations as follows:

- technological literacy: to be aware of the interplay between technology and society and to understand the technological principles needed to develop relevant solutions and achieve goals
- ICT literacy: the skills needed to make effective and efficient use of ICT
- information literacy: the capacity to access information efficiently and effectively, to evaluate information critically, and to use information accurately and creatively. (Voogt & Knezek, 2010)

In this regard, the literate person in the 21st century should be able to collect, analyze, synthesize and evaluate information. This makes the 21st century learning approach the kind that will be described as being holistic and inspired by modern systems theory. With this background, it is clear that the teacher of the 21st century is faced with challenges that their predecessors did not encounter.

Fig 2: A cartoon of the modern learning environment

Nonetheless, the electronic media have made materials easily accessible, digestible and available to teachers in the era for them to develop lessons that meet the needs of students/learners. Effective teaching in this age requires more than just the basic understanding of classroom management and educational theories. Rather, it requires teachers to collaborate with one another and learn to utilize these new technologies in their classrooms; thereby prepare students to enter the global market. The issue that many teachers hold on to is on how they learn and process information and knowledge instead of considering the realities of how modern students think and process their information. In deed, teachers have to be equipped with a range of skills as discussed above in addition to critical thinking, creativity and problem solving skills. Creating a conducive 21st century classroom, where teachers will engage students meaningfully implies that teachers will have to keep pace with new developments in technology as well as in new methodologies and approaches to teaching. This is likely to increase students' learning and enhance their (teachers) own professional development. It is clear that the learning environment should be kept active by the engagement of students in challenging tasks so that students are not bored. And creating such an environment could begin with engaging students in devices/tools that they already own such as mobile devices, computers, the internet and cell phones (Knezek, et. al. 2009). Studies in the literature indicate that the current generation of students learn best through manipulation of objects whether real or animated. For example, the web-cams, podcasts and online social media sites (facebook, twitter) are seen to have opportunities for teachers to take online virtual tours with their students to historical events or sites and even re-enact past events (ibid).

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From the above discussions, it can be deduced that teachers need to be prepared with knowledge beyond what is required to operate in the ordinary classroom so that they can engage in pedagogical innovations. But the issue is that, unless teacher preparation programmes change in ways that make information communications technologies (ICT) as an integral part of courses, it is unlikely that graduates from teacher education institutions can embrace new approaches to teaching. Models of good practice in teacher preparation, which include the use of ICT as integral part of courses appear to be the way forward for teachers and teacher educators. Similarly, teachers and teacher educators need to have a new mindset that teaching in the 21st century cannot be more effective without ICT and that it would be necessary for them to adopt best practices. But it needs to be mentioned that teacher training institutions where ICT is either not present or not integral part of courses, leaves prospective teachers with little understanding of how education is being practiced in the 21st century (Law, 2008).

Recent case studies of teachers' perceptions of Teacher Education in Sub Saharan Africa (TESSA) OERs, indicate that the initiative in producing the resources have achieved good results (Thakrar, Zinn & Wolfenden, 2009). ICT knowledge and frequency of use during field experiences combined with mentoring could help create ICT-rich instructional environments for teachers continuing professional development. Further, using approaches such as teachers' video clubs in which teachers collaboratively review videos of their own teachings and that of their peers have the potential to improve classroom practices (Law, 2008). Teacher professional development and networking have been suggested as critical for the updating of teachers' knowledge and skills (ibid).

Benefits of OERs to Developing Countries
Several reasons have been advanced for the use of OERs in developing countries. This is because it is believed that there are challenges with the free flow of information. Also the cost of textbooks for students could be very expensive beyond the ordinary man's pocket. As a result, OERs are some of the strategies being advanced to address these challenges. OERs are mostly cost-free. Propounders are always lobbying for the lowering of total cost of ownership, which includes other tools and resources but the cost is not handed down to the consumer. Cost

minimization includes cost shifting so that the consumer has cost-free access. It is assumed that the University professor who puts his notes online will have his University to ultimately bear the cost of publishing the notes online under the Creative Common Licence. Benefits derived from OERs may be grouped into Faculty or institutional or global. Open global contents provide Faculty with more contents choices when building learning space. Further, OERs build awareness of unique contributions to one's field of work; it fosters connections with colleagues around the world and also preserves a record of teaching innovations and allow others to build upon them. There have been various uses of TESSA OERs that have transformed many teachers classroom practices and informally self-motivated them. Shared experiences from consortium members indicate that the resource use can be put into three main modes, namely, "highly structured", "loosely structured", and "guided use" (Thakrar, Zinn & Wolfenden, 2009).

Institutional benefits associated with OERs include: providing a resource for students, faculty and alumini which pre-supposes that it will help build global awareness of the institution's educational approach and curriculum. Other benefits include: provide a resource for students, faculty and alumni that support learning and collaboration (Wikipedia, 2007).

Fig.3:   Source: Adapted from TESSA website

OERs may be considered as an evolving web of open and easily accessible materials for various activities. The materials are in forms including:

- Different media: text, images, audio files ….

- Format ranges from full courses to small discrete learning objects such as images

- May include tools to support authoring, adaption and sharing.

Methodology

Various reasons are advanced towards exploratory research studies. Sometimes it is to determine the extent of impact or relevance of a phenomenon in a particular situation. In this study, both quantitative data (data expressed in numbers) and qualitative data (data expressed in narratives or words) were collected to find out students' experiences with using TESSA OERs in their practical teaching internship. Mixed methods of survey and interviews using questionnaires and semi-structured interview guides were used in collecting data from 30 student teachers in the Early Childhood Care and Development Department of the University of Education, Winneba. Six of them, who were group leaders were purposively sampled for the one-on-one-interviews.

The questionnaires were administered to all 30 students in their various schools and collected after a week. A semi-structured interview guide was used in eliciting data from the purposively sampled students. Interviewees' consents were sought before the interviews and they were assured of confidentiality and anonimity. Interviewees willingly agreed to the tape recording of their responses for easy transcription and analysis since their responses could be repeatedly played over and over again. The questionnaire data were coded and the computer software, Statistical Package for Social Science research (SPSS) used in analyzing them. Similarly, the interview responses were transcribed from voice to text, data coded and categorized into themes. The interview data were analysed manually since few people were interviewed. Key phrases from the research questions were used as initial code categories and then from the content analysis the codes were expanded. A 'codebook' was developed to guide the analysis and also used to give meanings of quotations. The analysis process may be described as iterative with reflexivity as the main characteristic of the researchers. We had to move forward and backward

in reading the transcripts to understand what interviewees were implying in their responses and corroborate with the open-ended questionnaire responses.

Analysis and Discussion of Data

With the goal of the study being to establish the impact of OERs on student teachers' classroom practices from their experiences, coding of data into categories was done deductively and inductively. Emerging themes used included:

- nature of teachers' adaptation
- conditions that support use
- impact on teaching and learning
- challenge; and sustainability of OER use.

Twenty respondents that is approximately 67% returned their questionnaires and these were used in the analysis. Out of this number, 12 were females and 8 were males. Most of them, 15(75%) were between ages 20-40 with 5(25%) aged 41 years and above. 10(50%) had 1-5 years teaching experience, 5(25%) had 6-10years teaching experience and 5(25%) had 16 and more years of teaching experience. During the internship period, students taught in different grades as shown in Table 1. and in schools located in semi-urban, rural and urban communities, as shown in Table 2. It emerged from the data that most of them 15(75%) taught in classes with pupils numbering 20-60 and 5(25%) taught classes with size over 80 pupils. I presume this class will have more than one teacher.

Table 1: Grades taught by students

Grade	Frequency	Percent
Nursery-KG	16	80.0
Primary 1-3	3	15.0
JHS 1-3	1	5.0
Total	20	100.0

Table 2: Location of school

Type	Frequency	Percent
Rural	4	20.0
Semi-urban	11	55.0
Urban	5	25.0
Total	20	100.0

Since the TESSA OERs, which are made up of both audio and text (modules) are to be accessed from the internet, we wanted to find out students' accessibility to computers and the internet. Responses indicated that: 9(45%) had access to computers and 11(55%) did not have access to computers. The same percentage could access/not access the internet respectively. However, 13(65%) did access the library, while 7(35%) did not have access to the library. In this case then, how could students use the materials? It may be that they downloaded copies earlier on to use or what they took along with them from their campus lecture lessons. This finding was confirmed in the interview where interviewees indicated that:

> *I don't frequent the internet café because as you know, you need to have some cash [money] on you before otherwise it will be hard so I go there only when I have real need for something [1:11:27]*

> *Normally when we have activities to do before I go to the café but these are only few and sometimes my friend in the house nearby, who has a laptop and comes around then I try to download some few things so that when he goes to work he prints them for me [4:39]*

Nature of adaption and integration of OERs into classroom practice

From interviewees' responses and from the questionnaire, it emerged that students' adaptation and integration of the TESSA OERs were in various forms based on: the different age groups of classes they taught (see Table 1), the abilities of the pupils; time allotted to a lesson; expected learning outcomes and sometimes the resources available in their environments. Some indicated that:

> *At the KG level, you can't teach without TLMs so in every lesson I prepare activities and TLMs before going to class. Using the child as the centre of activities was my philosophy and also knowing that the child needs to manipulate to learn so in all my planned activities ... whether with charts, posters or whatever, I take these into consideration ...* [interviewee 1]

> *I design my activities with their age factor and ability factor in mind ... activities such as cut-out words, plays and games ...* [interviewee 2]

Analysis of a question in the questionnaire also came up with the distribution in fig.3 as to how they palnned activities for their pupils using the TESSA OERs.
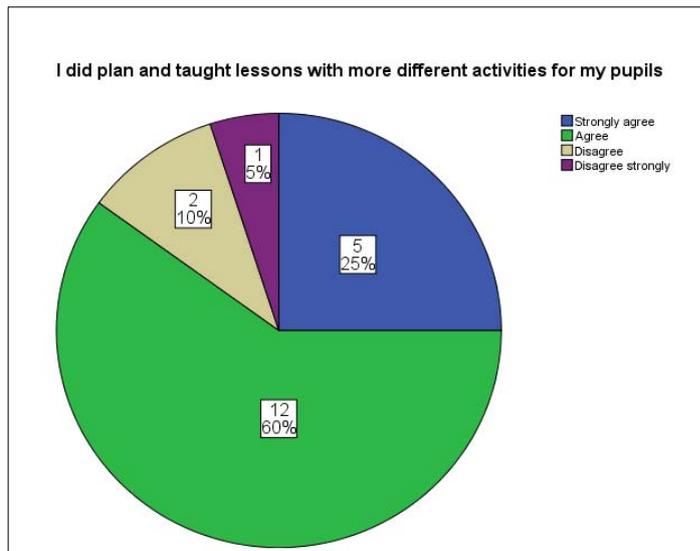
11

Fig 4: Planning & using more activities during lessons

It can be gathered from fig. 1 that 17(68%) of the respondents 'strongly agree and agree' to using OERs in planning and teaching their lessons, employing different activities, with 3(15%) disagreeing with the notion. This view supports interviewees' response that children learn by play and so their lesson designs are mainly loaded with activities that excite them. This insight seems to depict the teachers vision and beliefs about how OERs could contribute to teaching and learning of pupils at the basic level.

Lesson preparation and introduction is a skill that every teacher needs to acquire. Respondents' indication in the study that the TESSA materials aided them greatly in starting their lessons is a gain worth maintaining. The data, as shown in Table 3 indicates that 17(68%) of respondents strongly agree and agree to OERs helping them to start their lessons and even new topics better while 3(15%) disagree to the view.

Table 3:TESSA materials helped me to start my lessons and new topics better

	Frequency	Percent
Strongly agree	2	10.0
Agree	15	75.0
Disagree	2	10.0
Disagree strongly	1	5.0

	Frequency	Percent
Strongly agree	2	10.0
Agree	15	75.0
Disagree	2	10.0
Disagree strongly	1	5.0
Total	20	100.0

Categories of statements derived from the open-ended questions and interviewees' responses in relation to OERs being used in lesson planning are as indicated in the Table 4. It is evident from the categories in Table 4 that the OERs could go a long way to assist teachers design the learning pathways for pupils and meet the learning outcomes expected. 25 responses were to the point that OERs could be used to modify materials to suit the curriculum and learning needs of pupils, which at the same time allowed them to explore and make meaning of concepts being taught. In other words, OERs supported and contributed to the teaching and learning situation of the teacher and learners.

This evidence of OERs enriching the learning environments and making teaching and learning interesting seems to also underpin respondents' attitudes to the resources. The others who did not seem to have benefited might have their own reasons for not using them in planning their lesson. It is believed that teachers who resist the use of IT in teaching sometimes have reasons relating to either emotional or pedagogical limitations. Teachers who are not familiar enough with IT and its added value in teaching will hesitate to use them in their lessons; they will be more inclined to stick to their familiar routines (Voogt et. al. 2008).

On the other hand, teachers whose belief of learning is based on knowledge construction (constructivist theory) are likely to be interested in using OERs or information tools in teaching than those who believe in knowledge transfer (Hermans et. al. 2008). Also the attitudes of the 17 respondents may be seen from their conception of learning. The extent to which teachers feel comfortable using OERs may be seen as one of the key factors for their effective use in teaching.

Table 4: How TESSA materials helped students in lesson preparation

		Responses	
		Frequency	**Percent**
I did this by …[a]	Modifying the materials to suit the content and needs of pupils.	13	21.7%
	Allowing pupils to manipulate or explore the materials and make meaning out of them.	12	20.0%
	Guiding pupils to make their own inferences.	9	15.0%
	Reviewing pupils RPK using the TESSA materials.	9	15.0%
	Making the lesson real and pupil centred.	8	13.3%
	Including TESSA materials in lesson planning and delivery.	9	15.0%
Total		60	100.0%

An attempt to find out the kinds of activities that respondents employed whilst using the OERs also yielded responses as in Table 5. They include role-plays and dramatizations (26.7%), practical work in groups (23.3%), games (15%), lesson demonstrations (8.3%), outdoor activities (21.7%) and class discussions (5.0%). From the data, it appears two main factors supported OER use in activities; they are the human factor and the materials factor. The human factor is immaterial and therefore will be difficult to change from the outside or might take some time since it is made up of attitudes, beliefs, values and conception of how children learn. On the other hand, the material factor, which relates more to cost and budget lines is an issue that school administrators or managers can help teachers to address.

Table 5: Activities that OERs were used in developing

		Responses	
		Frequency	**Percent**
Activities that I used the materials included …[a]	Games in lessons	9	15.0%
	Lesson demonstrations	5	8.3%
	Class discussions	3	5.0%
	Practical work in groups	14	23.3%
	Dramatization/role play	16	26.7%
	Outdoor activities	13	21.7%
Total		60	100.0%

In sum, the impression given is that the teachers in the study believe in OERs adding value to the teaching and learning situation. Again, they believe that OERs create flexible environments that simulate real life settings that allow pupils to carry out activities that interest them, which can be perform after school as well. Teachers believe that when pupils actively get involved in learning such as work in groups, consult one another, figure things out together and even engage in physical activities, subject contents can be mastered and immediate feedback obtained. But in all these revelations, the performances of the pupils were not measured. Thus, further studies need to be carried out to that effect.

Conditions that Support the Use of/and the Impact of OERs on Teaching & Learning

The two themes were analyzed and discussed together because it emerged during the preliminary analysis of data that categories from the both sides were overlapping each other and being repeated. Both the questionnaire and interview guide sought to find out how the OERs had helped respondents in understanding the different ways that pupils learn and how they have improved their teaching in that direction. Most of them seemed to have responses that included statements such as:

> *I now think more about the lessons I have taught and this helps me to improve my teaching and lesson preparation … I can use the OER in different ways, before, during and even after the lesson* [Interviewee 2].

I now teach pupils more about things that are important to them and use resources from around them ... I have new ways of using the resources [interviewee 6].
I'm a better classroom manager now, and have learnt new ways of teaching … [interviewee 1]
I planned and taught lessons that my pupils found interesting and enjoyable ... [interviewee 3]

From these extracts, one can deduce that respondents seemed to have reflected on their teaching after using OERs and resolved to bring about improvement in their classrooms. For example, the comment that *I now think more about lessons taught …* is an evidence of reflection-on-action and identifying areas for improvement if the opportunity comes again. Further, planning to teach in future lessons that relate to pupils' real life situations and interesting to them indicates that a lot of thinking or reflection have been taking place with the teachers. Reflective practice is a concept that student teachers are supposed to engaged in during their teaching internship and use in designing action research projects. They are to use that self-evaluation process to also make changes until learning outcomes of pupils. It could be assumed that respondents in this study seemed to have acquired these qualities and will be using them in their future practice. Again, the different ways in which the TESSA materials used during lesson preparation and teaching are as in Table 6.

From Table 5 and 6, OERs seemed to have had positive impact on both the teacher in his/her lesson planning and delivery as well as the pupils in their participation in the lesson delivery. Also it seems that the teacher now has a renewed mindset to teaching pupils' learning and could design frameworks for working in class. This exposure is likely to lead teachers to achieving learning outcomes within their given times and have an inner satisfaction that concepts are being grasped. This is supported by literature that when pupils actively get involved in teaching and learning, there are radical changes in the learning environment and teachers tend to find the important teaching methods (Kennisnet, 2010). Respondents used games as a strategy in teaching a lot in this case; and games in education can be developed also from different perspectives. It may be assumed that games developed from the TESSA OERs were simulations that helped pupils imitate reality in the form of models [respondents should have elaborated of the kinds of games]. Nonetheless, simulations from games are known to allow pupils to develop practical skills or familiarize themselves with basic principles in creativity, which eventually creates inquiry-based learning.

Table 6: The different ways teachers used the TESSA materials

	Responses	Frequency
Ways I now use the TESSA materials are….	a) Pupils interacting with TESSA materials and engaging them in problem solving activities such as games	11
	b) Guiding pupils to explore varieties of the TESSA materials and come out with their own ideas and share with others.	8
	c) Gradually, I take pupils thru' the use of TESSA materials to enhance their understanding of concepts.	7
	d) Maintaining the level of creativity in using the TESSA materials	5
	e) Using the TESSA materials to cater for individual differences/ abilities	4
The new ways that I use the materials are …	a) Giving variety of materials to pupils (in groups) to explore and guiding them to come out with their own ideas	12
	b) Involving pupils in lesson discussions and class activities (pupil centeredness)	8
	c) Guiding pupils to brainstorm and role-play what they learn	6
	d) Effectively using the TESSA materials in lesson planning and delivery	9
	e) Evaluating lessons using TESSA materials	3
	f) Using local materials that pupils are familiar with to whip up their interests	9
	g) Encouraging pupils to explore and question things in their locality	6
	h) Relating classroom activities to pupils experiences	5
	i) Engaging pupils in activities that cater for their individual differences	4
	j) Planning lessons based on practical activities	5

Again, it seems clear from the responses that creative abilities of teachers were ignited and they were poised to designing materials to make lessons interesting and exciting for pupils to enjoy. Respondents seemed to have been awakened to the fact that local resources in their immediate environments could be used in lesson planning and delivery and responses to that effect are as in Table 7.

Table 7: Materials around that are used in preparing TLMs

Some resources that I use are …	Responses	Frequency
	Artificial: Empty containers: boxes, cans (tins), cartons, bottle tops.	11
	Natural: - Animals: Seashells, sea-sand stones/pebbles, plants: wood/sticks/seeds/straws/flowers, seeds etc. in the environment.	19
	Commercially made TLMs e.g. blocks, shapes, legos etc.	4
	Any available TLMs in the environment	3

The findings in table 7 indicate that almost all (19) respondents made use of natural materials found in their locality. The University is located in a community close to the sea and it is not surprising that natural resources such as seashells, sea sand, stones and pebbles were being used in teaching a lot. Again, empty containers, boxes and cans were adapted and used as TLMs. However, it seems teachers did not comment on their own 'man-made' posters and charts. From Table 6 (e) only 3 respondents '*evaluated lessons using TESSA materials'*. This raises an issue of receiving and giving feedback on pupils' performance, which is an important aspect of assessment. The skill of giving feedback to pupils is considered important so that teachers can share what went, what did not go so well and how that can be corrected or improve upon. Further, it gives pupils the opportunity to let you as the teacher know their problems and difficulties they encounter. However, challenges that did not aid them to constantly use OERs are discussed ahead in the text.

In sum, various elements contributed to supporting teachers' use of the TESSA OERs in teaching and learning practices. It emerged in the analysis that reflection-on-action played a key role in teachers continuous use of the OERs. Teachers renewed mindset to pupils' learning styles which led to lessons interesting them and aiding them to participate thereby achieving learning outcomes and inner satisfaction of teachers supported the OER use. Again, the availability of local materials in the immediate environments, which aided the development of learning materials (TLM) made teachers develop positive attitudes to using the OERs.

Challenges and Ways to improve the Use of the OERs

Besides the positive impact of the TESSA OERs in teachers' planning and delivery of lessons, respondents were similarly disappointed with certain issues that have been repeatedly raised in the past but no solutions have been found to them. Respondents were referring to the time on campus when they were first introduced to the website and the resources. An evaluation report conducted whilst they were on campus revealed that the cost of accessing the Internet was costly to them as students, yet still nothing seems to have been done about it; lack of capacity to use the internet was also a limitation and the slow nature of the connectivity. Comments from the open ended questions on challenges they encountered are as shown in Table 8.

Table 8: Comments on challenges and frustrations in using the OERs

	Responses	**Frequency**
They could do this by ...[a]	Frequently organizing in-service training on TESSA materials preparation and usage	**18**
	Making follow-ups in schools to observe how TESSA materials are used & seek thier views.	**7**
	Making internet facilities available in schools to access the TESSA website.	**5**
	Occasionally providing schools with modern varieties of TESSA materials.	**5**
	Providing funds to design and prepare simple materials.	**2**
	Handouts on the preparation and use of TESSA materials.	**2**

Almost all (18) respondents indicated that they need training in how to use the OERs in lesson preparation and delivery; some (7) indicated that they will appreciate it very much if effective monitoring is instituted so that they will they will know how well they are performing with the use of the resources. Others would want the school management to support them with material development when they are on internship. These viewpoints are in line with what the general group iterated in the campus survey. Additional comments from interviewees are as in Fig 5 below
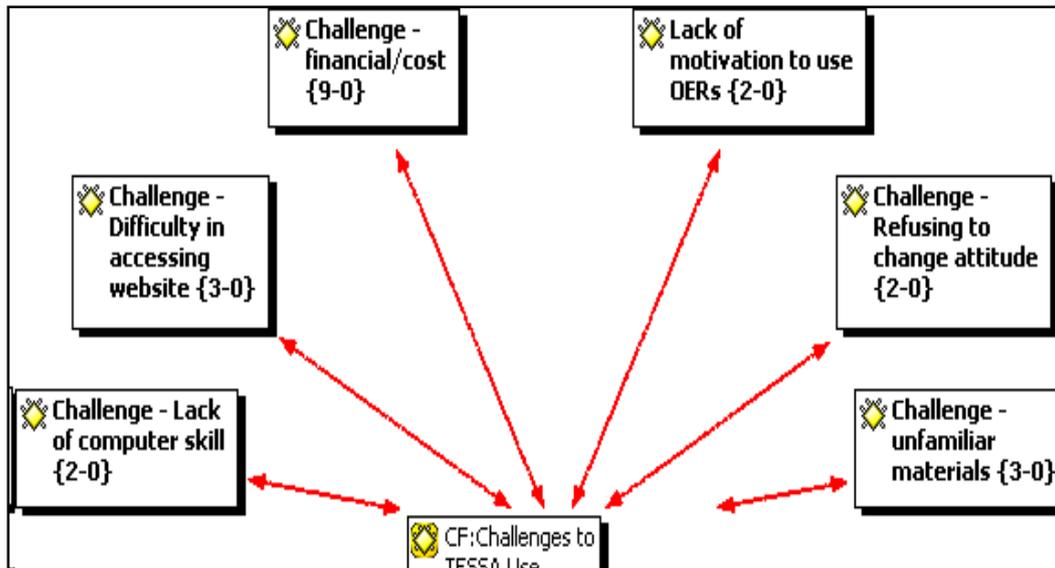
Fig 5: Challenges Users Encounter during use of TESSA OERs

Let me tell you the truth. Some of us are not very good accessing the internet. So when it is a group assignment, we go there and those who are very good browse whilst we sit by them. It is interesting anyway. You see a lot of fascinating things during the process... [4:2:19]

Another thing is the accessibility. The few places you can access the website are very slow. So it means you waste a lot of time and hence you pay more. Sometimes if you key in you see that there are a lot of programmes at the website. You may be looking for language and literacy but if you aren't specific, it will generate a lot of information that may be irrelevant to you at the moment. [2:5:30]

These concerns of respondents that due to connectivity issues, browsing the internet takes so long to access materials. The length of time was costly to them and a burden. They further complained about severe lack of resources and funding to develop sufficient materials using the OERs. Lack of skills to use the computer by some individuals limited them to access the materials. These are issues that school managers need to address so that teachers can benefit from using such resources to teach. Respondents therefore requested that support systems should be put in place to enable them benefit from the resources.

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Conclusion and Recommendations

These findings, though tentative and in need of further elaboration, throw light on some issues relating to teachers using technologies in general and in particular open educational resources in different socio-cultural contexts. It is clear from this study that teachers have positive attitudes towards OER usage in lesson preparation and delivery. This is because they acknowledge the fact that the resources added value to the teaching and learning environment. Again, the teachers in the study shared the belief that OERs enhance pupils' learning and that the integration of OERs into their teaching is both desirable and needed. However, they realized that there was not enough support to enable them achieve their best. They indicated that support structures in areas such as access to the internet at a reasonably low cost, equipment to help build their capacities, lecturers following them up to monitor how resources were being used, funds for material development and other classroom structures to support use of the OERs were lacking. In addition, teachers in the study stressed the need for continuous staff professional development to build their capacity. Specifically, they requested that there should be opportunities, particularly in OER use for them in the teaching and learning situation. Teachers need to be encouraged to adapt new approaches and strategies in their classrooms. In other words, as new technologies emerge in the information and communication industry, teachers should to be exposed to them so that they can equally meet the learning needs of the pupils. Furthermore, they should be exposed to best practices and how others have used OERs in their contexts. It was suggested that if possible, the coordinator should provide them with sites to access a wide range of support materials in alternative modes. The project team should also expand the scope of the contents to cover other curriculum areas.

Again, teachers in this study indicated that their knowledge and skill in reflective teaching have been sharpened. This is because as they used the resources and had positive feedback, they were motivated to explore alternatives and other creative techniques, which would excite the pupils. It is clear that the teachers interest and enthusiasm in using OERs were aroused. This evidence not withstanding the many challenges gives the assurance of sustainability of use when they are on their own in future.

Concluding, on the whole, student-teachers' experiences with the use of TESSA OERs have been positive as users and the influence on their learners. The nature of use of the OERs was in diverse ways: almost all of them seemed to have been using the OERs in lesson preparation or planning and in delivery. They were using them in material development; in other words, in designing innovative TLMs to enhance teaching and learning, they also used the OERs in a way that had positive impacts on pupils' learning so that there was creativity and adaptability in using them, they used them in exciting and interesting ways and even in assessing pupils' learning. However, some were concerned about difficulties they encountered when using OERs and suggested that there should be support structures to address those challenges. According to Rowntree (1992):

> "As reflective practitioners we never allow our work to become a matter of routine. We remain alive to new issues, new theories, new knowledge, new technologies, new controversies that touch upon our field. We expect to go on learning and developing new approaches of our own as log as we practice" (Rowntree, 1992, p.2).

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