

Constructivist-based blended learning environments in higher education: student and teacher variables in the Tanzanian context

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Chapter 1

General Introduction*

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Chapter 1
General introduction

Abstract
This introductory chapter aims to offer an overview of the research studies in this dissertation. First, the chapter focuses on recounting the general problem and its setting. Second, the theoretical background is discussed. Third, the research design, research objectives, research questions and the overall framework of this dissertation are deliberated.

1. Introduction and problem setting

1.1 General problem statement

The traditional teaching and learning environment is typically characterised by face-to-face instruction in live interpersonal interactions between teacher and student, or student and other students (Giannousi, Vernadakis, Michalopoulos, Zetou & Kioumourtzoglou, 2011; So & Brush, 2008). In such a learning environment, learning opportunities are limited due to physical separation and the delay in providing feedback to students. With the rapid increase in the adoption, integration and implementation of digital instructional technologies in educational settings, however, higher education institutions (HEIs) have assisted the deployment of the blended learning environment, which is regarded as a useful way to meet the challenge of the traditional teaching and learning environment (Sang, Valcke, van Braak & Tondeur, 2009). Furthermore, blended learning has minimised problems related to physical spaces.

Research indicates that HEIs are struggling to deliver effective, flexible, convenient, well-designed and accessible learning environments to address students' adaptable needs, societal forces and skills (Richardson, 2010; Tshabalala, Ndeya-Ndeya & van der Merwe, 2014; Owston, York & Murtha, 2013). Scholars have suggested that the expanding and growing deployment and implementation of blended learning environments have created a new path for communication, interactions, multimedia input and assessment models, and it is regarded as an uncomplicated learning model (Moskal, Dziuban & Hartman, 2013; Owston et al., 2013; Norberg, Dziuban & Moskal, 2011; Porter, Graham, Spring & Welch, 2014). In blended learning environments, the focus is on the opportunities available for students to construct meaning, devise their method of learning, and confirm understanding through discussion (Garrison & Vaughan, 2008). However, in both theory and practice, blended learning

environments offer access to improve expertise and gain professional knowledge and skills in real-life problem solving (Jokinen & Mikkonen, 2013).

For some time, teaching and learning in Tanzanian HEIs have been characterised by behaviourist strategies, which are based on the development of a set of instructional sequences with predetermined outcomes (Komba, 2009; Mtebe, Dachi & Raphael, 2011; URT, 1995, 2014). In fact, these instructional models are applicable in behaviourist learning environments and not in constructivist learning environments, whereby instruction is based on the subject outcomes (Mogonea & Mogonea, 2014b; Rovai, 2004). Constructivist beliefs place less emphasis on the sequence of instruction and more emphasis on the instructional design, and on learning environments that instigate active learning, collaborative learning, engagement and meaning construction (Jonassen, 1994; Lefoe, 1998).

Moreover, constructivist beliefs have emerged as an active pedagogical approach in support of students' authentic learning and teachers' teaching in complex, ever-changing educational settings. Research shows that constructivist beliefs uphold the premise that students construct knowledge through experienced-based activities and personalised learning, rather than teachers' direct instructions (Mogonea & Mogonea, 2014a; Roblyer, 2006). According to Alessi and Trollip (2001), students are the active creators and innovators of knowledge through observation, manipulation and, thus, interpretation of the real environment, as they make sense of their learning experiences.

While considerable research on students' and teachers' experiences, challenges, satisfaction, learning approaches, adoption strategies and constructivist learning in blended learning environments have been conducted in higher education (Prawat, 1992; Szeto, 2014; Porter et al., 2014; Mtebe, 2013; Yen & Lee, 2010; So & Brush, 2008; Sife & Lwoga, 2007; Osguthorpe & Graham, 2003), little is known about students' and teachers' perceived roles, constructivist teaching practices, engagement strategies and motivational factors in constructivist-based blended learning environments (CBLEs) in the Tanzanian context. Moreover, research investigating student and teacher multiple variables can be interpreted as a rational shift in the fields of knowledge generation, technological innovations and learning theories in the Tanzanian context. Furthermore, to understand how CBLEs work in higher education, one should be conversant with both teacher and student variables including learning approaches, the conception of constructivist learning, engagement strategies, motivational factors to learn and their constructivist beliefs, which are crucial variables when incorporating and implementing CBLEs in HEIs. This brings into consideration the general research problem and the objective of this research project, as discussed in this dissertation.

This dissertation uses the orientation of coherent and specific chapters, and each chapter presents a single independent research study. Thus, this research project involves five studies in one. The orientation should not be regarded as synonymous in all respects to a typical introduction to a research dissertation, although a resemblance can be observable. The main purpose is to provide an orientation to the dissertation and, as such, it provides information on the following: the research problem, the theoretical and empirical background, the research objectives, research questions, research variables, research design and study instruments. A comparable format is followed in each chapter. The dissertation adopts three main perspectives: (students' learning, teachers' teaching, and HEIs (cf., learning environments - CBLEs). These perspectives are interlinked with constructivist beliefs.

The constructivist epistemological interrelationship of the three perspectives is illustrated in Figure 1. A link can be observed between students' constructivist learning, teachers' constructivist teaching and constructivist beliefs, which basically lead to constructivist-based blended teaching and learning practices, strategies, engagement, learning activities and environments. As for student learning variables, the following are examined: conceptions of learning approaches, motivational factors to learn, engagement strategies and conceptions of constructivist learning. As to teacher variables, the dissertation focuses on teachers' beliefs, teachers' perceived roles (TPRs), constructivist teaching practices (CTP) and constructivist engagement practices (CEPs) in CBLEs. Lastly, HEIs, in which a constructivist-based blended learning environment is conceived on the basis of: active learning environments which integrate traditional face-to-face learning and digital instructional technologies (supportive learning, collaborative learning and authentic academic tasks (Rovai, 2004; Ültanır, 2012). However, crucial interactions among students, teachers and learning environments (cf., constructivist-based BLEs) offer appropriate guidance to the conduct of the research projects.

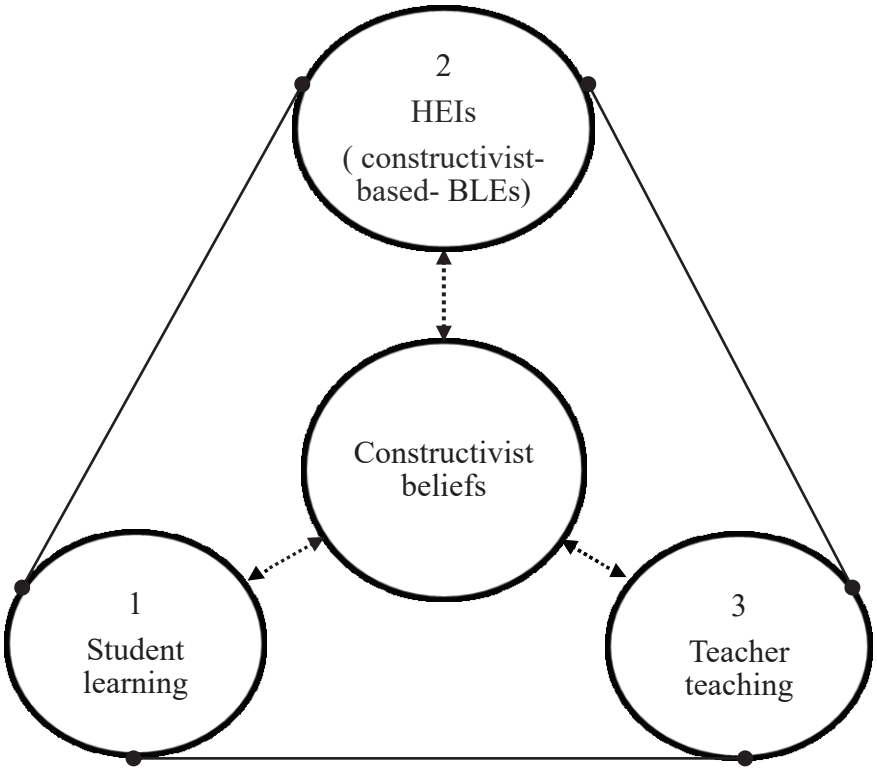


Figure 1. Research perspectives of this dissertation

1.2 Higher education in the context of this research

Higher education in Tanzania refers to the scope of knowledge and skills taught and learnt within the tertiary level of education (URT, 1999). The tertiary level of education signifies universities, university colleges and non-university HEIs accredited by the Tanzania Commission for Universities (TCU), the National Council for Technical Education (NACTE) and higher education service agencies (URT, 2010; TCU, 2012). Although HEIs are regarded as autonomous bodies, TCU and NACTE are responsible for the guidance on the provision of quality higher education, quality assurance and oversee both public and private universities and non-university institutions. The number of HEIs has increased significantly since 1990 following the creation of the Ministry of Science, Technology and Higher Education, which was responsible for the provision and guidance of higher education. Although, the name of the ministry has been changing over time, however, the demand of integrating innovative teaching and learning technologies in higher education has remained as a core mission in educational policies, guidelines and endorsements. As such, in 1999 the National Higher Education Policy was formulated to guide the delivery of higher education in the country (URT, 1999).

In this context, HEIs are dedicated to the professional and intellectual development of humanity and society, with three core functions including teaching, research and community

engagement (public service). In HEIs, multiple delivery modes such as radio correspondence, distance and continuing education and face-to-face delivery have been in place for some time. With technological innovation in higher education, combined multiple delivery modes such as digital instructional technologies (e-learning, media, mobile, online learning) and face-to-face (direct instruction) have been deployed, integrated and implemented. It is evident that a few HEIs with adequate ICT facilities and bandwidth have incorporated the use of digital instructional technologies in teaching and learning (URT, 2007; URT, 2016), thus, enhancing students' constructivist engagement in authentic learning and making teachers' constructivist alignment more flexible and meaningful. This research was motivated by the need to investigate teacher and student variables in the Tanzanian context in which constructivist-based BLE combine constructivist pedagogy, digital instructional technologies and traditional modes of education delivery in higher education.

1.3 Blended learning research in the Tanzanian context

Since the endorsement of the National Higher Education Policy in 1999, HEIs have been implementing powerful instructional technologies based on computer and communication technologies. Most of these educational innovations have been designed to support academic delivery and enhance learning processes. For example, learning management systems (LMS) and content management systems (CMS) such as Moodle, Sakai, Edmodo, CANVAS and Blackboard (Komba, 2009; Lwoga & Komba, 2015) have been installed, integrated and implemented to assist the teaching and learning process. Essentially, HEIs in Tanzania have adopted and implemented blending learning to supplement on-campus delivery since 1998, based on the Blackboard system (Bhalalusesa, Lukwaro & Clemence, 2013; Twakyondo & Munaku, 2012). Moreover, Mtebe and Raphael (2013) maintained that with funding from the Flemish Inter-University Council the Blackboard system introduced at the University of Dar es Salaam changed the method of education delivery, and subsequently planning, deploying and reporting training activities were accomplished at 'anytime' and 'anywhere'.

Moreover, research on innovative educational technologies in Tanzania has relied on the apparent increase in the adoption, deployment and implementation of digital instructional technologies (cf., blended learning, e-learning systems) in higher education (Sife, Lwoga & Sanga, 2007; Mtebe & Raphael, 2017; Mtebe, 2013; Mtebe & Raphael, 2013). Furthermore, the importance of incorporating technology in education has been explicitly enshrined in different government policies, circulars and strategies that have been endorsed to influence its

incorporation and adoption in higher education (URT, 1999; URT, 2010; TCU, 2012). Therefore, Tanzania's vision 2025, National ICT policy of 2003 and the updated National ICT policy of 2016 together influence and recognise the use of the internet, digital instructional technologies and multiple delivery modes (URT, 2003; URT, 2007; URT, 2014; URT, 2016; Almasi, Machumu & Zhu, 2017). URT (2016) maintained that in order to enhance all the possible education opportunities HEIs should foster teachers' professional development in the field of educational technology and pedagogy and advocated for the development and utilisation of digital instructional technologies. On the one hand, Sife et al. (2007) have examined how ICTs and relevant instructional technologies have changed the delivery and organisation of higher education in Tanzania, while Raphael (2016) has explored the challenges of HEIs offering blended learning programmes. On the other hand, scholars have examined several innovative instructional technologies and the development of the blended learning approaches in Tanzanian higher education based on instructors' and students' interactive experiences (Makuu & Ngaruko, 2014; Muries & Masele, 2017).

Multiple research studies have focused on the creation of e-resources, e-content and change in the curriculum by engaging more students in the design, planning and delivery of blended learning courses (Muries & Masele, 2017; Macharia & Nyakwende, 2010). Studies reported that several HEIs use digital instructional technologies to improve the quality of face-to-face delivery through blended learning (Lwoga, 2012; Mtebe, 2013; Mtebe & Raphael, 2017). Recently, HEIs have used open-source software (Moodle) built on didactic ideologies to deliver blended learning courses (MU, 2015; Mtebe & Kisaka, 2015b). However, the deployment of a blended learning strategy is concomitant with some HEIs' corporate strategic plans to intensify the deployment of ICT infrastructure in training and learning (MU, 2012).

Trends in the use of blended learning have increased the number of HEIs appreciating its potential advantages (Mtebe & Kissaka, 2015a; Tedre, Ngumbuke & Kemppainen, 2010; Ndume, Tillya & Twaakyondo, 2008). Most of the existing studies on blended learning are about attitudes, adoption, deployment, implementation, awareness and technical aspects of the field. However, studies on students' learning approaches, constructivist learning, motivational factors, engagement strategies, teachers' beliefs and constructivist engagement practices regarding constructivist-based blended learning environments are inexplicit. On that account, there are also few studies that have explicitly investigated student and teacher multiple variables in constructivist-based blended learning environments in higher education in Tanzania. Therefore, this research systematically investigates student and teacher variables in constructivist-based blended learning environments in Tanzanian higher education.

2. Theoretical background

2.1 Conceptions of learning

In order to understand how blended learning and constructivist-based blended learning environments are executed in the context of this research project, this section describes the term 'learning' in detail. In so doing, it is appropriate to define three aspects in relation to the term learning hereunder: (1) learning as construction of meaning, (2) learning in context (learning environments), and (3) engagement (Strommen & Lincoln, 1992; Moust, Bouhuijs & Schmidt, 2007; So & Brush, 2008).

According to Moust et al. (2007) learning as a construction of meaning deviates from 'direct instruction', a passive process whereby a teacher always owns the knowledge, and the student is 'packed' with the knowledge as an empty space or mind. That is, to assume that learning has taken place, the student should be able to remember factual information provided by the teacher. Moreover, in order to understand the acquired knowledge, the student's prior knowledge on the topic plays a central role in meaning-making. Thus, the information provided should be transformed into personal meaning (Entwistle & Peterson, 2004). As a result, the student uses prior knowledge to construct meaning (Jonassen & Land, 2012). Also, learning is viewed as an act of student interpretation and application, based on knowledge already possessed about a subject matter. The student's existing knowledge should be related to the learning environment in which the student is engaged in order to be helpful in the new learning experiences (Moust et al., 2007).

However, students need to be engaged in order for their existing material to help them acquire new learning experiences. Students' engagement in learning relates to their interactions, efforts, time and resources invested in optimising their new learning experiences. Furthermore, learning should involve the highest degree of curiosity, attention and passion for acquiring knowledge, based on prior stimulated knowledge in a new learning situation (Negovana, Sterian & Colesniuc, 2014). Finally, scholars in the field of educational research have reported that knowledge will remain abstract if it is not interpreted and applied to the relevant learning environments (Jonassen & Land, 2012; Vermunt & Vermetten, 2004). With resourceful learning environments, students can transfer learned knowledge into the real world (Moust et al., 2007).

Generally, in this PhD dissertation, learning is to be understood as learners' ability to engage in knowledge construction based on prior learning experiences fostered by resourceful learning environments. Resourceful learning environments are defined as student and teacher favourable

teaching and learning surroundings or conditions that maintaining a positive culture of meaningful learning in higher education (Kember & Leung, 2006). It involves creating a learning platform, spaces, getting the students to cooperate, teacher and student support services and facilities such as the internet, library with both print and multimedia resources such as e-books. In such learning environments, students are more likely to be task-oriented, collaborative and reflective, and hence, more likely to engage in higher order thinking (Ping, Teo, Wong, Khine, Chai, & Divaharan, 2003). However, resourceful learning environments do not just happen; they are the results of effective higher education management, university leadership and stakeholders concern that establishes the work systems for both student and teacher engage in meaningful teaching and learning or active learning.

2.2 Blended learning

Blended learning has been defined as a combination of traditional face-to-face instructional modes with innovative computer-mediated instruction (Graham, 2006; Hung & Choub, 2014; Khechine, Lakhal, Pascot & Bytha, 2014; Rooney, 2003). Garrison and Vaughan (2008) described blended learning as "organic integration of thoughtfully selected and complementary face-to-face, online approaches and technologies (p.148)". However, based on this definition, two perspectives related to the practical application of blended learning should be clearly defined. First, the basis of integrating face-to-face and digital instructional technologies to support a wide range of pedagogical approaches in higher education. Second, teachers' and students' primary use of digital instructional technologies to enhance their engagement and quality of learning (Garrison &Vaughan, 2008; Norberg et al., 2011).

Donnelly (2006) reported that blended learning is a process of creating an intellectually stimulating environment to most effectively and efficiently achieve the intended learning process and outcomes. An intellectually stimulating environment is regarded as an informative environment in which teacher and students share training events, challenge each other and actively engage in developing appropriate educational experiences for solving real-life problems. Blended learning integrates several pedagogical issues including peer coaching interactions, constructivist learning, instructional resources, self-regulated learning, learning effectiveness, cognition and performance support (Karimi & Ahmad, 2012; Kistow, 2011; Norberg et al., 2011; Szeto, 2014). Furthermore, researchers have argued that blended learning involves studying different design features and learning activities, including peer interactions, peer review, assignments and online discussion forums (Wicks, Craft, Mason, Gritter &

Bolding, 2014). However, the blending of these learning activities enhances the students' ability to meet the intended learning objectives.

Alongside this, Thurab-Nkhosi (2013) stressed that "blended learning is an integrated and planned approach to teaching and learning that appropriately combines face-to-face and digital instructional technologies to advance student-centred learning" (p.82). That is the integration of innovative instructional technologies in traditional face-to-face learning support and improve both teachers' teaching and students' learning. Furthermore, scholars have argued that the most important aim of the blended learning approach and its design features is to find the most effective and efficient combination of learning modes for the individual learning subjects, courses, modules, contexts and objectives (Marsh, 2012; Norberg et al., 2011). In this way, the major aim of blended learning is not to choose learning tools that are right, best or innovative as opposed to the traditional, but to create appropriate and active learning environments that enable authentic student learning (Kihoza, 2016). However, in this dissertation, 'blended learning' is operationalised as the thoughtful, planned and designed delivery approach, which takes advantages of both traditional teaching modes and digital instructional technologies to yield the intended student learning experiences.

2.3 Development of blended learning in higher education

Blended learning has evolved in conjunction with innovative ideas in educational settings to conform to diverse pedagogical approaches, instructional designs, learning tools and instructions that teachers use (Singer & Stoicescu, 2010; Yen & Lee, 2010). However, many factors are in place driving higher education to implement blended learning, such as economics, technological changes, pedagogical approaches, working and social factors (Sife, Lwoga & Sanga, 2007). Therefore, the current development and increasing use of blended learning in HEIs are due to the influence of innovative instructional digital technologies and the failure to meet learners' expectations in traditional learning (Mtebe & Kissaka, 2015b; Thurab-Nkhosi, 2013). Moreover, implementing blended learning in HEIs has accelerated information access, communication via e-facilities, increased students' active learning, engagement and collaborative learning, personalised learning and is cost-effective. In this research, cost-effective is described as economic analysis for higher education has primarily focused on e-adoption and implementation of ICT and related systems like e-learning, digital instructional technologies (Garrison & Kanuka, 2004). It involves the decision made regarding the adoption

of blended learning that decreases the risks of implementation from both a financial perspective and the perspective of maintaining quality teaching and learning.

Scholars identified two conceptions regarding the development of blended learning in higher education (Garrison & Kanuka, 2004; Singer & Stoicescu, 2010; Norberg et al., 2011). On the one hand, blended learning has evolved along with teachers' concerns about how to understand its pedagogical orientation, rather than an understanding of the technological requirements. On the other hand, blended learning has evolved due to technological innovations in HEIs that transcend online learning (Yen & Lee, 2010). However, studies in the field of educational technologies have maintained that the emergence of blended learning in HEIs is associated with several limitations regarding online learning including lack of pedagogical design and approaches, reading from a digital display and diverse cultures (Ackerman, 2009; Osguthorpe & Graham, 2003; Kanuka & Rourke, 2013; Eshet-Alkalai & Geri, 2007). Other limitations include challenging educational environments, lack of physical reinforcement of the face-to-face learning environment, and lastly, loneliness and social detachment (So & Brush, 2008; Precel, Eshet-Alkalai & Alberton, 2009).

Also, researchers have shown that pedagogical and technological innovation in higher education influenced the development of blended learning, whereby appropriate instructional design has been used to maximise student engagement, provide authentic learning, improve academic performance and track teachers' performance (Vaughan, Cleveland-Innes & Garrison, 2013; Skrypnyk et al., 2015). In 2008, So and Bush reported that successful cases in blended learning had shown the significance of well-designed learning activities and engagement strategies based on both students' and teachers' creativity, and methodical thinking to overcome the limitations of face-to-face and online instructional delivery in HEIs. For example, the teacher-centred approach is guided by traditional face-to-face instruction, whereas online learning is purely a student stand-alone learning approach.

However, research has shown that learner-centered models of teaching and learning have replaced the traditional face-to-face instructional models (Sife et al., 2007; Shea & Bidjerano, 2010), with the emergence of innovative instructional technologies offering educators a unique, available opportunity to apply blended learning that is highly interactive, innovative, meaningful and learner-centred (Shaari et al., 2012). In summary, the development of blended learning in higher education is a result of many factors including challenges facing students and teachers to engage in authentic teaching and learning and challenges facing the traditional philosophy of teaching and learning. Other factors include research efforts examining appropriate teaching and learning pedagogies in the provision of twenty-first-century education

which fosters students' active learning, and teachers' engagement practices and understanding with the aid of innovative digital instructional technologies in ever-changing real-life skills.

2.4 Conceptions of constructivist-centred learning

The premise of constructivist-centred learning is based on meaning-making and, practically, it is when learners actively try to make sense of the material presented to them (Mayer, 1999; Mayer, 2003). Constructivist-centred learning has been referred to as meaningful learning or knowledge construction because students actively engage in knowledge construction by deeply processing the to-be-learned material while trying to understand it (Mayer, 1999; Saidalvia & Mansor, 2012). Moreover, students actively and deeply process knowledge as their facilitators utilise instructional methods and technologies that promote the sense-making process. While students are responsible for constructing their own meaning based on their learning experiences, teachers are responsible for facilitating and directing discourse based on students learning experiences.

For successful knowledge construction, Perez and O'Neil (2003) suggested that constructivist students "must apply and coordinate their cognitive processes while engaging in meaningful learning" (p.128). In this case, learning in constructivist-centred learning depends on both teacher and student thoughts, experiences and senses. In reality, constructivist-centred learning is not confined to specific disciplines or levels of study. It applies to all field of study; however, its coordination requires proper knowledge and skills. For example, constructivist-centred-technology learning has been conducted in medical education (i.e., telemedicine), geology (i.e., GIS-based multimedia and remote sensing), mathematics and geometry (i.e., GeoGebra) and statistics (Poelmans & Wessa, 2015). In Tanzania, for example, constructivist-centred learning approach has been used in primary schools (i.e., English medium schools) such as the International Schools of Tanganyika, secondary schools (i.e., learner-centred science teaching and learning (Mkimbili, 2018), such as ShuleDirect project - an online platform that provides educational learning content for students and teachers in secondary schools - https://www.shuledirect.co.tz), and higher education (several institutionalised learning platform).

Moreover, constructivist-centred learning has its theoretical foundation, scope and principles in the work of several critical scholars, such as John Dewey's educational philosophy, the works of gestalt scholars like Bartlett and Bauer, and the works of prominent educational theorists like Lev Vygotsky, Jean Piaget and Bruner (Raths, 2001; Gurbuzturk &

Sad, 2009). However, the focal point is that learning is aligned with learner-centred principles (Azizinezhad & Hashemi, 2011; Saricoban, 2013) including discussion, engagement, collaboration, interactions and problem-solving in a meaningful learning environment. According to Jonassen, Davidson and Collins (1995), constructivists believe that "our personal world is constructed in our minds and that these personal constructions define our personal realities" (p.10). This implies that the mind is an instrument of thinking, judging, organising and interpreting individual experiences in a social context, and finally constructs meaningful learning (Gurbuzturk & Sad, 2009; Simon, 2001). However, in this research, it should be noted that innovative instructional technologies should seek to activate the cognitive processing that leads to students' understanding of the materials presented to them. Thus, it should either seeks to enhance productive cognitive activity in tandem with appropriate behavioural activity or "complement human capabilities, aid those activities for which we are poorly suited and enhance and help develop those for which we are ideally suited (Norman, 1993, p. 12)".

2.5 Constructivist-based-technology learning environments (CBLEs)

The use of blended learning has become increasingly invaluable in HEIs, in such a way that its design, deployment, adoption and implementation in higher education seems to have a wide impact on students' learning and teachers' teaching (Littlejohn & Pegler, 2007; Zhu, 2009). Blended learning approach is used in support of diverse pedagogical approaches in higher education including constructivism, social constructivism and problem-based learning. As such, learning environments in which blended learning delivery is experienced is considered to be CBLEs. It is argued that the focus of blended learning delivery is not giving people access to the latest technology rather on promoting human understanding through cognitive activity with the aid of technology which is not applicable in behaviourists that focus on individual student's behaviour change through behavioural activity (Mayer, 2003). In CBLEs, face-to-face interactions and digital instructions are optimally integrated in such a way that the strengths of each are blended to form a unique learning environment congruent with the context and intended educational purposes (Akkoyunlu & Soyle, 2008; Garrison & Vaughn, 2008). Zhu (2009) upheld that apart from online provisions, traditional face-to-face contact is still a significant part of the educational setting, although exploiting CBLEs' potentials are of paramount importance to both students' and teachers' authentic engagement in HEIs.

Scholars have argued that CBLEs are characterised by students' self-regulation, great autonomy of students' learning experiences, unlimited learning places, time and physical materials and offers students great control over when, what and how to study (Barnard et al.,

2008; Bonk & Graham, 2006; Jokinen & Mikkonen, 2013; Singer & Stoicescu, 2010; Yen & Lee, 2010).

However, for effective design of CBLEs, it is significant to balance between digital instructional technologies and traditional face-to-face teaching and learning environments. As Akkoyunlu and Soylu (2008) found, the blending of instructional objectives, engagement strategies, learning approaches and the condition of online resources of teachers play a significant role in designing CBLEs. Moreover, when academic achievement among students measured in the same way, most of the studies have shown that students who actively engage in CBLEs tend to achieve good academic performance compared to students who engage in traditional learning environments (Ashton, Koch, & Rothberg, 2014; Ceylan & Kesici, 2017; Kwanjai & Sumalee, 2012). Giannousi et al. (2011) affirmed that in CBLEs both student and teacher engage in peer coaching interactions, participate in group discussion and share curriculum contents. Furthermore, in promoting a personalised curriculum, student interactions based on real-life knowledge and prior learning experiences are core ingredients in enhancing the adoption of CBLEs (Rovai, 2004). In this research, CBLEs involve the use of face-to-face and digital instructional technologies enhanced by social interactions, communities of learning, on-time feedback and increased collaborative activities.

2.6 Teachers' variables related to constructivist-centred technology integration

2.6.1 Constructivist-centred teaching practices

The basis of constructivist-centred teaching is that students should actively construct their own meaning as they engage in a learning activity. Constructivist-centred teaching analyses independent action based on collaboration. In constructivist teaching, students are responsible for their learning experiences (Azizinezhad & Hashem, 2011) while teachers' coach, guide and model an authentic learning discourse. In CBLEs, the teacher plays several roles such as facilitator, leader, supporter and director, as well as the designer of instructional objectives. Active learning is viewed as an effective tool for developing constructivist-centred teaching practices and stimulating students' interest to learn and their engagement. Brook and Oliver (2003) found that students construct new knowledge based on established connections between their pre-existing knowledge and newly facilitated knowledge, and in this way develop their own understanding and conclusions. This implies that constructivist-centred teaching perhaps reconsiders students' awareness of an indicated body of knowledge.

When attempting to establish what is designed for students to learn, teachers are responsible for shaping their approach based on student engagement, problem-solving, active participation and guided discovery, rather than imparting 'ready-baked' knowledge. Constructivist-centred teaching encourages active student participation and sharing knowledge as enabler approach to discover, discuss and appreciate the existence of new knowledge. The teacher engages and reconstructs their teaching beliefs based on their teaching expertise and, as far as learners are concerned, constructivist-centred teaching should consider the learners' perspective (Jonassen et al., 1995) where constructivist-centred beliefs of teaching and learning are immersed and operate. A constructivist-centred teacher organises the situation and then guides an individual or group of students who are trying to construct and display their explanations (Ku, Tseng & Akarasriworn, 2013) based on a guided collaborative task.

2.6.2 Teachers' beliefs

Beliefs have been described as psychological constructs and cognitive states that are thought to be true (Chen & Bonner, 2017; Erdogan, 2014; Gurbuzturk & Sad, 2009; Pajares, 1992). Beliefs towards teaching seem to have a direct relationship with the teaching activities in which the teacher is engaged and affect their practices (Alissari & Heikkola, 2017). Beliefs can be described as an individual's internal judgement of the truth or falsity of a proposition that is linked with personal and emotional experiences (Pajares, 1992).

Moreover, the literature has established that for knowledge to be correct there should be a justification (Gettier, 1963; Orton, 1996). For example, a constructivist-centred teacher might believe that professional development, course management, teaching methods, learning experiences and the learning environment enhance students' authentic learning. Research studies show that unlike knowledge, beliefs do not require a condition of truth and general agreement (Orton,1996) and that what is known and believed connotes different understandings unless the claim is a justified true belief (Gettier, 1963; Khader, 2012). Therefore, teachers' beliefs are possibly reflected by their continuous professional training regarding course management, teaching methods and work experiences (Erkmen, 2012), which also seem to be individual factors. In this dissertation, the focus is on teachers' beliefs (i.e., teaching methods and course management) and their constructivist-centred engagement practices (interactions, explicit engagement and supportive teaching) in BLE courses, as it is the beliefs teachers hold that can have either a positive or negative impact on their daily work.

2.6.3 Teachers' perceived roles

Hung and Choub (2014) maintained that teachers have many concerns when taking on the role of blended learning instructors. In order to shoulder CBLEs' associated responsibilities, instructors should be able to adapt to the new and sometimes seemingly complex learning environments. Consequently, teachers need to be trained as CBLE instructors, technical advisors, course designers and facilitators. Studies have shown that teachers' changing roles constitute a critical issue in blended constructivist-centred teaching (Hung & Choub, 2014; Matzat, 2013). Zhu (2009) reported that the adoption of specific teacher roles in the instructional process might facilitate or hinder students' ability to acquire the intended content and skills. Moreover, in CBLEs, new teacher roles need to be established including handling technical issues and complex course structures, careful preparation, design and planning, multiple teaching approaches and effective communication. However, teachers need accurate professional support, so that they feel safe to engage and participate in CBLEs and acquire enough shared vision to be able to do something. In this dissertation, teachers' perceived roles such as leader, supporter and designer as they engaged in CBLEs are examined.

2.6.4 Constructivist-centred engagement practices

Teachers' constructivist-centred engagement practices (CEPs) are built on the philosophy that "to teach is to engage students in learning" (Christensen, Garvin & Sweet, 1991; Smith et al., 2005) and that their engagement should lead to authentic student learning. Studies show that teaching and learning in CBLEs are a student-centred process whereby a teacher facilitates, motivates and collaborates with students to ensure authentic student learning (Hughes, 2007; Stubbs, Martin & Endlar, 2006). Mayer (2003) reported that constructivist-centred teaching begins by exploring students' prior knowledge on subject-matter and proceeds by "creating opportunities for the student to grow intellectually" (p.130), which appears to be consistent with today's CBLE courses. Furthermore, students' successful accomplishment in CBLE courses depends on many factors including extensive facilitation, motivation, collaboration and support from course instructors (Eka, 2014).

Lavery (2007) described facilitation as teachers' ability to contextualise the learning, build participant knowledge, create shared learning resources and build community relationships. One goal of facilitation is either to influence active involvement or participation. In this view, students' ability to engage in active learning is influenced by teachers' ability to motivate, collaborate and facilitate intended learning outcomes. Moreover, in CBLEs motivation implies

individual teachers' multiple constructivist characteristics for engaging students in a meaningful learning activity or practice. As such, teachers in CBLE courses are expected to demonstrate knowledge competence as they motivate students to engage in CBLE courses.

Moreover, in CBLEs, teachers who proffer both online and offline collaboration among students achieve the intended learning outcomes (Gokhale, 1995; Ulmane-Ozolina, 2011; Tarnopolsky, 2012). A teacher who engages in collaborative instructional practices allows students to share diverse learning experiences in small groups. Likewise, research has shown that a teacher who employs both online and offline collaboration "gives students an opportunity to interact based on discussion forums, take responsibility for their learning, construct their learning experiences and therefore achieve intended learning outcomes" (Schweizer, Paechter & Weidenmann, 2003). In many cases, a teacher who engages in collaboration tends to create and manage meaningful learning experiences and stimulates students' ability to solve real-world problems (Oliver, Herrington & Reeves, 2006). Thus, teachers in CBLE courses encourage thoughtful reflection on experiences and stimulate student thinking through collaborative learning. This dissertation examines teachers' CEPs such as facilitation, collaboration and motivation.

2.7 Students' variables related to constructivist-centred technology integration

2.7.1 Conceptions of constructivist learning

Constructivist-centred learning is based on constructivist learning theory. It focuses on three important aspects of CBLEs including pedagogy, sociocultural factors and technology. Jonassen, Peck and Wilson (1999) supported that in designing the pedagogical aspect of student learning, students' satisfaction, expectations and learning support should be considered based on the role of active participation and engagement. Moreover, it is in such constructivist-centred-technology learning environments that students will be able to construct their own meaning based on their previous learning experiences and materials presented to them. Studies have shown that students' conceptions of constructivist learning depend on several factors, such as an available opportunity to engage in situations that encourage collaborative learning, discussion, sharing knowledge, problem-solving and formulation of questions (Chisanu, Sumalee, Issara & Charuni, 2012; Kwanjai & Sumalee, 2012; Lefoe, 1998).

Students who actively engage in learning conceive constructivist-centred learning as a process of meaning-making with support and guidance from the teacher (Saidalvi & Mansor, 2012; Rovai, 2004; Nie & Lau, 2010). In this regard, students in constructivist-centred learning are intrinsically motivated to the extent that they conceive learning is their own responsibility.

Furthermore, students conceive constructivist-centred learning in such a way that they are required to perform academic tasks in the same way as problems they will confront in their life after school. In support of that, Rovai (2004) maintained that constructivist-centred students are normally responsible for their own decisions, as they engage in constructivist-based blended learning environments. This dissertation investigates students' conceptions of constructivist-centred learning and their engagement in blended learning environments.

2.7.2 Learning approaches

Approaches to learning have been referred to as how students tackle specific learning tasks within a course (Shaari et al., 2012; Zhu, 2009). Most studies highlight two contrasting approaches to learning, namely 'deep' and 'surface' approaches, as two distinct levels of learning processing (Duff & Mladenovic, 2015; Marton & Saljo, 1976). While the deep approach involves students' ability to integrate new materials based on previous knowledge, synthesise new materials and relate these to real-life environments in order to have broader concepts (Shaari et al., 2012), the surface approach relies on the teacher as a source of knowledge and, thus, learning is one-sided. Students who employ the surface approach tend to memorise. They learn by memorisation of ready-made ideas, in structured learning environments and like to be directed with frequent follow-up.

Various research (Diseth & Kobbeltvedt, 2010; Evans, Kirby, & Fabrigar, 2003; Schmeck, 1998; Zhu et al., 2008) has advocated a third approach to learning known as the 'strategic approach or transfer'. The strategic approach is based on the effective use of space and time (strategy) and motivation to acquire good grades (Baeten, Kyndt, Struyven & Dochy, 2010). According to Lublin (2003), the strategic approach depends on the time students are engaged in a subject or a course module.

According to Biggs (1999), learning approaches vary according to diverse students' learning characteristics because some students will tend towards taking a deep approach while others take a surface or strategic approach. Although teaching which involves students in active, collaborative and independent learning is more likely to encourage a deep approach to the subject (Baeten et al., 2010; Lublin, 2003), previous studies have generally maintained the underlying principles of deep, surface and strategic approaches to learning (Biggs, 1999; Zhu, 2009). However, there are diverse factors that appear to determine the student learning approaches which are used in the learning process, including the students' background and

learning environments. This research investigates deep, surface and strategic learning approaches in relation to blended learning environments.

2.7.3 Engagement learning activities

Student engagement in learning activities in CBLEs depends on a clear set of learning outcomes for the course because this helps students to understand the purpose of each activity (Kay, 2018). Moreover, in CBLEs students engage in learning activities that enhance their opportunities to work together, improve personalised learning and facilitate completion of assigned activities. As such, group work (both online and offline), collaborative learning communities (online and offline), peer interactions and assessment are examined in this dissertation.

The group learning technique is described as an assignment that intends to attract students with the same interests to work together to accomplish specified learning objectives (Beccaria, Kek, Huijser, Rose & Kimmins, 2014). Moreover, by working as a team student fulfil the essential attributes of accessing learning materials, enhancing interpersonal skills and developing critical thinking skills (Ellington, Percival & Race, 1995; Smith & Rogers, 2014). In CBLEs, the in-class session is complemented by regular joint group meetings, a compilation of group work and submission. Likewise, in online collaborative sessions students work together in small groups to pursue a common learning goal. Jung (2013) suggested that online collaborative group work allows the learners to exchange ideas and views with unlimited time and space.

Furthermore, collaborative learning communities serve well in CBLEs and play two roles of academic inquiry and engagement (Vaughan, Cleveland-Innes & Garrison, 2013). Academic groups of students who work closely, socialise and problem-solve together with a faculty member are learning communities. In CBLEs, both online and offline learning communities exist. Both "provide conditions for discussion, negotiation, and agreement in face-to-face and online environment with virtually limitless possibilities to connect to others and information" (Vaughan et al., 2013, p.10). As Rovai and Jordan (2004) observed, both online and offline learning communities are shaped by broad educational goals, and are a purposeful, open and disciplined community of inquiry that engages students in deep learning. On the other hand, offline learning communities revolve around usual traditional networks like friends, study colleagues and neighbours with the same learning interest and goal (Näsi, Rasanen & Lehdonvirta, 2011).

Studies have shown that in CBLEs, peer interactions should aim to achieve at least five principles of effective learning including problem-solving, information exchange, promoting appropriate learning and increasing student motivation (Richardson, 2010). Studies by Archila (2014) and Parker (1999) affirmed that interactions allow reciprocal communication between student and student, student and teacher, and student and tool interaction under a specific learning task or module. On the one hand, online learning interactions via LMS have been used to facilitate student-tool interactions (Lwoga, 2014), student-content interactions (Sife et al., 2007), student-environment interactions (Mtebe & Raphael, 2013), student-teacher interactions, as well as student-student interactions (Hew & Cheung, 2003; Skrypnyk et al., 2015). On the other hand, face-to-face interactions focus on tutorial sessions, physical group discussions, student-self interaction and student and teacher interactions, which involve reflections and analysis of the learning process and problem-solving (Saidalvia & Mansor, 2012).

In this research, assessment is considered to be a process, activity and instruments developed to measure students' achievements, normally after they have engaged in an instructional activity or course (Ellington et al., 1995). Perez and O'Neil (2003) asserted that constructive assessment with instructional technologies should focus on the quality of students' understanding rather than the quantity of the knowledge they have acquired. Kay (2018) suggested that for successful students' assessments the following constructivist teaching practices should be in place: a clear set of learning outcomes, clear grading systems, opportunities for choice and creativity, collaborative assignments and, above all, prompt feedback. However, in this dissertation, student engagement in learning activities are studied to examine its relationship with student conceptions of learning approaches in blended learning environments.

2.7.4 Motivational factors

Student motivation is like glue in a successful teaching and learning process. Some are self-motivated and have self-efficacy toward learning, but others not. According to Erten (2014), motivational orientation determines the nature of students' learning behaviour and current learning strategies and previously learned skills. A study by Hickey, Moore and Pellegrino (2001) indicated that student motivation in a constructivist instructional situation is related to cognitive engagement and performance, self-regulation and improved academic performance.

As a result, a self-motivated student will be able to establish his own solution to diverse problems in many subjects.

Also, Huang (2002) upheld that the constructivist approach recommends the development of the students' ability to solve their real-life problems by actively engaging in constructing new knowledge. However, the study of Nie and Lau (2010) maintained that the process of meaning construction, achievement of good grades, and understanding as related to student approaches to learning might foster students' motivation to learn and to achieve either in individual or social processes. Therefore, based on the principles of constructivism, in BLE students are highly encouraged and motivated, set study plans and work on their objectives and find ways to achieve expectations, find learning materials, apply appropriate learning strategies, styles and approaches. From the perspective of this research, student motivation to learn is used to study the relationship between student learning approaches and motivation to learn in CBLEs.

2.7.5 Engagement learning strategies

Studies show that student engagement encompasses the complexity of human development domains (i.e., physical, psychological and cognitive) which determine their successful engagement in the learning environment (Crick & Goldspink, 2014; Saeed & Zyngier, 2012; Ryan & Deci, 2000; Skinner & Belmont, 1993). However, in this research project, student engagement in learning strategies are conceptualised as the plans and techniques students draw up, put forth and carry out to achieve their intended learning outcomes in CBLEs. Such engagement in learning strategies should be appropriately redesigned to enable authentic student learning in CBLEs (Seki, 2014). This research project focuses on three student engagement strategies such as capturing, support and fascinating (Jeffrey, Milne, Suddaby & Higgins, 2012; Pintrich & Garcia, 1994; Rosegard & Wilson, 2013). Jeffrey et al. (2012) suggested that capturing strategy (cognitive engagement) occurs when a teacher, at the beginning of teaching and learning, assesses the students' attention and records observable individual, socio-emotional, behavioural and cognitive processes. An established finding is that teachers who employ a capturing strategy include assessing students' orientation to sensory events, mental efforts, detecting signals for focal processing and upholding attentive state (Rosegard & Wilson, 2013).

On the one hand, a support strategy (metacognitive engagement) refers to students' ability, awareness and knowledge to use designed instructional objectives, innovative teaching gadgets, guidelines and course syllabi (Clayton, Blumberg & Auld, 2010; Jeffrey et al., 2012). It is

regularly modified and improved to assess and accommodate learning relevance, rigour and relationship. On the other hand, a fascinating strategy (re-engagement) refers to behavioural components of self-regulated learning and involves the use of multiple practices, mind tools and socio-academic media, which are central to collaborative learning experiences (Coates, 2006; Vaughan, 2014). Therefore, this study examines students' motivational factors and engagement strategies reported by Tanzanian university students who participated in CBLEs.

3. Research objectives, questions and methodology

3.1 Research objectives

This doctoral research project aims to investigate students' variables (conceptions of constructivist learning, learning approaches, motivational factors, engagement strategies) and teachers' variables (beliefs, perceived roles, constructivist teaching practices, constructivist engagement practices) influencing their constructivist-centred technology integration in the context of Tanzanian HEIs. More specifically, the research focuses on the following research objectives:

1. Examining students' conceptions of learning approaches and their engagement in BLEs.
2. Investigating students' conceptions of constructivist-centred learning and their engagement in CBLEs.
3. Studying students' motivational factors to learn and their constructivist-centred engagement strategies in BLE courses.
4. Examining teachers' beliefs and constructivist-centred teaching practices (CTP) in CBLE courses.
5. Studying teachers' perceived roles and their constructivist-centred engagement practices in CBLE courses.

3.2 Research questions

The main goal of this dissertation is to enhance the understanding regarding the student and teacher variables influencing their CBLEs. The main research question of this dissertation is: *What are the students' and teachers' variables influencing their constructivist-centred technology integration in the context of Tanzanian HEIs?* The research question takes a general perspective and investigates the assumed research problem existing among students and teachers in CBLEs in the context of the Tanzanian HEIs. Moreover, to achieve the specific objectives, the following specific research questions outlined in Table 2 guided the design of the five empirical studies in this PhD research project:

Table 2
Overview of the research objectives and research questions in each the study

Research Objectives (RO)	Research Questions (RQ)		Chapter (s)
RO 1	1	What are the Tanzanian students' conceptions of deep, surface and strategic learning approaches in BLEs?	2
	2	To what extent are Tanzanian students engaged in BLE learning activities (group work, interactions, learning communities and assessments)?	2
	3	How are the deep, surface and strategic learning approaches related to student engagement in BLE learning activities?	2
RO 2	4	What are the conceptions of constructivist learning of students in a Tanzanian university?	3
	5	To what extent are the students engaged in a CBLE in a Tanzanian University?	3
	6	How are students' conceptions of constructivists learning related to their engagement in a CBLE?	3
RO 3	7	What are the Tanzanian university students' motivational factors and engagement strategies in CBLE courses?	4
	8	Are there gender differences in motivational factors and engagement strategies in CBLEs among Tanzanian university students?	4
	9	How are Tanzanian university students' motivational factors related to their engagement learning strategies in CBLEs?	4
RO 4	10	What are the beliefs of the university teachers who teach BLE courses?	5
	11	What are the university teachers' CTP in BLE courses?	5
	12	Are there differences in the university teacher's beliefs and their CTP in BLE courses with regard to gender, academic rank, educational level and teaching experience?	5
	13	How are the beliefs of the university teachers related to their CTP in BLE courses?	5
RO 5	14	What are the teachers' perceived roles in CBLE courses?	6
	15	What are teachers' constructivist engagement practices in CBLE courses?	6
	16	Are there gender differences in teachers' perceived roles in CBLE courses?	6
	17	How are teachers' perceived roles related to their constructivist engagement practices in CBLE courses?	6
		General discussion and conclusions	7

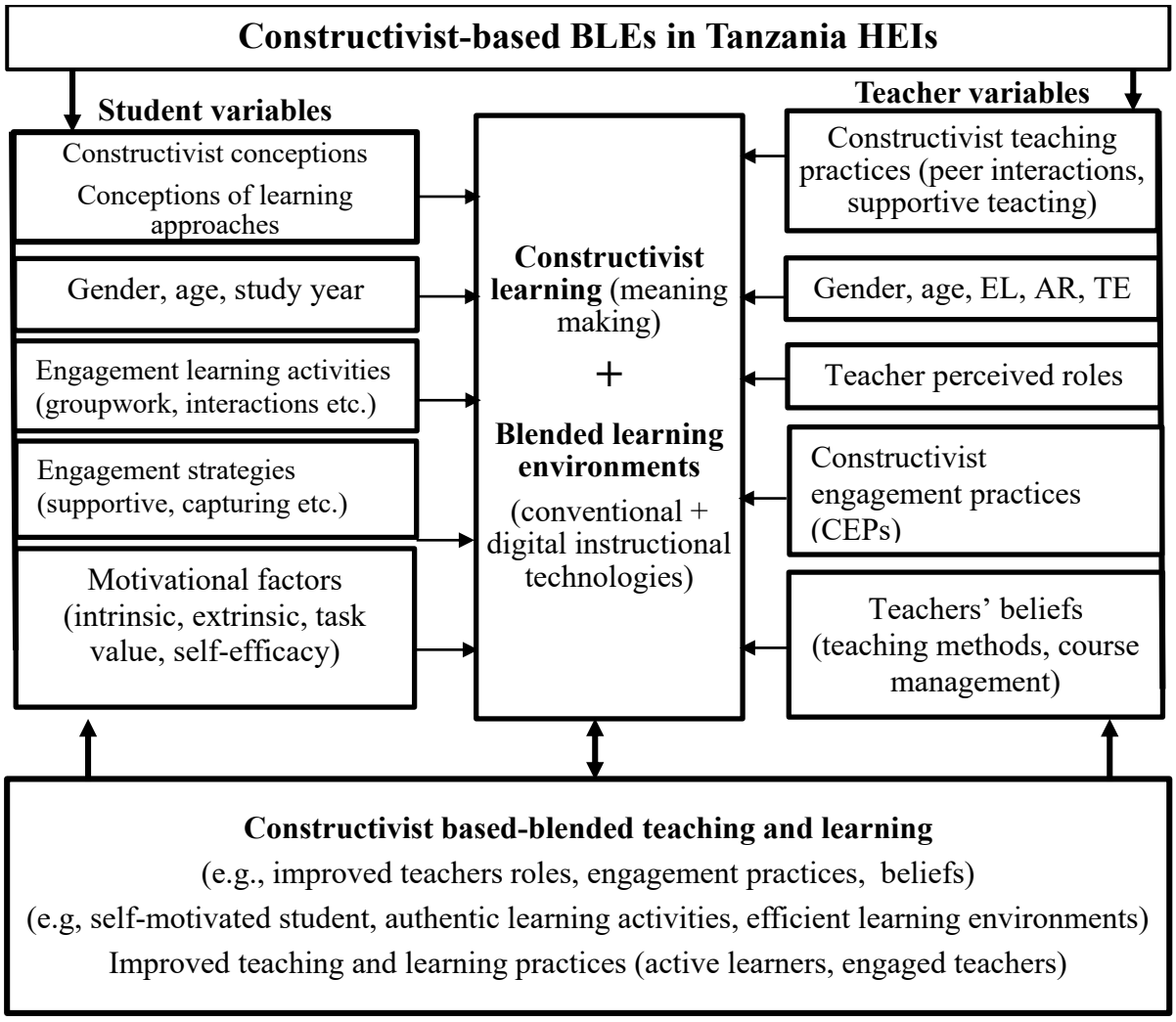


Figure 2. Research framework of this dissertation
Note: EL = Education level, AR = Academic rank, TE = Teaching experience

3.3 Research methodology

3.3.1 Research design

From a critical constructivist viewpoint, this research project used a mixed-methods research design to inform the conduct of the five studies in HEIs in Tanzania (see Appendix A, Fig. 3). The mixed-methods research design is grounded on an interpretive epistemology focusing on the in-depth exploration of the actual case based on extensive data collection. Detailed diverse research instruments were used to collect data to answer specific research questions under each study. Survey questionnaires, semi-structured interviews and observation were used. A mixed-methods research design in a cyclic manner was employed, which allowed the mix of multiple data collection instruments. Furthermore, this research project focused on multiple variables which offered more options regarding research design and data collection techniques. The complement between quantitative and qualitative research design enabled the research project

to examine more expectations for both theoretical and practical implications, improvements and implementation of blended learning and constructivist-based blended learning. The research questions in each study guided the interaction between the two approaches (quantitative and qualitative) during data analysis.

In study one we used a quantitative survey design while in study two mixed-method research design was to use triangulating quantitative (survey) and qualitative (observation and interviews). We collect quantitative data at the beginning which was triangulated by qualitative data at the end. It should be noted that study two involve constructivist aspects which were not easy to define with quantitative data such as students understanding regarding constructivist learning. Besides, study three was designed to collect information via multiple non-interactive research design (survey and non-participant observation) while study four was quantitative research collecting quantitative data via survey. The final study triangulated both qualitative (observations, interviews) and qualitative (survey) data. This kind of research design assisted in collecting data expected inform the world about examined Tanzanian HEIs regarding on how constructivist-centred technology integration with reference to the exploration of multiple students' and teachers' variables.

Moreover, in this PhD project, the quantitative analyses enabled the testing of the significance of variables, which helped in the estimation of the size of relationships among multiple variables. Moreover, the qualitative analysis helped in the interpretation of the various quantitative findings and description of the situation in question. This research used the orientation of coherent and specific chapters, and each chapter presents a single study. In most cases, the findings, discussion, limitations, implications, areas for future research and conclusions are drawn from one study were used either as a starting point or as an informed decision, for the design of the next study. The five independent studies in this dissertation are detailed in Table 3.

Table 3

Overview of the research design, timing, data collection instruments and analysis in each study

RO	Study time (in an academic year)	Research design	Data collection instruments	P (N)	Data analysis	Reported in
RO1	Study 1 (2014-2015)	Quantitative research design	Questionnaires with summated index- scale (Linkert Scale)	466	Descriptive statistics, correlation, multiple regression	Chapter 2[a]
RO2	Study 2 (2015-2016)	Mixed-methods research design (QUAN-QUAL)	Questionnaires, observations and semi-structured interviews	722	Descriptive statistics, correlation, EFA, multiple regressions and thematic analysis	Chapter 3[b]
RO3	Study 3 (2015-2016)	Multiple non-interactive research design	Questionnaires & Non-participant observation	1010	Descriptive statistics, correlations, EFA, CFA, multiple regressions thematic analysis	Chapter 4[c]
RO4	Study 4 (2016-2017)	Quantitative research design	Questionnaires	211	Descriptive statistics, correlations, multiple regressions	Chapter 5[d]
RO5	Study 5 (2017-2018)	Mixed-methods research design (QUAL-QUAN)	Observations, questionnaires, and semi-structured interviews	261	Descriptive statistics, correlation, EFA, CFA, multiple regressions, thematic analysis with open coding	Chapter 6[e]

Key: QUAN = quantitative, QUAL = qualitative, RO = research objective, P = participants, EFA = exploratory factor analysis, CFA = confirmatory factor analysis

[a] Accepted in the *International Journal of Technology Enhanced Learning (in press)*
[b] Published in the *International Journal of Learning Technology*
[c] Published in the *Afrika Focus Journal*
[d] Published in the *International Journal of Knowledge Learning*
[e] Accepted in the *International Journal of Learning Technology (in press)*

Table 4

Instrumentation and scales of measurements used in this dissertation

Instrument and measurements		No of items	Adopted/self-developed (author-years)	Scoring Scales	Reported in
ABLESS	ALSI (deep, surface, strategic)	18 items	*Adopted and modified from the work of* Mattick et al. (2004); Entwistle & McCune (2004)	1= strongly disagree to 5 = strongly agree	Chapter 2 (Study 1)
	BLESS (interactions, learning communities, assessments, and group work)	20 items	*Self-developed with insights from* the work of Garrison & Vaughan (2008) Haggis (2003)		
CBLEs	CCL (self-directed, shareable experiences, and active participation)	12 items	*Self-developed*	1 = strongly disagree to 5 = strongly agree	Chapter 3 (Study 2)
	CBLE (interactions, learning communities, assessments & group work)	20 items	*Self-developed*		
SMFELSs	MFI (self-efficacy, task value, intrinsic & extrinsic)	24 items	*Self-developed with insights from* Gedera et al. (2015); King (2016); Ocak & Akçayır (2013)	1 = strongly disagree to 5 = strongly agree	Chapter 4 (Study 3)
	ELSI (capturing, supporting & fascinating)	17 items	*Self-developed with insights from* Jeffrey et al. (2012); Crick & Goldspink (2010); Trowler & Trowler (2010)		
TBCTPs	TBS (teaching strategy, course engagement)	13 items	*Self-developed with insights from* Gales & Yan (2001); Lameras et al. (2012); Canto-Herrera et al. (2010)	1 = strongly disagree to 5 = strongly agree	Chapter 5 (Study 4)
	CTP (explicit engagement, supportive teaching and interactions)	27 items	*Self-developed with insights from* Hursen & Soykara (2012); Gurbuzturk & Sad (2009); Prawat (1992)		
TPEPs	TPRs (leader, supporter and designer)	15 items	*Self-developed with intuition from* (Grasha, 1994; Grasha and Riechmann-Hruska, 1990; Garrison and Vaughan, 2008; Zhu, 2010; Eka, 2014).	1 = strongly disagree to 5 = strongly agree	Chapter 6 (Study 5)
	CEPs (facilitation, collaboration and motivation)	16 items			

3.3.2 Research instruments

The research collected data based on five studies with multiple data collection. Five surveys were either adopted or self-developed with insight from the existing literature. Each study gathered, adopted, modified and developed several statements which indicated agreement or disagreement towards various issues related to this research project. In such a way, the following instruments were developed: (a) approaches to learning and engagement in BLEs survey (ABLESs); (b) constructivist-based BLE surveys (CBLEs); (c) students' motivational factors and engagement in learning strategies survey (SMFELSs); (d) teachers' constructivist teaching beliefs and constructivist teaching practices survey (TBCTPs); and (e) teacher perceived roles and constructivist engagement practices survey (TPEPs).

In this research project, the development of the five survey questionnaires was an exhaustive process with many steps, such as selecting the most suitable items for specific study variables, pilot the instrument, and revising the questionnaires. All of the five surveys either adopted or developed were piloted before actual data collection to cross-check their validity, reliability and corroboration. The reliability was established using Cronbach's Alpha Analysis. However, the Polytomous item response theory was used to develop, design and validate most of the surveys. Furthermore, regarding the validity, any anomalies found after each pilot study were rectified with the assistance of experts in the field of constructivist pedagogy, the blended learning approach and educational technology. Moreover, during the pilot studies, wording systems which were found to create confusion among the respondents were either deleted or modified to reflect the context under study.

Furthermore, interview guides and observational checklists were designed to assist in the collection of qualitative information relevant to this dissertation. Because the research project used a mixed-method research design, Table 4 presents detailed information about the design of the instruments and measures of scales. However, below is a summary of each instrument per study:

Approaches to learning and engagement in BLEs survey (ABLESs)

The ABLESs questionnaire was developed, comprising three sections including demographic information, approaches to learning and studying inventory (ALSI-adopted with minor modifications) and student engagement in BLEs (BLESS-self-developed). ABLESs was built on a five-point Likert scoring scale (strongly disagree (1) to strongly agree (5)) used to measure students' agreement or disagreement with specific items. Moreover, ALSI had a relative lack

of critique in the literature in the higher education and medical domain (Entwistle & McCune, 2004; Mattick et al., 2004; Haggis, 2009; Malcom & Zukas, 2001). Furthermore, BLESS was self-designed based on the original work of Garrison and Vaughan (2008) and applied in this dissertation.

Constructivist-based blended learning environment student survey (CBLEs)

The study used a self-developed research instrument (CBLEs survey) to measure students' conceptions of constructivist learning as they engaged in CBLEs. The CBLEs consisted of three categories including demographic data, conceptions of constructivist learning (CCL) and engagement in constructivist-based BLE (CBLE). Furthermore, CBLEs consisted of a five-point Likert scoring scale, i.e., strongly disagree (1) to strongly agree (5).

Students' motivational factors and engagement strategy survey (SMFELSs)

The students' motivational factors and engagement in learning strategies survey (SMFELSs) was self-developed and divided into three constructs comprised of demographic characteristics, motivational factors inventory (MFI) and engagement in learning strategies inventory (ELSI). To some extent, these sub-scale items were modified from the previous work of other scholars such as Coates (2006); Crick and Goldspink (2010); Gedera et al. (2015); Herzberg et al. (1959); Jeffrey et al. (2012); King (2016); Ocak & Akçayır (2013) and Trowler and Trowler (2010). The SMFELSs version had 46 variables measured by a five-point Likert scoring scale (i.e., strongly disagree (1) to strongly agree (5)). The SMFELSs was designed to measure students' motivational factors, experiences and their most influential strategies applied in CBLEs.

Teachers' constructivist teaching beliefs and constructivist teaching practices survey (TBCTPs)

The teachers' constructivist teaching beliefs and constructivist teaching practices survey (TBCTPs) was designed with insight from the work of a number of researchers (Brickhouse, 1990; Canto-Herrera & Salazar-Carballo, 2010; Gales & Yan, 2001; Gurbuzturk & Sad, 2009; Hursen & Soykara, 2012; Prawat, 1992; Raths, 2001). The TBCTPs consisted of three major sections. Section one asked for the demographic characteristics of the sample. Section two enquired about the university teachers' beliefs about the nature of their constructivist teaching practices (CTP) in BLE courses. The TBCTPs was designed with a five-point Likert scoring

scale ranging from strongly disagree (1) to strongly agree (5), requesting teachers to identify their agreement or disagreement with each item statement presented in the survey.

Teachers' perceived roles and constructivist engagement survey (TPEPs)

The TPEPs is a self-developed survey questionnaire with intuition from the works of a number of researchers (Eka, 2014; Garrison & Vaughan, 2008; Grasha, 1994; Grasha & Riechmann-Hruska, 1990; Zhu, 2010). The Polytomous item response theory model (cf., polytomous Rasch Model; Rasch, 1960; Salzberger, 2015) was used to develop, design and validate the TPEP survey questionnaire. The TPEPs was targeted to measure two elements in CBLE courses including teachers' perceived roles (TPRs) and teachers' constructivist-based engagement practices (CEPs). The TPEPs was divided into three sections. Respondents were invited to provide a Likert-type response from strongly disagree (1) to strongly agree (5) to all item statements, except demographic characteristics.

3.3.3 Research Population

The population of this research project comprises students and teachers who were engaging in constructivist-centred technology integration (i.e., blended learning approach, e-learning and constructivist pedagogy) in HEIs in Tanzania. Among 49 HEIs as of 2016 offering bachelor's degrees, only 10 HEIs were implementing blended learning approaches with e-learning systems. In those 10 HEIs, it was found that only 300 teachers were coordinating blended learning courses based on institutional e-learning systems. 52,831 students were enrolled in HEIs by 2016. However, those enrolled in blended learning courses were determined by HEIs.

A general note about research methodology

Predominantly, the dissertation used mixed-methods research designs to collect both qualitative and quantitative data to explain and interpret the execution of CBLEs in the context of Tanzanian higher education. With the focus on multiple variables, an interpretive epistemology focusing on the in-depth investigation of the actual case was based on extensive data collection and was primarily meaningful. Furthermore, the research instrument per each study was either designed, adopted or modified from the previous work of other scholars to reflect the context of this research project. Moreover, a hybrid of practical, methodological and statistical considerations was applied based on the relevance of cases. In each single research study the following were achieved: (1) provision of clear and relevant theoretical background; (2)

provision of accurate and sound research design (relevant samples, ensuring efficiency, utility, validity of instruments and data triangulation); (3) relevant use of data analysis techniques (i.e. correlational analysis, exploratory factor analysis and confirmatory factor analysis, multiple regression and thematic analysis with open coding) to achieve more robust results and conclusions; (4) provision of informative discussions (contributions, implications and directions for further research) and conclusions.

4. Dissertation structure

This dissertation is organised on a chapter basis. In total, seven chapters are interlinked, and the information within each is presented in a lucid succession. For example, Chapter one, General Introduction, is a foundational chapter, while Chapters two to six are based on the theoretical background, research philosophy, research framework and the design of the dissertation presented in chapter one (cf., Fig.1., Fig. 2., Table 2., Table 3), each is inter-connected. Chapter seven, General Discussion and Conclusions, summarises the dissertation by presenting an overall general discussion, recommendations and the conclusions of this research project.

The research study in Chapter 2 examines students' conceptions of learning approaches and their engagement in blended learning environments (BLEs) in the context of Tanzanian universities. The chapter discloses students' conceptions of learning approaches. Approaches to learning and a studying inventory (ALSI) were used to uncover students' conceptions of learning approaches and their preference regarding appropriate learning approaches while engaging in blended learning environments. However, students' engagement in BLE learning activities are also indicated. The study collected information from a sample of 446 undergraduate students, and multiple regression was used to determine the relationship between approaches to learning and engagement in BLE learning activities.

Chapter 3 focuses on investigating students' conceptions of constructivist learning and engagement in CBLEs at Mzumbe University, Tanzania. The research study used a mixed-methods research design to collect data from 722 students. With positive students' conceptions of constructivist learning, the study also reports a significant correlation between students' conceptions of constructivist learning and their engagement in CBLEs. The results offer remarkable contributions to constructivist educators and education stakeholders about what should be considered while encouraging student engagement in CBLEs. The study concludes

that students' conceptions are essential to the success of their learning in CBLEs since their active constructivist engagement in diverse learning activities depends on their constructivist conceptions.

Chapter 4 introduces a study to investigate students' motivational factors and their engagement in learning strategies in the CBLEs in Tanzanian Universities. The study was built on the theoretical foundations of engagement in learning and constructivist-based blended learning. The study collected data from 1010 undergraduate students from three universities in Tanzania. While the study reports positive students' motivation to learn in CBLEs, a significant correlation was found among students' motivational factors and their engagement in learning strategies. The study offers a notable contribution to e-pedagogy designers, teachers and curriculum developers for the design of blended learning courses, learning environments and learning activities in respect of students' socio-background and motivational factors.

The research study in Chapter 5 examines the university teachers' beliefs and their constructivist teaching practices (CTP) in blended learning environment courses in Tanzanian universities. The study collected data from 211 teachers practising BLE courses. The study reports that explicit engagement, supportive teaching and interactions are important aspects of CTP in BLE courses. Moreover, the study reports a significant relationship between teachers' beliefs and their CTP in BLE courses. This study provides important implications and empirical evidence about the beliefs of the university teachers and their CTP in BLE courses.

Chapter 6 examines teachers' perceived roles (TPRs) and their constructivist engagement practices (CEPs) in CBLE courses in Tanzanian universities. The study used multiple data collection techniques to collect relevant data from 261 teachers within ten selected universities. The results show that teachers perceive themselves as supporters, leaders and designers in CBLE courses. The study further revealed that there is a statistically significant relationship between TPRs and CEPs in CBLE courses. The results serve to be of benefit to teachers and higher learning institutions aspiring to implement CBLE courses and reassures them that its deployment and implementation in teacher education should align with teachers' perceived roles and their constructivist engagement practices.

Chapter 7 presents a summary of studies and the main research findings. Likewise, it provides answers to the general research question. Also, theoretical and practical implications for future research, practice and CBLEs design regarding higher education in Tanzania are presented in line with the recommendations and conclusion.

5. Positionality (reflexivity) statement

This research is based on the United Republic of Tanzania (URT), specifically in higher education institutions (HEIs) and impartially implementing constructivist-based blended learning environments (cf. constructivist-centred technology integration). The research topic seems to be new in the context of this research (i.e., in the URT), but it has been in a realm of educational technology for a while. The research seeks to enhance an understanding regarding the implementation of constructivist-centred technology integration in HEIs teaching and learning environments with reference to students' and teachers' variables. The URT is a low-income country which has not only succumbed to donor dependency but also lack of ownership of the development agenda (URT, 2000). The URT envisage to be a well-educated and learning society through the provision of state-of-the-art education.

I was born, raised and educated in the URT, my father was employed by the government and working within the District Agricultural Department, his station was located to the then Jews Agricultural Irrigation Scheme along with the shore of Lake Victoria. My mother was also engaging in agriculture, although she was less educated she used to encourage me on the passion for knowledge and learning and I should seek higher education. My parents insisted that I should respect everyone identity in the community and I centred on their advice. I was socialised in that kind of family ecology.

As for my educational background, my interest in teaching and learning began while pursuing my advanced secondary school education where I was engaging in direct instruction with my fellow students. I studied Bachelor of Education in Arts (honour) at the University of Dar es Salaam. After being exposed to the course of Educational Media and Technology in my undergraduate studies, my desire for technology-assisted learning become my private teaching and learning belief. This course not only enriched me with the fundamental concepts about how learners get to know and use instructional technologies but also it exposed me to basic approaches and methods of instructional technologies. After completing my studies, I was employed to teach educational research, measurement and evaluation together with educational technology in a government teachers' college in 2007. Teaching to teacher-trainees gave me an

entirely new experience in teaching and learning because the community was built on a student-centred learning approach. Joining Mzumbe University in Morogoro region, the Eastern part of Tanzania for an academic post as a tutorial assistant enriched my post-positivist belief to actively engage in constructivist teaching and learning although I found the system of teaching and learning dominated by conventional teacher-centred learning approach. It was not easy to distinguish myself, but I excelled well. I still remember well engaging in solving controversial situations between students and teachers reported to me while I was serving as head of the department in the department of education. For instance, some students were complaining that some teachers are not fair to them. They would just read the notes and drive overcrowded slides in the class in such a way that students were unable to grasp even a single point. I managed to calm down the situation by engaging myself in critical dialogue with accused teachers. In another scenario, students reported that when they were trying to ask for clarification in class, some teachers were uncomfortable, and they would turn serious. I went on helping the student on how to handle the situation. At some points, the situation was intense to the extent that the head of the organisation approached the accused teachers to calm down the situation. I will never forget those scenarios in my academic career!

Along with what I have experienced so far, higher education could be placed in three perspectives: the teacher, the student and the learning environments. I also feel that the perspectives should be dealt differently with different teaching and learning variables. Because of these experiences and observations, I recognise myself to have a liberal viewpoint regarding education and technology integration for teaching and learning in higher education. Currently, I am at the level of full exposure to the use of constructivist-centred technology integration for teaching and learning. I am aware that constructivist-centred learning defines that an individual constructs his/her worldview based on his/her discernment of it, as well as materials presented to them. I also understand that because perceptions and observations are fallible, our constructions might be fallible too. I fully understand that human beings are all biased and all of our observations are affected. I am aware that these perceptions, experiences and observations have advantages and disadvantages in my present research I am doing.

I also understand that this is a bias which I have to deal with by first recognising those biases and second by finding an approach to figure out the research objectivity. In an attempt to promote an ideal of trustworthiness and objectivity in this research journey, my hope relies "on triangulations across multiple fallible perspectives within the context of scientists who dare to criticise each other's work" (Trochim, 2006). As a result, most of the research studies in this

project undergone blind peer-reviews in scientific recognised research journals. I also feel that the "lack of objectivity is not just a problem, it is also an opportunity" because our cultural, social, political and environment do impact researches we undertake (Hamby, 2018).

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Appendix A: Research project areas



Fig. 3. Map of Tanzania showing the PhD research project sample sites

Chapter 2

Students' conceptions of learning approaches and their engagement in blended learning environments*

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Chapter 2

Students' conceptions of learning approaches and their engagement in blended learning environments

Abstract

Students employ diverse learning approaches when they are engaged in learning activities. Their choices on the type of approach to use are affected by many factors, including learning environments, instructional design and types of learning activities assigned. This study examines students' conceptions of learning approaches and their engagement in blended learning environments (BLEs). The study involved students from two universities in Tanzania. The study used descriptive statistics, correlations and multiple linear regression analyses. The results indicate that students hold compelling conceptions of surface approach compared to deep and strategic approaches in BLEs with a high level of engagement in BLE learning activities. The results further reveal that there was a significant negative relationship between students' conceptions of learning approaches and their engagement in BLE learning activities. The deep approach was a significant negative predictor of BLE learning activities while the surface approach was an insignificant negative predictor for BLE learning activities. The study proposes an appropriate redesign of BLE learning activities to encourage a deep learning approach by students.

1. Introduction

The growing demand for twenty-first-century learning, competencies and working skills - in both developed and developing countries - has upheld the integration of newly innovated technologies in education. Considerable efforts have been made to invest in transferable skills and knowledge through Internet-based electronic learning in universities (Back et al., 2014; Dias & Diniz, 2014). As a result, many universities have adopted an e-learning system in support of teaching and learning processes (Mtebe, 2013). The major motive is to enhance students' acquisition of professional abilities to deal with real-life problems in a complex and dynamic situation in a rapidly technologically changing society (Demirer & Sahin, 2013; Shana, 2009). Moreover, a number of projects are currently being implemented in many universities in Tanzania to extend the benefits of technology use for innovative teaching and learning (Mtebe & Raphael, 2013; The United Republic of Tanzania, 2014). Also, digital

technologies are used as a platform to provide relevant educational information and create learning environments related to students' learning approaches (Ellis, Goodyear, Calvo & Prosser, 2008).

The idea to use blended learning environments (BLEs), in teaching and learning, emanates from student-centred beliefs and active learning that allows a deep construction of knowledge, peer interactions and engagement in both technology-enhanced environments and campus-based learning environments. In Tanzania, government education policy and endorsement specify that 21st-century teaching and learning skills, such as online learning, blended learning and digital instructional technologies, should be integrated into all levels of education to facilitate rapid achievement of the country's development plans (The United Republic of Tanzania, 2014). Previous studies have shown that, in BLEs; students prefer to engage in constructive, accessible learning materials, peer interactions and reflective learning activities (Back, et al., 2014; Khlaisang & Likhitdamrongkiat, 2015). Learning approaches and learning activities in BLEs have been designed to establish compelling evidence on the link between student-centred learning, academic achievement and engagement in meaningful learning discourse (Keengwe & Kang, 2013).

On the one hand, there is a lack of relevant research in Tanzanian universities addressing the perspective of blended learning environments (Raphael, 2016). On the other hand, little literature addressed the application of blended learning settings and blended learning activities (Mtebe, 2013; Raphael & Mtembe, 2016) and, hence, it is not known what learning approaches students are likely to employ while engaging in BLEs. Moreover, literature reviews have not explicitly indicated the magnitude of students' engagement in BLE learning activities in Tanzanian universities. Instead, challenges, impacts, e-learning course design, satisfaction and learning management systems dominate the literature related to the blended learning approach in higher education in the context of Tanzania (Kafyulilo & Keengwe, 2013; Mtebe & Raisamo, 2014; Mtebe & Raphael, 2013). Consequently, there is a need to investigate students' conceptions of learning approaches and their engagement in BLE learning activities.

1.1 Statement of the problem

The use of BLEs in teaching and learning in Tanzanian HEIs is increasing. Students participation in BLEs are increasing rapidly due to its potential for promoting engagement and active participation in academic task through several learning approaches. These learning approaches are conceived as surface, deep and strategic learning (Frey, Fisher & Hattie, 2017;

Hattie & Donohue, 2016; Tsai & Tsai, 2013). In the context of Tanzanian HEIs, implementing blended learning is neither known how students approach academic tasks nor how well they are engaged in BLEs. The issue is, BLEs is considered as a newly deployed teaching and learning environments in Tanzanian HEIs (Mtebe, 2013). As a result, this issue in HEIs requires understanding among blended learning practitioners so as to encourage appropriate students learning approaches and meaningful engagement in BLEs. This quantitative study on learning approaches and BLEs learning activities investigate students' conceptions of learning approaches and their engagement in BLEs learning activities as a strategy to unveil students' conceptions of learning approaches contributing to their engagements in Tanzanian HEIs implementing BLEs. The data gathered in this study provides educational practitioners and HEIs with information on how they may address issues contributing to the current adoption, deployment and implementation of BLEs.

2. Theoretical background

2.1 Activity Theory

Grounded in the work of Lev Vygotsky, Alexei Leont'ev, Sergei Rubinstein and later Engeström, the activity theory (AT) is a multi-disciplinary framework deep-rooted from applied psychology through education, to information systems and human-computer interaction, and information seeking behaviour (Allen, Brown, Karanasios, Norman, 2013; Ditsa, 2003; Wilson, 2009). According to Hasan & Kazlauskas, (2014, p. 9) "AT is all about 'who is doing what, why and how". The theory is applicable in addressing blended learning activities because it provides a conceptual framework to understand the inter-relationship between activities, actions, subjects' motives and goals, and aspects of the social, organisational and societal contexts within which these learning activities are designed (Nardi, 1996). AT is framed in such a way that it accommodates entire activity within the system beyond just one actor or user. In higher education, AT accounts for both physical and virtual learning environments, the role of the actor (students, teachers and staff), learning the culture, motivations, and complexity of activity. However, in BLEs, learning novel activities are required practices, activities and tasks are required to avoid replicating current traditional face-to-face practices (Donnelly, 2008; Karasavvidis, 2008).

Although AT has rarely applied in study related to blended learning (Gedera & Williams, 2016; Karasavvidis, 2008; Koné, 2015), AT is an ideal tool because shares both human cognition and human action is an interest in actual material of human action (Bertelsen &

Susanne, 2003). As a result, AT allows instructional designers and educators to conceptualise what works and what does not in the blended learning, what hinders change, at what level and in relation to which factors. Also, according to AT, "learning is not a matter of how the individual adapts or gets adapted to the artefact; it is also a matter of how the collective practice develops, in small steps or larger leaps (Bertelsen & Susanne, 2003, p. 294)". Moreover, studies have shown that AT has been used as a theoretical framework related to e-learning implementation, e-learning tools (Dyke et al., 2007; Joyes, 2006). Thus, it is appropriate to refer the AT when investigating how students' conceptions of learning approaches are related to the pedagogical engagement in BLEs learning activities.

2.2 The BLEs in the context of Tanzanian universities

Most of the universities in Tanzania were built on the belief of traditional face-to-face teaching and learning, a system associated with the use of the physical presence of classrooms, textbooks and pen-and-paper examinations. Ever evolving education technologies are changing education practices with more time and resources focused on developing, deploying and implementing newly innovated technologies and enhancing learning environments (cf. e-books, e-library, e-exams and e-school). Recent research supports the fact that educational institutions that are technologically advanced offer more constructive and efficient high-quality educational experiences than universities that are not (Juhan & Halkias, 2017).

The blended learning environment is described as an innovative teaching and learning environment that combines traditional face-to-face instruction with digital instructional technologies to maximise student teaching and learning time (Pawan, Paulus, Yalcin & Chang, 2003; Prohorets & Plekhanova, 2015). Indeed, the BLE conforms to technological, methodical and pedagogical uses of innovative digital instructional resources to enhance authentic student learning. BLEs support peer collaboration, peer coaching and active learning in combination with the one-to-one interactions between the student and the teacher both inside and outside of conventional learning environments (Back et al., 2014; Pawan et al., 2003). Thus, the use of BLEs in higher learning institutions facilitates authentic learning through multiple learning activities designed to enhance student motivation, knowledge construction, achievement and solving real-life problems.

The current deployment and integration of information communication technologies (ICTs) in the education system in Tanzania support the adoption and implementation of BLEs through the Moodle (cf. learning management system) based system in universities. As a country,

different policies and strategies have been endorsed to influence the adoption of BLEs. For example, Tanzania's vision 2025 and its national ICT policy of 2003 together prioritise and recognise the use of ICT, the Internet and e-learning to enhance educational opportunities and advocate the development of e-education (The United Republic of Tanzania, 2014). Although traditional face-to-face learning seems to dominate teaching and learning in most of the universities, the adoption of e-learning systems has enhanced BLE implementation. In this regard, the increase of ICT use in universities encourages student engagement in diverse designed BLE learning activities. In BLEs, there is an emphasis on the use of Internet-based technologies, and face-to-face learning activities so as to achieve authentic student learning. Dias & Diniz (2014) suggest that an improved learning environment takes advantage of blended learning approaches with supportive and technology-enhanced educational activities.

However, for BLEs to be successful, an understanding of how a student approaches learning activities participates in the learning process; and handles both campus-based and online learning activities in combined forms should be examined. Studies show that students' conceptions of learning approaches influence the learning environments (cf. BLEs) in practice, and their engagement in BLE learning activities (Bliuc, Ellis, Goodyear & Hendres, 2011; Prohorets & Plekhanova, 2015). As such, they affect students' engagement in authentic interactive learning activities. In the Tanzanian context, BLEs describe a computer-supported teaching and learning environment that combines both traditional campus-based and e-learning environments.

2.3 Approaches to learning

Marton and Saljo (1976), in their seminal work, indicated two distinct levels of student information processing related to how students approach a particular learning task (Baeten, Struyven & Dochy, 2013). The two approaches (cf. deep and surface) are also called strategies students use to approach learning (Hattie & Donoghue, 2016). Scholars have identified a "strategic approach" or "transfer" as a third approach to learning, and their emphasis has been on learning how to know efficiently and effectively (Al-Qahtani, 2015). Studies of Baeten et al. (2013) and Hattie and Donoghue, (2016) report that knowing more efficiently and effectively is a transitional or relational process which involves moving from the surface, through engagement in strategic thinking (transfer). However, approaches to learning are context based in which learners' skills, experiences, learning environments and goals determine the use of an approach to learning. As Frey, Fisher & Hattie (2017) articulated, for students to complete

extended thinking tasks (cf. deep approach), they should also be able to memorise the material (cf. surface approach). It seems that students need to recall information and be familiar with the material before engaging in critical analysis and knowledge construction. Ekici, Coskun and Yurdugul (2014) emphasise that deep learners set learning goals of their own, use task strategies for achieving goals and use time management skills to accomplish learning objectives.

On the one hand, Struyven, Dochy, Janssens and Gielen (2006) assert that a deep approach to learning refers to students' efforts to understand, seek associations between the evidence, experiences and dynamic conceptual analysis. On the other hand, Biggs (1999) and Zhu (2009) follow the idea of Marton & Saljo (1976) that the surface approach focuses on acquisition and consolidation of learning content, based on rote-learning and rehearsal of facts, to fulfil situational demands, although it is argued that students with a surface approach fight to achieve their goals with little effort focussed on the task (Struyven et al., 2006). In contrast, a recent study by Hattie and Donoghue (2016) noted that students with a deep learning approach needed to possess foundational knowledge (surface) and skills related to the topic under study which was needed to consolidate and expand their knowledge. That is, a student's choice of learning approach depends on the student's prior knowledge and socio-cultural background (Frey et al., 2017).

Moreover, Evans, Kirby and Fabrigar (2003) found that a student embracing the strategic approach strives to organise their learning based on the study requirements (knowledge base) by making effective use of space and time. There is a view that strategic learning approaches encourage the use of diverse learning environments (Mattick, Dennis & Bligh, 2004; Mimirinis, 2013; Tsai & Tsai, 2013; Zhu, 2009). As such, to achieve intended learning outcomes in BLEs, teachers should actively facilitate learning processes through three relational phases (cf. surface, deep and strategic). That is, before students embark on strategic learning, there should be a connection between the facts and the principles (surface) and reflection, organisation and interpretation (deep) (Hattie & Donoghue, 2016). In itself, the choice of approach to learning in BLEs seems to support three transitional phases in the learning process because students engage in active learning based on their prior learning experiences and socio-cultural setting.
Moreover, in BLEs, teachers evaluate a student's ability, facilitate active engagement in learning as well as promoting them towards an appropriate learning approach to be used in a unit of study. As stated by Zhu (2009), new learning technologies support appropriate student learning approaches as they participate and engage in diverse learning activities in BLEs. Therefore, learning approaches play a significant role in the student engagement in BLE

learning activities. Thus, this current study intends to examine student conceptions of learning approaches and their engagement in specific BLE activities.

2.4 Key BLE learning activities in Tanzanian universities that students are engaged

Understanding how students approach learning, engage in learning and how they interact, needs an analysis of the key BLE learning activities. According to Khlaisang and Likhitdamrongkiat (2015), BLE learning activities favour interactions between students, teachers and resources which enhance students' engagement in meaningful learning. Back et al. (2014), maintains that BLE learning activities also provide a link between individual learning approach and academic success, in particular, authentic learning activities. Under this understanding, BLE learning activities are specified in such a way that serves as a cognitive guide to help and develop students on problem-solving or conducting a scientific experiment (Mayer, 2003). These BLE learning activities offer a highly-adaptable and flexible solution that eliminates challenges that might be caused by conventional strategies and uses student-centred approach to maintain effective results. For example, online learning activities such as discussion forums and online recorded learning or attending lecture through direct skyping help students to engage in learning without the interference of their school calendars.

Another good example of cognition learning activity in using blended learning, is use of simulation or computer-aided learning programs designed with tasks that stimulate learner's cognition such as identification of problems, generation of hypotheses, collection of information or generating an enquiry plan, weighing the evidence for and against a hypothesis, making decision on basis of available evidence. Although students engage in diverse learning activities in BLEs, the following learning activities (cf. group work, interactions, assessments and learning communities) have been examined, because of their relative importance in the study (Hocaoglu, 2015; Pawan et al., 2003). Understanding students' learning activities engaged in BLEs opens more avenues for improvement of students' learning in a resource-poor context.

Scholars have shown that group work executed in BLEs allows learning experiences that enable communication and coordination between students, teachers and learning tools (Back et al., 2014; Shana, 2009). However, skills and knowledge developed in BLE learning activities, like team learning, are relevant to the student's career development while at school and in their working life (Beccaria, Kek, Huijser, Rose & Kimmins, 2014; Hocaoglu, 2015). In the context of Tanzania, group work in BLEs is mostly carried out during face-to-face sessions (70%) and

by holding online discussions (30% approximately) in forums to support collective learning processes (Swarts & Wachira, 2010; The United Republic of Tanzania, 2014). It is possible because of many challenges, including poor internet connectivity, frequent power cuts and lack of e-tools among students and teachers. In group work, students engage in cognitive activity, negotiate and share ideas to achieve specific intended learning outcomes.

Another key activity is interaction, which involves both on-task and off-task interactions. On-task and off-task interactions enhance shared thoughts and solve problems collectively because successful student-student interactions exhibit environmental evidence, as suggested by Webb (1987) that "students who are on-task most of the time engage more in team learning than when they are working alone" (p.197). That is, using their individual computers, university facilities, including computer labs or other Internet-based tools (i.e., hand-held devices) such as smartphones, iPads and tablets, students spent more time interacting and sharing ideas, information and teaching contents online (Proherets & Plekhanova, 2015; Webb, 1987). Moreover, these technology-based devices influence interactions among students for diverse purposes including communication and entertainment that support learning. Van Eijl, Pilot and Voogd (2005) suggest that communication and collaboration tools, like online forums, chats and emails serve the purpose of facilitating on-task interactions among students, peers and teachers. Studies of peer interactions have primarily reported that increased engagement with educational technologies and collaborative activities increase students' on-task interactions, helping behaviours and timely achievements of intended learning outcomes (Aspden & Helm, 2004; Beccaria et al., 2014; Webb, 1987) and, hence, fostering students' learning success. Learning experiences have shown that, in Tanzania, interactions based on BLEs include both on-task and off-task interactions such as live face-to-face lectures, seminars, online postings and discussions in small groups, asking and answering questions and giving hints.

Furthermore, a study, by Tondeur, Krug, Bill, Smulders and Zhu (2015), reported that students' engagement in both online and offline learning communities enhances knowledge creation and promotes social cohesion among participants. In this activity (i.e. learning community), learning promotes active participation and collaborative learning that builds up social construction, which is imperative in student online learning communities. For example, Nel and Wilkinson (2006) reported that active participation fosters a sense of a learning community in which students aspire to improve their learning and therefore achieve intended learning outcomes. Other studies have reported multiple benefits of online learning communities including students shared learning experiences (Arnold & Paulus, 2010),

attracting active participation, translating creative ideas into practical skills and practice (Keengwe & Kang, 2013; Yilmaz & Orhan, 2010). In this view, learning communities in BLEs enhance collaborative learning, experiential learning and problem-based learning in which technology-supported curricula are based on creative use of technology and pedagogy (Garrison & Vaughan, 2008; Rovai & Jordan, 2004). Szeto (2014), also suggests that blended learning emphasises the use of online learning communities rather than face-to-face learning communities because of its role in connecting participants' activities in resourceful, flexible environments. As a result, face-to-face learning communities may be integrated into online learning communities. In this regard, developing successful learning communities requires reliable, safe and secured BLEs that deepen students' understanding of instructional goals.

Furthermore, assessments in BLEs involve appropriate practices for collecting students' learning data (Kyriazi, 2015; Wanner & Palmer, 2015). It is about the proper analysis of student learning tasks in a bid to evaluate not only their learning performance but also their engagement in BLE. Segers and Tillema (2011) advocate that assessments provide useful information about student learning performance. Innovative digital pedagogies such as blended learning and e-learning emphasise the use of innovative digital assessments aligned with students' learning approaches as the primary motivator for successful student engagement in the productive learning activities (Wanner & Palmer, 2015). As suggested by Kyriazi (2015), students' assessment in BLEs needs to be more student-driven, flexible and time oriented.

Moreover, online assessment is an essential activity for enhancing students' learning processes and predicting students' achievements in BLEs (Demirer & Sahin, 2013). In this view, the basis of assessment in BLEs depends on timely feedback, motivation and students' active learning. Therefore, online assessments such as e-portfolios, e-exams and e-tests can be useful tools which can be used to encourage authentic learning and potentially contribute to the improvement of students' academic achievement in BLEs.

2.5 The relationship between students' conceptions of learning approaches and their engagement in BLEs learning activities

Integration of BLEs in university teaching and learning has generated more concerns among educational researchers related to how students learn in such an environment (Garrison & Vaughan, 2008). In search of a more efficient and active student learning process, the current study examines the relationship between students' learning approaches and their engagement in BLE learning activities. The students learn in diverse learning environments including in-

class learning, distance and computer-generated learning (Goodyear, Asensio, Jones, Hodgson & Steeples, 2003; Mimirinis, 2013). Moreover, knowing how their approach to learning relates to BLEs helps to understand and improve student engagement in in-depth academic-related activities as well as enhancing student reflection and interaction with learning environments. Most of the studies have examined the relationship between student learning strategies and the use of technology (Mimirinis, 2013), challenges (Mtebe, 2013) self-regulated learning and student experiences in BLEs (Ekici et al., 2014; Goodyear et al., 2003). However, experience shows that no study has examined the relationship between students' conceptions of learning approaches and their engagement in BLE learning activities in Tanzanian universities.

Furthermore, Figure 1 represents the research framework indicating a link between students' learning approaches and learning activities for students engaged in BLEs. The dotted lines illustrate the students' conceptions of learning approaches (surface, strategic and deep) and their engagement in BLE learning activities (group work, peer interactions, learning community and assessments). The other lines indicate the central role played by BLEs in predicting the relationship between students' conceptions of learning approaches and their engagement in BLE learning activities. Therefore, the study is set up to unveil the relationship between students' conceptions of learning approaches and their engagement in BLE learning activities.

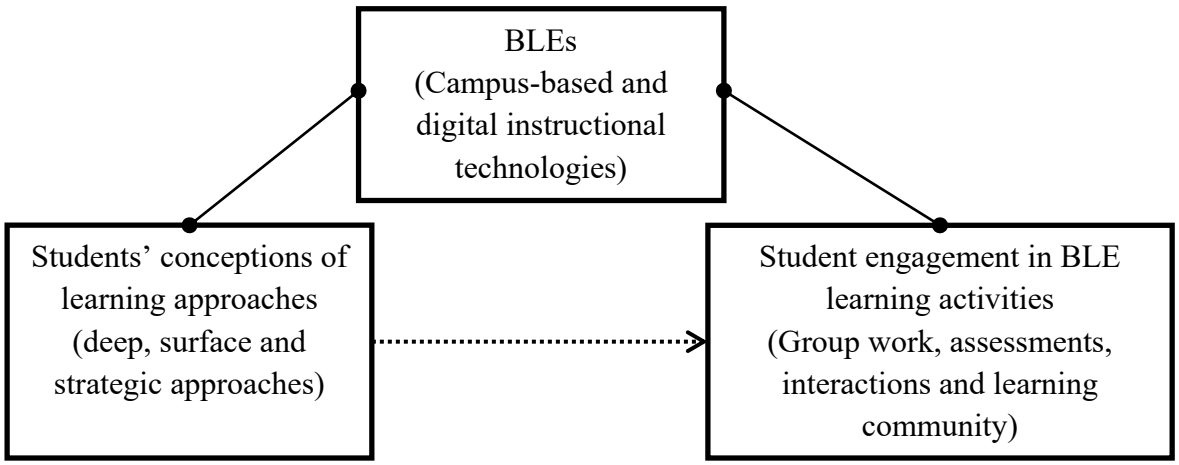


Figure 1. Research framework for studying students' conceptions of learning approaches and BLE activities

2.6 Objective and research questions

This study examines students' conceptions of learning approaches and their engagement in BLE learning activities. Specifically, the current study addresses the following three research questions:

1) What are the Tanzanian students' conceptions of the deep, surface and strategic learning approaches in BLEs?
2) To what extent are Tanzanian students engaged in BLE learning activities (group work, interactions, learning communities and assessments)?
3) How are the deep, strategic and surface learning approaches related to student engagement in BLE learning activities?

3. Methods

3.1 The specific educational context of the study

Higher education (HE) in Tanzania incorporate post-secondary education leading to the award of certificates, diplomas and degrees in diverse disciplines of study. The Tanzania Commission of Universities (TCU) monitor, evaluate and oversee the provision of HE offered by HEIs in the country (TCU, 2012; URT, 2014). In reality, TCU is commissioned to maintain an education system that provides established HE to support national social, economic and cultural development. HE in Tanzania comprises three years of theoretical and practical training for the disciplines related to social sciences, humanities and business courses; and four years for engineering courses and five years for medicine. HEIs are responsible for curriculum design, development and review. TCU is responsible for guidance and quality check of the proposed curriculum in both private and public universities before its endorsement.

Public universities are semi-autonomous and subsidised by the government (URT, 2010; URT, 1999). Teaching and learning delivery in HEIs encompass traditional face-to-face instruction and instructional technologies. However, computer-assisted-instruction (CAI) has been used in several universities and university campus colleges. Since the 2000s, e-learning systems have been implemented as a blended learning platform in some of HEIs to complement traditional face-to-face instruction, offering education courses in distance modalities. Since then, the number of students registered in HEIs has been increasingly (TCU, 2016). Blended learning in the context of Tanzania, aims at using a variety of multimedia (i.e., face-to-face learning, online, internet, radio, social media), and learning environment (i.e., teamwork, self-regulated learning, peer-to-peer learning) to achieve knowledge, cognition skills and possibly social and communication changes.

3.2 Design and sampling procedure

The current research employed a cross-sectional survey design to examine students' conceptions of learning approaches and their engagement in BLEs among undergraduate students in two universities in Tanzania: Mzumbe University (MU) and the University of Dar Es Salaam (UDSM). MU and UDSM were selected based on the following criteria: first, a minimum of five years' experience in using e-learning systems as a platform for the blended learning approach to teaching and learning. Second, the integration of ICT into education, preferably with available facilities and services for teaching and learning. Third, the availability, accessibility and use of computer labs connected to the internet and, finally, offering BLE courses with curriculum contents available and accessible via educational platforms.

Based on experiences from a preliminary study, random sampling was employed to select students from two blended learning courses. Specific university e-learning experts, ICT specialists and system administrators assisted in generating a list of blended learning courses housed in the e-learning system. Eight teacher education blended learning courses (i.e. four from each university) with the highest number of visits, page views, hits (files downloaded) and contents were purposefully sampled. Also, from eight sampled courses, a randomisation process was used to obtain two blended learning courses (one from each university) with the highest course viewers, and students engaged in discussion forums and frequent teachers' visit. Based on course information gathered after sampling, we noted that the selected courses were compulsory. These courses were coordinated by teachers with five to seven-years teaching experience who have been engaging students in BLE learning activities for two to three years. With firsthand information about courses, students engaged in the selected courses were consulted by the researcher with the help of their class leaders who assisted in the distribution and collection of the questionnaires. Students were requested to fill out the survey considering their first thought on the items as the respond reflecting their own understanding.

3.3 Participants and context

A total of 446 students, who were engaging in blended learning courses, participated in this study. The total of 271 (60.8%) respondents were females, and 175 (39.2%) were males. Three hundred and two (67.7%) of the respondents were first-year students, and 144 (32.2%) were second-year students. All respondents were enrolled as full-time students. With regards to courses taken per semester, 8 (1.8%) respondents took five courses, 150 (33.6%) took six

courses, and 288 (64.6%) took seven courses. Furthermore, 205 (24%) were full-time workers, 42 (9%) were part-time, and 229 (67%) were not working. 203 (45.5%) respondents were residing on-campus, while 243 (54.5%) were living off-campus. 68.4% of respondents were in the age range 20-29; 19.5% were 30-39; 10.1% were 40-49; and 2.0% were 50-59. Table 1 presents the summary results of the demographics of the sample.

Table 1
Demographics of the sample (N=446)

Respondents characteristics	Categories	N	%
Gender	Male	175	39.2
	Female	271	60.8
Year of study	First year	302	67.7
	Second year	144	32.3
Student status	Full time	446	100
Number of courses taken this semester	5 courses	8	1.8
	6 courses	150	33.6
	7 courses	288	64.6
Place of residence	On-campus	203	45.5
	Off-campus	243	54.5
Work status	Full time	205	24
	Part-time	42	9
	None	229	67
Age	20-29	305	68.4
	30-39	87	19.5
	40-49	45	10.1
	50-59	9	2.0

3.4 Data collection procedures

Apart from the demographic characteristics of the respondents, other factors assisted the selection of students, including engaging in online interactions; online assessments, posting, questioning and group work, live face-to-face lectures and online group discussions. After the preliminary study had been conducted among universities in Tanzania implementing blended learning, two universities for actual data collection were selected. Furthermore, this study has gone through a strict ethical approval from the two universities under study. Sampled students were requested to attend a two-hour seminar in the form of direct dialogue on learning approaches, learning activities and BLEs. The workshop was aimed at, firstly, gauging students' awareness and understanding of BLEs and learning approaches and secondly, selecting the appropriate group of students for actual data collection. The first and second year Bachelor of Education students participated in this study. However, participants were assured

that only researchers would have access to the data that the survey provides and such data would not be shared, distributed or divulged to any third party.

3.5 Instruments

The study used the ABLESs questionnaire survey which had three sections. Firstly, demographic information which involved the following variables: year of study, student status, number of courses per semester, place of residence, workstation, age and gender. Secondly, approaches to learning and studying inventory (ALSI), an abridged version used to measure students' conceptions of learning strategies in BLEs was adopted and modified. Lastly, the blended-learning environments student engagement survey (BLESS) was self-designed based on the original work of Garrison and Vaughan (2008). Adopted and modified ALSI was used because, on a review of the relevant literature, we found no study had been conducted in Tanzania measuring students' conceptions of learning approaches in BLEs. The ALSI was validated through a pilot study conducted in three Tanzanian universities before actual data collection.

Furthermore, the ALSI has been employed and validated in educational contexts such as higher education (Entwistle & McCune, 2004) and medical education (Mattick et al., 2004) in other countries. It consists of three subscales: cf. surface (three items), deep (seven items), strategic (eight items) based on five-point scoring scales: strongly disagree (1) to strongly agree (5). Based on the pilot study, 18 items were retained. The general reliability of the ALSI subscale was .71 which is acceptable. Moreover, the BLESS survey consisted of students engaged in BLE learning activities in Tanzanian universities as a design feature of BLE courses. The BLESS was used to examine the magnitude of students' engagement in BLE learning activities. The BLESS consists of 20 items built on five scoring scales: strongly disagree (1) to strongly agree (5) reflecting four sub-scales interactions (five items), learning communities (five items), assessments (five items) and group work (five items). The overall reliability value of the BLESS sub-scale was .85, which is satisfactory.

3.6 Data Analysis

The current study examines students' conceptions of learning approaches and their engagement in BLE learning activities. The study theorised that students' conceptions about learning approaches (deep, surface and strategic) had a direct relationship with their engagement in BLE learning activities. Descriptive statistics were used to analyse respondents' conceptions of

learning approaches in BLEs. Spearman's rank order was used to examine the relationship between ALSI subscales and BLE learning activities so as to determine the extent of student engagement in BLE learning activities based on a specific learning approach. Further, the study used multiple linear regressions to find out if learning approaches could predict the relationship with student engagement in BLE learning activities.

4. Results

4.1 Students' conceptions of learning approaches in BLEs

Table 2 shows the descriptive statistics regarding students' conceptions of learning approaches and BLE learning activities engaged. The results show that surveyed Tanzanian students hold diverse conceptions of learning approaches as measured by means score and standard deviations: strategic approach scored (Mean = 4.62, SD = .25), deep approach scored (Mean = 4.57, SD = .29) and the conceptions of surface approach scored (Mean = 4.56, SD = .33). The overall results indicated that surveyed Tanzanian students had three conceptions learning approaches as shown by the mean values of strategic, deep and surface approaches. The results further indicated that the students were likely to engaged in the following BLE learning activities: group work (Mean =4.36, SD =.45), learning community (Mean =4.34, SD =.43), assessments (Mean = 4.29, SD= .46) and interactions (Mean = 4.25, SD = .41). To summarise, these results indicated that surveyed Tanzanian university students who were engaged in multiple blended learning activities. Thus, it is noteworthy that students were highly engaged in BLE learning activities.

Table 2
Descriptive statistics for all the variables among ALSI and BLESS subscales

Learning approaches	Mean	SD	BLE learning activities	Mean	SD
Surface approach	4.56	.33	Group work	4.36	.45
Strategic approach	4.62	.25	Learning community	4.34	.43
Deep approach	4.57	.29	Assessments	4.29	.46
			Interactions	4.25	.41

Furthermore, bivariate correlations analyses were conducted to identify the degree of correlation among students' conceptions of learning approaches (cf. deep, surface and strategic) conceived by students in BLEs. The findings show that there was a statistically significant

correlation between students' conceptions of deep and surface learning approaches exist in BLEs (r_s = .375, p<.01). The results further show that there was a statistically significant correlation between students' conceptions of deep and strategic learning approaches exist in BLEs (r_s =.519, p<.01). Furthermore, the results found that there was a statistically significant probability that the relationship between students' conceptions of strategic and surface learning approaches exist in BLEs (r_s =.400, p<.01). The results showed that students hold several conceptions regarding diverse learning approaches in BLEs. To summarise, the results indicated that students hold diverse conceptions of learning approaches like strategic, deep and strategic learning approaches in BLEs. Table 3 provides a summary of the results.

Table 3
Correlations between students' conceptions of learning approaches (*N=446*)

	1	2	3
1. Deep approach (DLA)	-		
2. Surface approach (SLA)	.375**	-	
3. Strategic approach (STA)	.515**	400**	-
Mean	4.57	4.56	4.62
S. Deviation	.29	.33	.25

** p<.01

4.2 Students' engagements in BLE learning activities

Correlation analysis was run to examine the degree of the relationship between the BLE learning activities (cf. interactions (INTR), assessments (ASS), group work (GRW) and the learning community (LCM)). The results indicate that for all four surveyed BLE learning activities students engaged, statistically significantly correlated with one another ($p<.01$). The findings further indicated the following degree to which BLE learning activities were correlated to one another: ASS and LCM (r_s =.*524*); ASS and GRW (r_s =.*520*); LCM and GRW (r_s =.*471*); INTR and LCM (r_s =.*417*); INTR and ASS (r_s =.*373*) and the INTR and GRW (r_s =.*352*), The results suggests that students were diversely engaged in BLE learning activities. To summarise, the results show that the students were engaged in multiple learning activities. That is, the students who engaged in one type of BLE activity also engaged in other types of BLE activities. Table 4 provides a summary of the results.

Table 4
Correlations between key BLE learning activities that Tanzanian students are engaged in (*N=446*)

	1	2	3	4
1. Interactions (INTR)	-			
2. Learning community (LCM)	.417**	-		
3. Assessments (ASS)	.373**	.524**	-	
4. Group work (GRW)	.352**	.471**	.520**	-
Mean	4.25	4.34	4.29	4.36
S. Deviation	.41	43	.46	.45

** $p<.01$

4.3 The relationship between students' conceptions of learning approaches and their engagement in BLE learning activities

Multiple linear regression analyses were conducted to find out if learning approaches (cf. DLA, SLA, STA) could predict learning activities (INTR, ASS, LCM, GRW) of a student engaged in BLEs. The results show that the variables entered statistically predicted INTR, ASS, GRW and LCM. For INTR, $R^2 =.081$, R^2 *(adj.)* $=.075$, $F(3,442) = 13.006$, $p<.001$. With regard to LCM, $R^2 =.114$, R^2 *(adj.)* $=.108$, $F(3,442) = 18.986$, $p<.001$. Similarly, for ASS, $R^2 =.107$, R^2 *(adj.)* $=.101$, $F(3,442) = 17.745$, $p<.001$ and for GRW the results indicate, $R^2 =.084$, R^2 *adj* $=.078$, $F(3,442) = 13.550$, $p<.001$.

The results further show that DLA and STA approaches were statistically significant predictors of INTR, LCM, ASS and GRW. For the INTR, the results indicate ($\beta_{DLA}=.175$, $p=<.001$; $\beta_{SLA} =.024$, $p =.640$; $\beta_{STA} =.137$, $p =.014$), showing that the conception of DLA predicted INTR while neither SLA nor STA significantly predicted INTR. Regarding LCM ($\beta_{DLA}=-.168$, $p=.002$; $\beta_{STA}=.168$, $p=.003$; $\beta_{SLA}=.086$, $p=.087$), the results show that DLA and STA were statistically significant predictors for LCM, which was also an insignificant predictor for SLA. Similarly, the conceptions of DLA and STA were significant predictors for ASS ($\beta_{DLA}=.140$, $p=.010$; $\beta_{STA}=.172$, $p<.002$). Also, the results indicated that SLA was an insignificant predictor for ASS ($\beta_{SLA}=.097$, $p=.056$), indicating that students with DLA and STA conceptions were more likely to engage in ASS than those with SLA conceptions. The results further show that DLA was a statistically significant predictor for GRW ($\beta_{DLA}=.177$, $p<.001$) while neither STA nor SLA predicted GRW ($\beta_{SLA}=.022$, $p=.667$, $\beta_{STA}=.143$, $p=.011$), signifying that the students with DLA conceptions are more likely to engage in group work compared to those with STA and SLA conceptions. To summarise, the results indicate that

DLA could significantly predict interactions, learning community, assessments and group work activities for students engaged in BLEs while STA could predict interactions, learning community and assessment learning activities. However, the result shows that SLA could not predict student engagement in BLE learning activities, suggesting that the students with SLA were less likely to engage in BLE learning activities. Table 5 gives a summary of the results.

Table 5
Predictors of students' conceptions of learning approaches in BLEs

Variables	INTR		LCM		ASS		GRW	
	β	p	β	p	β	p	β	p
DLA	.175	.001	.168	.002	.140	.010	.177	.001
SLA	.024	.640	.086	.087	.097	.056	.022	.667
STA	.137	.014	.164	.003	.172	.002	.143	.011
$F_{(3, 442)}$	13.006**		18.986**		17.745**		13.550**	
R^2	.081		.114		.107		.084	
$R^2_{adj.}$	.075		.108		.101		.078	

** p<.001

5. Discussion

5.1 Students' conceptions of learning approaches in BLEs

Studying students' conceptions of learning approaches offers reliable information which determines how students approach learning while engaging in BLEs and, hence, proposes measures to improve student learning and the design of BLE learning activities. The findings indicate that students hold diverse conceptions of learning approaches such as strategic, deep and strategic learning approaches as they engage in BLEs. Studies by Ellis et al. (2008) and Frey et al. (2017) support our findings that students vary in their conceptions of learning approaches in technology-mediated learning environments and that such approaches exhibit qualitative differences among students. More interestingly, the results indicated that the surveyed Tanzanian university students who hold strategic learning approach conceptions were also likely to hold conceptions of deep and surface approaches. Students' socio-cultural background, instructional strategies and the dominance of an in-class teaching philosophy might be the main reasons, which are also supported by the study by Cakir & Delialioglu (2009).

Furthermore, the findings might be interpreted as significant evidence for inclusive learning approaches in BLEs since other studies have shown that it is challenging to develop in-depth knowledge without surface knowledge (Fisher, Frey & Hattie, 2016). Our finding is supported by the view of Tsai and Tsai (2013) that different learning conditions (cf. campus-based, learning activities, instructional strategies, design structure, nature of the learning environments) may play distinct roles in shaping students' conceptions of learning approaches.

5.2 Students' engagement in BLE learning activities

The findings further indicate that students are likely to engage in diverse BLE learning activities and this has multiple and positive outcomes for students as well as teachers who facilitate meaningful learning in BLEs. It was hoped that, in BLEs, students would engage in a different number of learning activities, which in turn would promote successful learning. It appears to be true because, in BLEs, students are expected to exhibit high participation in multiple learning activities so as to achieve the intended learning objective. As such, interactions, assessments, group work and the learning community in BLEs attract active student engagement and therefore sharing authentic learning experiences. Thus, the findings suggest that students who actively engage in BLE learning activities support flexible learning, manage their learning and take responsibility for their learning. As Goodyear et al. (2003) suggest, in BLEs engagement in diverse learning activities influence networked learning and teamwork between several face-to-face and online interactions a such as online lectures, discussion forums, offline and online learning communities with peers and teachers.

5.3 The relationship between students' conceptions of learning approaches and their engagement in BLE learning activities

Student learning approaches play a significant role in evaluating and assessing the effectiveness of their engagement in BLE multiple learning activities. The findings of the current study confirm the relationship between students' conceptions of learning approaches and their engagement in BLE activities. Our results indicate that deep and strategic learning approaches were significant predictors of several BLE learning activities in which the students engaged. The findings support researchers' expectations that students need to hold different conceptions of learning approaches as an important prerequisite for their engagement in multiple blended learning activities. However, the findings of the current study offer new insights that blended learning champions and practitioners need to rethink the relations aspect of learning approaches

rather than thinking one approach is self-sufficient. In support of the findings, Hattie and Donoghue (2016), propose that the students who hold the surface knowledge of a topic should also hold deep and expansion of knowledge. The findings further suggest that the following blended learning aspects should be considered: firstly, addressing diverse students' conceptions of learning approaches; secondly, improving authentic students' teaching and learning in BLEs and, lastly, the in-depth restructuring of the BLE learning activities.

Moreover, the findings of the current study suggest that students' conceptions of learning approaches were related to their engagement in some BLE learning activities. As such, students who have a surface learning approach were unable to engage in BLE learning activities which require an in-depth understanding of materials. A possible explanation is that the surface learning approach requires partial engagement in meaningful learning while the students concentrate on producing the facts (Evans et al., 2003; Struyven et al., 2006). It is advised that, to align with deep learning strategies, BLE teachers and instructional designers should redesign the BLE learning activities to embrace more deep learning-oriented activities that would help students develop and engage in meaningful learning. The findings echo previous research in which students' conceptions of learning approaches were not only based on the actual learning environment but were also shaped by their cultural background knowledge and recent experiences (Al-Qahtani, 2015). Perhaps these findings have clear implications for practice, and that student learning approaches and their engagement in BLE learning activities vary depending on several factors, including student ability and learning environments, as well as the design and nature of learning activities.

6. Implications of the study

This current study provides essential theoretical and practical implications for teaching and learning practices among teachers, blended learning champions and BLE curriculum developers in Tanzania. First, the findings indicate that engaging students in BLE learning activities should be more deep-learning oriented. As such, facilitating authentic teaching and learning, achieving intended learning outcomes, gauging students' deep understanding should also relate to students' conceptions of learning approaches. Second, the results indicate that students were likely to engage in BLE learning activities, which implies that although BLEs support personalised learning, more open space is available for team learning and interactive opportunities which activate students' higher-order thinking. Third, the correlation between learning approaches and BLE learning activities imply that there is an important link between

students' conceptions of learning approaches and their engagement BLE learning activities. In most of the previous studies, deep learning approach is more favoured than the other approaches, whereas, in this study, we found that all three learning approaches are applicable and play important roles in the teaching and learning process in BLEs. The study contributes to the new understanding that students' conceptions of learning approaches rely on several factors including learning activities, instructional design, learning resources, the familiarity with learning contents and learning environments.

7. Limitations and future research directions

This study also has its limitations that should be addressed in future research to understand better the relevance and order of learning approaches and BLE learning activities in which students are engaged. Firstly, this study used a sample of students (cf. 446) from two universities in Tanzania. Future research is needed, for example, to replicate the study in other universities in Tanzania with diverse characteristics. The findings further are generalisable to Tanzanian universities implementing BLEs and students with similar characteristics. Secondly, for the students and teachers' practice, this study measured only four BLE learning activities, issues related to the design of BLEs and motivation to engage in BLEs were not addressed. In future studies, researchers are prompted to address both the BLE design features and motivation aspects in relation to learning approaches. Third, future research is needed that inform whether students' conceptions of learning approaches differ according to their beliefs and their constructivist engagement in BLE courses. Fourth, in the future research, there is a need to test students' conceptions of learning approaches and their constructivist learning in constructivist-based BLE because of the hypothesis that BLEs influence meaningful learning.

8. Conclusion

The current study offers several conclusion based on the findings. First, in surveyed Tanzanian universities students hold diverse conceptions of learning approaches as they engage in BLEs such as surface, deep and strategic learning approaches. Second, students identified four learning activities engaged in BLEs including group work, interactions, learning communities and assessments. Third, there was a statistically significant correlation between students' conceptions of learning approach and their engagement in BLE learning activities. The findings contribute to the knowledge base regarding learning approaches and BLEs learning activities. Fourth, application of students diverse learning approaches depending on the magnitude of the

BLE learning activities in which they are engaged. For Tanzanian universities offering BLE courses, authentic students' engagement in BLE learning activities seems to depend on diverse factors including the BLE teacher's capability to motivate and encourage active learning.

Similarly, since the students do not rely on a surface learning approach or strategic learning approach, but more attention should be given to the design features of BLE learning activities so as to be more deep-learning oriented, which helps students to achieve intended learning outcomes. However, the findings suggest that in BLE learning activities firsthand experiences should be facilitated regarding on when and how to use learning approaches, the conditions appropriate to using learning approaches in order to influence authentic student learning. More importantly, teachers and universities, willing to implement BLEs in their teaching and learning, should encourage students' engagement in diverse BLE activities and facilitate appropriate discourse and awareness on the necessity of an in-depth construction of knowledge through relevant learning approaches.

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Appendix: Questionnaire

Approaches to Learning and Blended Learning Student Survey (ABLESs)

PART A: **Demographic information**

Insert a '√' in the place appropriate to you

Respondents' characteristics				
a	Year of study:	First Year [….]	Second year […]	Third-year [……]
b	Student status:	Full Time [….]	Part Time […..]	
c	Courses enrolled this semester (in number): [……]			
d	Place of residence	On campus residency [……..]		Off-campus […….]
e	Work status:	Full Time […….]		Part Time [……]
f	Age:	>20 [……];	21-30 […….];	31-40[…...]; 40+ […...]
g	Gender:	Female [……]		Male [……]

PART B: **Approaches to learning**

Put a '√' in the most appropriate place to indicate how you agree or disagree with the following testimonials which relate to learning approaches employed as you engage in BLEs. The rating scale range from 1 strongly disagree to 5 strongly agree.

	Items	1	2	3	4	5
1	I have often had trouble in making sense of the things I have to remember					

2	I have usually set out to understand for myself the meaning of what we had to learn in BLEs					
3	In making sense of new ideas, I have often related them to practical or real-life contexts.					
4	Ideas I have come across in my academic reading often set me off on long chains of thought.					
5	I have looked at the evidence carefully and try to reach my own conclusion about what I am studying.					
6	It has been important for me to follow the argument, or to see the reasons behind things.					
7	In reading for this blended learning course unit, I have tried to find out for myself exactly what he authors means					
8	I have been over the work I have done to check my reasoning and see that it makes sense					
9	I have generally put a lot of effort into my studying in a blended learning environment					
10	On the whole, I have been quite systematic and organised in my studying					
11	When I have been communicating ideas, I have thought over how well I have got my points across.					
12	I have organised my study time carefully to make the best use of it.					
13	I have tried to find better ways of tracking down relevant information in BLEs					
14	Concentration has not usually been a problem for me unless I have been really tired.					
15	If I have not understood things well enough when studying, I have tried a different approach.					
16	Much of what I have learned seems no more than lots of unrelated bits and pieces in my mind.					
17	I have tended to take what we have been taught at face value without questioning it much.					
18	I have just been going through the motions of studying without seeing where I am going.					

Deep (1-7), strategic (8-15), surface (16-18)

PART C: **Engagement in BLE learning activities**

Insert a '√' in the most appropriate place to indicate your agreement or disagreement on the following statements relating to BLE learning activities. The rating scale range from 1 strongly disagree to 5 strongly agree.

	Items	1	2	3	4	5
19	The amount of interactions among students and contents in BLEs					
20	The amount of interactions among student and environment BLEs					
21	The amount of reciprocal interaction among student and teacher under a specific topic					
22	The amount of reciprocal interaction among student and tool under a specific topic					
23	The quality of interactions among student-teacher; student-tools; student-content and student-environment					
24	Student learning interest, participation and satisfaction in learning communities					
25	Teacher involvement and engagement in learning communities is encouraging					
26	The connection between online and offline					
27	The collaborative learning, the creation of knowledge, improved achievement, thinking and shared learning outcomes					
28	The amount of learning community (workshop, or another organised online group of learners)					
29	The quality of innovative peer assessment in blended learning environments					
30	In a blended learning environment, the opportunities for students to think out and receive critique					
31	In innovative assessment students understanding of the content and diagnosis of reasons for errors					
32	Discussion forums, evaluation modalities and feedback in blended learning					
33	Flexibility, all-in-one-software and delivering adaptive content for formative assessment					
34	Students learning interest, active participation and joint problem-solving in group work					
35	Students engagement, sharing innovative ideas and communicate with each other in group work					
36	The connection between learning approaches and group work and online collaborative learning					
37	Online collaborative learning and students' team-based learning in blended learning environments					
38	Open, team-based, social learning and construction of new knowledge in group work					

Interaction (19-23), learning community (24-28), assessments (29-33), group work (34-38)

Chapter 3

The relationship between students' conceptions of constructivist learning and their engagement in constructivist based blended learning environments*

* This chapter is based on: Machumu, H., & Zhu, C. (2017). The relationship between student conceptions of constructivist learning and their engagement in constructivist based blended learning environments. *International Journal of learning Technology, 12*(3), 253-272. doi: 10.1504/IJLT.2017.088408.

Chapter 3

The relationship between students' conceptions of constructivist learning and their engagement in constructivist based blended learning environments

Abstract

Emerging methodological and technological systems designed to accommodate students' unprecedented demand and needs, which incorporate both in-class learning methods and digital technologies learning environments, invite students to engage in the given learning activities. This study investigated the relationship between students' conceptions of constructivist learning and their engagement in constructivist-based blended learning environments (CBLEs). A mixed methods research design was used to collect data from 722 students at Mzumbe University, Tanzania. The results indicated a significant positive correlation between students' conceptions of constructivist learning and their engagement in CBLEs. The results showed that students had positive conceptions of constructivist learning. The results offer significant contributions to constructivist educators and education stakeholders about what should be considered while encouraging student engagement in CBLEs. The study concludes that students' conceptions are essential to the success of their learning in CBLEs since their active constructivist engagement in diverse learning activities depends on their constructivist conceptions.

1. Introduction

Student constructivist learning has been a key factor in the implementation of innovative educational technologies (i.e. online learning, e-learning and blended learning) in education research. While students seem to be the primary stakeholders for implementing constructivist-based blended learning environments (CBLEs) (Garrison & Kanuka, 2004; Jonassen, 1994; Lefoe, 1998), their prior conceptions, interests and experiences are not well articulated in research. For example, to achieve intended learning outcomes, teachers and instructional designers should perhaps reconsider student pre-instructional conceptions and knowledge as preconditions for their engagement in any meaningful learning contexts (Jonassen, 1991). In other words, student conceptions of constructivist learning play a significant role in the design of CBLEs in which their engagement in authentic learning activities is perhaps attributed by

active participation, shareable collaborative learning experiences and self-directed inquiry (Duffy & Jonassen, 1991; Vaughan, Cleveland-Innes & Garrison, 2013).

Moreover, studies have shown that well-designed and motivating CBLEs support student engagement in authentic and challenging learning activities (Holley & Dobson, 2008; Laurillard, 2015). Furthermore, student engagement in CBLEs involves several challenging learning activities and strategies including group work and team experiences, innovative digital assessments, interactions and learning community. In fact, the possible drive of CBLEs seems to be constructivist learning principles and values including active engagement, student-centred learning, personal relevance, personal autonomy, reflectivity, experiences with knowledge and multiple perspectives (Banditvilai, 2016).

Therefore, CBLEs combine in-class and out-of-class learning methods with technology-mediated learning instructions whereby the physical co-presence of a teacher and students is a prerequisite, with some components of student control over time, place and pace (Delialioğlu, 2012; Hannafin & Land, 2000; Henrie, Halverson & Graham, 2015; Johnson & Graham, 2015). Nevertheless, for effective student engagement in CBLEs, rethinking their concerns, conceptions and preferences about constructivist learning and what to learn should be a focal point for their engagement in authentic learning activities. Despite such understanding, there has been a disappointingly slow uptake in Tanzanian universities based on sociocultural learning diversities and a lack of study in addressing students' conceptions of constructivist learning although they use CBLEs (Aydede, Kecercioglua & Arabacioglua, 2009). While most of the studies have examined other constructivist blended learning variables like students' experiences, challenges, awareness, opportunities and infrastructure (Kafyulilo, 2015; Mtebe, 2013; Tedre, Ngumbuke & Kemppainen, 2015), our study focuses on what and how students conceive constructivist learning as they engage in CBLEs. Therefore, the purpose of this study is to investigate the relationship between students' conceptions of constructivist learning and their engagement in CBLEs.

2. Theoretical background

This research study takes account of two relevant theoretical frameworks including the constructivist learning framework (Garrison & Archer, 2000; Garrison & Kanuka, 2004) and the empirical-theoretical foundations of student engagement (Kuh, 2001; Kearsley & Shneiderman, 1998). We discuss constructivist learning in the first section, which is then

followed by a discussion on student engagement in CBLEs. Finally, the relationship between student conceptions of constructivist learning and CBLEs is deliberated.

2.1 Constructivist learning

Constructivist learning encompasses students' ability to construct meaningful and educationally worthwhile knowledge on their learning (Schunk, 2000), and is a process of continuous collaborative reconstruction of experiences (Garrison & Archer, 2000; Garrison & Kanuka, 2004). Some would argue that constructivist learning entails the students' ability to construct rather than acquire knowledge through tutor-led instructions (Andrea, Noweski & Meinel, 2012). One view - expressed by Vaughan et al. (2013) - is that students construct their learning based on individual experiences. Others, however, argue that students confirm ideas collaboratively within a realistic learning environment and a community of learners (Garrison, Anderson & Archer 2010).

Moreover, student constructivist learning involves shareable collaborative experiences, self-directed inquiry, active participation and the self-construction of knowledge (Holley & Dobson, 2008). Laurillard (2015) further suggests that the focus of the constructivist student should be solely devoted to the supportive and recognised learning environment in which a variety of perspectives are examined, and misconceptions are diagnosed. As an example, students co-create new knowledge, while digital technologies enable students to address different learning interests, promote the highest level of reasoning, deepen their understanding (Holley & Dobson, 2008) and put concepts into practice (Vaughan, 2014).

In this case, the focus of constructivist learning is on active participation, self-directed learning, and shareable collaborative learning experience in diverse, enjoyable, flexible and reflective learning environments so as to develop a sense of ownership and curiosity. Moreover, self-directed learning offers greater flexibility as to what, when and how long to study, with or without the assistance of others. Again, research indicates that self-directed learning allows learners to define learning aims, identify appropriate methods and take responsibility for the entire learning process (Kwan & Wong, 2015). With attention to self-directed strategies, the key pedagogical aspect regarding constructivist learning perhaps is linked to the learner's ability to select appropriate educational resources, to decide on learning objectives and strategies, as well as to motivate oneself to learn.

Furthermore, in the context of this study, active participation is understood to involve students' cognitive and social collaborative active roles in, and time devoted, to constructivist

learning. Sarı, Alcı, Karataş and Ejder (2015) suggest that active participation includes students answering instructors' questions, debating, questioning, involvement in group discussions, negotiating ideas and the students' oral presentations. Teachers who encourage students' interactions through learning activities attract active engagement and resourceful participation in studying for a given topic (Howard, Short & Clarck, 1996). Also, authentic learning activities and reflections help students to participate, construct and co-create new knowledge and develop relevant skills needed for solving socio-economic and educational problems (Stacey & Gerbric, 2008).

Notably, shareable experiences embrace social constructivist, collaborative learning as an essential aspect for students to share prior learning experiences (Garrison & Kanuka, 2004). Students share their learning experiences through access to other ideas, communicate materials, debating and sharing of academic resources. Laurillard (2015) advocates that shareable experiences involve substantial constructivist learning conditions such as prior knowledge, acquisitions, inquiries, discussion and working with others to achieve intended learning outcomes. Learning is effective when it is shared because shareable learning experiences inspire and motivate the students to achieve the intended learning outcomes. In this study, constructivist learning embodies students' intellectual construction of their understanding as they engage in CBLEs with the focus on self-directed inquiry, active engagement, participation, personal relevance, collaboration and shareable experiences. We assume that once students' conceptions of constructivist learning are well-addressed in research, it will increase their level of engagement in CBLEs, henceforth improving their learning outcomes and the quality of learning.

2.2 Student engagement in CBLEs

Studies on CBLEs uphold that learning environments are important academic and social-psychological determinants of student engagement in CBLEs (Jeffrey, Milne, Suddaby & Higgins, 2012; Kwan & Wong, 2015; Rovai & Jordan, 2016). It can be observed that students who are constructively engaged in a BLE increase their attendance, enhance their active and collaborative learning and subsequently achieve their intended learning outcomes. Besides, CBLEs employ the use of in-class learning methods, technology-mediated instructions (i.e. the Internet and digital media) (Savery & Duffy, 2011) and learning perspectives (constructivism and cognitive). In this case, CBLEs focus on students' prior learning experiences, digital learning technologies and collaborative engagement learning as they construct new knowledge.

Moreover, student engagement has been defined as students' efforts in learning (Henrie et al., 2015) and students' involvement with academically meaningful activities (Delialioğlu, 2012). Trowler and Trowler (2010) echo this sentiment when they state that *"...student engagement is concerned with the interaction between the time, effort and other relevant resources... (p.3)"* invested by students intended to optimise their experience, personal relevance, interest, conceptions and enhance their learning outcomes. For instance, studies have shown that many interventions to improve students' engagement are mainly for direct instructions rather than student concerns on CBLEs (Rashid & Asghar, 2016). Arguably, the increase of students' engagement in CBLEs has contributed to the improvement of student learning outcomes, student-teacher interactions, group work and team learning among students. As a result, CBLEs appear to create more efficient, flexible, collaborative and participative learning experiences for students (Akyuz & Samsa, 2009).

In practice, student constructivist learning exhibits noticeable designed learning activities to encourage students' application of their conception as they engage in CBLEs. Hence improve their learning practices and outcomes which encourage the provision of timely feedback on students' academic progress (Markwell, 2007; McLean, 2001). Moreover, research has linked constructivist learning and student engagement in CBLEs to relevant learning activities such as interactions, communication, collaborative group work, assessments and learning communities (Zhu, 2012). In fact, these academic activities include interactions (cf. student-student, student-content and student-teacher), collaborative learning communities (offline and online participation) (Akyol & Garrison, 2011). Others include assessments (cf. online and offline exams, test, quizzes), group work and team learning (cf. take-home assignment, discussion forums), which foster student engagement in CBLEs (Rovai & Jordan, 2004).

In other words, students who engage in challenging learning activities are likely to develop stable and lucid domain expertise and sophisticated problem-solving skills (Savery & Duffy, 2011; Akyuz & Samsa, 2009). In brief, student engagement in CBLEs seems to be driven by student collaborative learning experiences in group work, innovative digital assessments and active participation in interactive learning towards achieving prescribed intended learning outcomes. In general, students engage in CBLEs through collaborative group works which foster active participation in problem-solving and knowledge transfer for long life learning.

2.3 The relationship between student conceptions of constructivist learning and their engagement in CBLEs

Studies have shown that student conceptions play an active role in their learning (Jeffrey et al., 2012; McLean, 2001). In fact, conceptions of constructivist learning are defined as ideas, thinking and beliefs about constructivist learning (Schunk, 2000). Since constructivist learning has different principles and values, students also have different ideas and conceptions about constructivist learning, during which students' constructivist conceptions agree with what to learn, students have a better position to construct new knowledge as they engage in CBLEs. A study by McLean (2001) found that a relationship exists between students' conceptions of constructivist learning and the academic environments in which they are engaged. Loyens, Rikers and Schmidt (2009) found that the learning environment students engage in can influence students' conceptions of constructivist learning. Furthermore, the student engages in authentic interactive learning opportunities when their conceptions are considered and accommodated.

A study investigating the relationship between students' conceptions of constructivist learning and their engagement in CBLEs focuses on the need to know how students' preconceptions agree or contradict with such learning environments is of paramount importance. Therefore, according to the constructivist learning principles, the overall idea is that a relationship exists between students' conceptions of constructivist learning and their engagement in CBLEs. However, despite the fact that few studies have examined students' conceptions of constructivist learning and their engagement in blended learning (Jeffrey et al., 2012; Loyens et al., 2009), neither of these studies has addressed the relationship between students' conceptions of constructivist learning and CBLEs nor about their engagement in CBLEs in Tanzania. Thus, a study regarding the relationship between students' conceptions of constructivist learning and their engagement in CBLEs can provide significant sociocultural and innovative insights to be further researched.

2.4 Research objective and questions

The research aims to investigate the relationship between students' conceptions of constructivist learning and their engagement in CBLEs. The study addressed the following research questions:

a) What are the conceptions of constructivist learning of students in a Tanzanian university?

b) To what extent are the students engaged in CBLEs in a Tanzanian University?
c) How are students' conceptions of constructivists learning related to their engagement in CBLEs?

3. Research Method

3.1 Setting and design

The study was conducted at Mzumbe University (MU) in Tanzania during the first semester of the 2015/2016 academic year. The MU e-learning system based on Moodle was utilised because the system has been used strategically as a blended learning platform since 2009. MU was selected for CBLEs' implementation because of students' experiences with e-learning coupled with traditional talk-chalk instructions and some elements of social constructivist learning. However, the e-learning system at MU complements the existing use of traditional instructions by encouraging the use of innovative digital technologies for teaching and learning. In this regard, CBLEs involved both online and offline learning practices whereby a combination of face-to-face lectures, discussion forums, seminars and interactive learning sessions were used. We used the mixed methods research design to collect both quantitative and qualitative data assuming that the triangulation of methods would help to find relevant research findings on student constructivist learning and their engagement in CBLEs.

3.2 Participants

In this current study, students who were engaging in CBLEs were the key informants. The study involved a total of 722 students from the Teacher Education Studies and Management Studies course at MU. Among the study participants, 336 were female, and 386 were male. Participants were selected based on the following criteria: they had previously taken blended learning courses, they had previous knowledge on CBLEs, students had basic knowledge of Information Communication Technologies (ICTs) components and their meaning for education, and they were engaged in constructivist learning. Additionally, 48 (6.6%) of the 722 students were enlisted for one-to-one interviews at the end of the semester.

3.3 Procedures

Before the implementation of the study, a seminar was offered to the participating students. The seminar intended to explain the purpose of the study, the pre-requirement for participant observations, gauging students' awareness regarding constructivist learning, clarifying the

presence of a new teacher involved in their classes, and how to fill out the pen-and-paper questionnaire. A week later, paper questionnaires were distributed in class with the assistance of the students' representative and teachers. A total of 800 questionnaires were distributed; only 772 questionnaires were completed and returned. Although all students in participating classes accepted to participate in our research, those who did not return the survey questionnaires were not forced to do so with consideration of their right to silence. The semester comprised 14 weeks of teaching and learning including a final examinations preparation week.

Moreover, participating classes were visited twice a week with the same teachers and the same classes to observe live face-to-face lectures and tutorial discussion sessions with the students. The visit aimed to observe and experience the spirit of constructivist learning used by teachers and students. However, the visit was supplemented with Similarly, ICTs components including online interactions, online group work, online assessment, online discussion forums and posting feedback were completed by teachers and students at their own pace and in their own time via the e-learning system. However, based on a large number of students, strategies were designed to avoid lurking behaviour among students: each student was responsible for his/her own work in the e-learning system except for group work. Students were assigned a username and a password for easy login and access to the digital contents/media. The course content (course outline/syllabus) under the specific course name (i.e. Educational Media and Technology) were also made available online.

Student collaborative groups were formed for interactions, group work and communication among students-teachers and student-student online discussion and posting. Moreover, for group work and team learning (teachers present online assignment for group work), individual work teachers asked students to complete assignments in the form of homework (partly online and face-to-face), assessments (teacher provide e-test and e-projects). Offline and online group discussions were also observed. Furthermore, students were responsible for forming their tutorial groups based on choices, familiarity and preferences. In total, 48 tutorial groups were developed for both online and offline discussions and group work. However, for management reasons, each tutorial session had at least 75 students, while in face-to-face lectures almost 350 students attended lectures in one class.

During the face-to-face tutorials, students in their respective groups of 10 to 15 were asked to present findings of the problem assigned and how the problem was resolved. After the presentation, the class was invited to share the specific issues in respect to the presented group work. Similarly, teachers were following both online and in-class student discussions as a

moderator. Each tutorial session was scheduled for two hours. Five groups, each consisting of 15 students, were responsible for one presentation per week. Likewise, during in-class tutorial sessions, instructional times were divided into 10 minutes for presentations and 10 minutes for discussions. Subsequently, at the end of the two-hour presentations, 10 minutes were left for teachers to clear misconceptions or provide announcements for the forthcoming tutorial lesson. Again, based on time and issues addressed, students were free to change the venue from face-to-face to online discussion after their presentations in class for more sharing experiences. These tutorial sessions moulded the selection of 48 students for the semi-structured interviews. From 48 tutorial groups, four students were selected based on gender (2 male and 2 female students), achievement (2 high achievers and 2 low achievers). Initially, 192 students were selected from 48 tutorial groups, however, based on a large number of qualified students for interviews only 24 female students (12 high and 12 low achievers) and 24 male students (12 high and low achievers) were selected for interviews, making a total of only 48 interviewed students.

However, justifications of students' academic achievement were based on feedback provided by teachers on their individual and group assignment as well as their active participation both in online discussion forum and tutorial sessions. For example, field notes from tutorial sessions including summaries of discussions about students' learning were used to support the selection of students for semi-structured interviews based on their conceptions of constructivist learning as they engage in CBLEs. The students were guided to discuss the content and share their thoughts and findings with others via the e-learning system. Moreover, in the 11th and 12th semester weeks, 48 students participated in one-to-one interviews based on their frequency of attendance and participation in both online and offline learning activities. In fact, 48 students were divided into two interview groups. In the first group, 25 students were interviewed in the 11th week, while the second group involved 23 students who were interviewed in the 12th week.

3.4 Instruments and measurements

The study used self-developed research instruments (hereunder CBLEs survey) to measure student conceptions of constructivist learning as they engage in CBLEs. The aim was to define the CBLEs' activities students engaged in, based on their learning characteristics, prior learning experiences with both the e-learning system (Moodle) and traditional face to face instructions. Moreover, the CBLEs survey consisted of three categories including demographic data,

conceptions of constructivist learning (CCL with three subscales) and engagement in CBLEs (four subscales). For example, three CCL subscales include self-directed (4 items), shareable experiences (4 items) and active participation (4 items) in order to measure student conceptions of constructivist learning. Next to that, four BLE activities subscales were developed to measure student engagement in CBLEs including group work and team learning (5 items), interactions (5 items), assessments (5 items) and learning community (5 items). Furthermore, CBLEs consisted of five Likert-type scoring scales (i.e., strongly disagree 1 to strongly agree 5). The overall Cronbach's Alpha scale reliability of BLE activities scored .78 and CCL scored .75 which are satisfactory. Also, qualitative measures including an observational checklist and semi-structured-interview guide questions were used to collect qualitative data.

3.5 Data Analysis

The current study collected both quantitative and qualitative data. For quantitative data purposes, we first analysed descriptive statistics for demographic information means based on percentages and frequencies. Second, an exploratory factor analysis was conducted to determine sampling adequacy and as a basis for correlations and regression analyses. Third, Spearman's rank-order correlation was conducted to determine the relationship between students' conceptions of constructivist learning and their engagement in CBLEs. Finally, multiple regressions were conducted to determine how students' conceptions of constructivist learning relate to their engagement in CBLEs. However, a step-by-step thematic analysis was used to analyse qualitative data obtained from documented observed checklists and semi-structured-interviews by studying field notes and listening to recorded audiotapes to identify data based on the classified patterns. Pre-defined themes were classified based on definitions (probing words), and the selection of relevant key quotes were prepared. With support from literature, valid arguments were built based on explained data, combinations and categorisation of sub-themes into meaningfully interpretable themes.

4. Results

4.1 Demographic Information

The information on gender revealed that 337 (46.7%) respondents were female and 385 (53.3%) were male. Analysis of the place of residence indicated that 357 (49.4%) respondents were on-campus residents, while the majority 365 (50.6%) lived off-campus. Although the results divulged that there was a slight difference between on-campus and off-campus residence, it is

a good indicator that both on-campus and off-campus resident students were engaged in CBLEs. A total of 582 (80.6%) respondents were aged 20-29, 96 (13.3%) were 30-39, 35 (4.8%) were 40-49 and 9 (1.2%) were 50-59. In Table 1, we report on the means and standard deviations of constructivist learning (each dimension) scales and BLE activities (each dimension) scales. However, the results show that for constructivist learning dimensions, self-directed scored the highest (Mean = 4.38, SD = .40), shareable experiences (Mean = 4.30, SD = .44) and active participation (Mean = 4.26, SD = .45). For the BLE dimensions, group work scored the highest (Mean = 4.69, SD = .27), learning community (Mean = 4.49, SD = .33), assessments (Mean = 4.34, SD = .28) and interactions (Mean = 4.26, SD = .36).

Table 1
Descriptive statistics for three dimensions of constructivist learning and four dimensions of student engagement in CBLEs (n = 722)

CCL dimensions	Means	SD	CBLE dimensions	Mean	SD
Self-directed (SD)	4.38	.40	Interactions (IN)	4.26	.36
Shareable experiences (SE)	4.30	.44	Learning community (LC)	4.49	.33
Active participation (AP)	4.26	.45	Assessments (ASS)	4.34	.28
			Group work (GW)	4.69	.27

4.1.1 Factor analysis

Exploratory factor analysis (EFA) was conducted for two reasons: firstly, to determine sampling adequacy. Secondly, as a basis for correlations and regression analyses. The results show that constructivist learning subscale (12 items) extracted three components with eigenvalues in a combination of 45.83% of the total explained the variance. The Kaiser-Meyer-Olkin (KMO) was at .818 and Bartlett's test of sphericity (χ^2 (66) = 1234.28, p<.001), indicating that correlations between items were sufficiently good for factor analysis (see Table 2). Moreover, the result shows that student engagement subscale (20 items) extracted four components with eigenvalues in a combination of 41.85% of the total explained the variance. A KMO test of .854 was found and Bartlett's test of sphericity (χ^2 (190) = 2254.65, p<.001), revealing that correlations between items were sufficiently good for factor analysis (see Table 3). The analysis of results suggests three factors for student conceptions of constructivist learning and four factors that relate to the four subscales items of student engagement in CBLE. Given that a large sample was used, variables cross-loadings indicate the variables relationship

and are considered acceptable. Finally, student constructivist learning items have loadings over .746 and student engagement items had a loading over .694 (see Tables 2 and 3).

Table 2
Factor loadings for the students' conceptions of constructivist learning in CCL items

Variables	Factor Loadings			Cumulative%
	SE	SD	AP	
SD_CL1		.583		
SD_CL2		.609		
SD_CL3		.689		
SD_CL4		.519		
SE_CL5	.698			
SE_CL6	.681			
SE_CL7	.644			
SE_CL8	.693			
AP_CL9			.693	
AP_CL10			.746	
AP_CL11			.416	
AP_CL12			.529	
Eigenvalues	3.252	1.242	1.006	
% of variance explained	27.098	10.352	8.380	45.83

Note: Factor loading more than .41 was considered for interpretation

Table 3
Factor loadings for the learning activities students engaged in CBLEs items (N = 722)

Variables	Factor Loadings				Cumulative %
	INT	ASS	LC	GW	
IN_1				-.354	
IN_2	.567				
IN_3	.694				
IN_4	.449				
IN_5	.524				
LC_6			.653		
LC_7			.607		
LC_8	.648				
LC_9	.599				
LC_10	.651				
ASS_11		.686			
ASS_12		.665			
ASS_13		.674			
ASS_14		.594			
ASS_15			.432		
GW_16			.479		
GW_17			.442		
GW_18				.535	
GW_19				.522	
GW_20				.671	
Eigenvalues	4.248	1.650	1.369	1.097	
% of variance explained	21.24	8.28	6.85	5.48	41.85

Note: Factor loading more than .35 was considered for interpretation

4.2 Students' conceptions of constructivist learning

The students' conceptions of constructivist learning were determined by studying the relationship of constructivist learning dimensions (i.e. self-directed, active participation and shareable experiences) in CBLEs. Bivariate analyses of correlations among constructivist learning dimensions were conducted. The results revealed that all constructivist learning dimensions (three) were positively significantly related to one another (p<.01). However, the least correlation was reported between self-directed and active participation (r_s=.350), while the strongest was found to be between shareable experiences and active participation (r_s=.507). This study found that constructivist learning was conceived positively among students engaged

in CBLEs. Table 4 provides a summary of the correlations among constructivist learning dimensions.

Table 4
Correlations among constructivist learning dimensions (n = 722)

	1	2	3
1. SD	-		
2. SE	.397**	-	
3. AP	.350**	.507**	-
Mean	4.38	4.30	4.26
S. Deviation	.40	.44	.45

Note: *SD* = self-directed, *SE* = shareable experiences, *AP* = active participation
**$p<.01$

4.3 Students' engagement in CBLEs

The study examined a variety of learning activities students engage in CBLEs including group work, interactions, learning communities and assessments. Table 5 provides a summary of associations of each variable with regard to the students' engagement in CBLEs. The results divulged that all four CBLEs activities were positively statistically significantly correlated to one another ($p<.01$). However, the least correlation was recounted between interactions and group work ($r_s=.227$), while the strongest was found between interactions and the learning community ($r_s=.531$). Based on these results, it became apparent that students were positively engaged in CBLEs through different learning activities.

Table 5
Correlations between each dimension of student's engagement in CBLEs (n = 722)

Variables	1	2	3	4
1. IN	-	.531**	.259**	.227**
2. LC		-	.377**	.364**
3. ASS			-	.344**
4. GW				-
Mean	4.26	4.49	4.34	4.69
S. Deviation	.36	.33	.28	.27

**$p<.01$

4.4 Students' conceptions of constructivist learning and their engagement learning in CBLEs

In studying the relationship between students' conceptions of constructivist learning and their engagement in CBLEs, Spearman's rank order correlation was run. The findings indicated there was a statistically significant positive correlation between students' conception of constructivist learning and their engagement in CBLEs (r_s =.372, p<.01, two-tailed). Table 6 provides a summary of the results.

Table 6
Correlations between student constructivist learning and student engagement in CBLEs

	1	2
1.Conceptions constructivist learning	-	.372**
2. Engagement learning activities		-
Mean	4.31	4.44
S. Deviation	.35	.22

**. p<.01

Multiple regressions analyses were run to predict four dimensions of CBLEs activities the students engaged in (i.e., IN, ASS, LC, and GW) from three student constructivist learning dimensions (i.e., SD, SE, and AP). For the IN, the variables entered were statistically significant and predicted IN with an R^2 = .101, adjusted R^2=.104, $F_{(3, 718)}$ = 29.00, p<.001. For LC, the variables entered were statistically significant and predicted LC which accounted for R^2=.086, adjusted R^2=.082, $F_{(3, 718)}$ =22.52, p<.001. Similarly, for ASS, the variables entered were statistically significant and predicted ASS which accounted for R^2=.085, adjusted. R^2=.081, $F_{(3, 718)}$ = 22.27, p<.001. With regards to GW, the variables entered were statistically significant and predicted GW which accounted for R^2=.035 and adjusted. R^2=-.031, $F_{(3, 718)}$ =8.79, p<.001 (see Table 5).

However, the results further show that shared experiences (SE) and active participation (AP) were significant predictors with a positive relationship to interactions (IN) (β_{SE}=.201, β_{AP}=.147), while the self-directed (SD) was not a significant predictor (β_{SD}=.050). The results indicate that self-directed and active participation were significant predictors to LC (β_{SD}=.126, β_{AP}=.166) while shareable experiences was not (β_{SE}=.079). Also, the results indicate that shared experiences and active participation were significant predictors to ASS (β_{SE}=.136, β_{AP}=.142) while self-directed was not (β_{SD}=.089). However, results show that shareable experience was a significant predictor to GW (β_{SE}=.156), while self-directed and active participation were not

significant predictors to GW (β_{SD}=.055, β_{AP}=.005). Table 7 provides a summary of the multiple regression analyses results of significant predictors of students' conceptions of constructivist learning and their engagement in CBLEs.

Table 7
Summary results of multiple regression analysis (n = 722)

	IN		LC		ASS		GW	
	β	p	β	p	β	p	β	p
SE	.201	.001	.079	.069	.136	.002	.156	.001
AP	.147	.001	.166	.001	.142	.001	.005	.900
SD	.050	.204	.126	.002	.089	.026	.055	.177
$F_{(3, 718)}$	29.00**		22.52**		22.27**		8.79**	
R^2	.101		.086		.085		.035	
R^2_{adjusted}	.104		.082		.081		.031	

**p<.001

4.5 Interviews and observations results

Qualitative data was gathered to examine students' conceptions of constructivist learning and their engagement in CBLEs via semi-structured-interviews and observations. As we interviewed and carefully listened to students' testimonials, classified patterns, expounded arguments and themes emerged and were categorised into a manageable unit of analysis. In this study, we established the elucidatory code (open coding system) with two pre-classified patterns. The process of open coding involves analysing the data line by line (i.e., coding every word careful). Word by word coding system assisted in determining code with valuable data.
It should be noted that open coding was conducted through pen and paper method after recorded interviews were changed into transcripts. Two transcribers were requested to listen to the recorded interviews and provide their transcripts before being justified by the researcher. In table 8 and 9, we provide some of the interviews raw data and how was analysed through an open coding system. The analysis is presented based on students' response to the interviewer and how was analysed. Table 10 shows a summary of the in-depth interviews and their definitions and relevant examples of participants' quotes and the categorised themes.

Table 8

Open coding related to students' conceptions of constructivist learning (research question 1)

Raw data	**Preliminary code/properties**	**Final selected code**
Interviewer: How do you think the teaching and learning in this learning environments help you to constructing new knowledge? **Student:** Uhmm (thinking), my participation in this course had made my learning rewarding because I can engage in group work wherever, I can share ideas with friends while at home and the work being done and submitted. Also, the teacher encourages participation in online group discussion as well as a tutorial session. Also, I found myself being able to ask and sometimes answer questions during the tutorial session.	Active participation Share ideas Solve problems Share ideas Online group work Self-motivation Self-directed Shareable experiences	Active participation Shareable experiences Self-directed learning

Table 9

Open coding on issues related to students' engagement in CBLEs (cf. research question 2)

Raw data	**Preliminary code**	**Final selected code**
Interviewer: Please let me know how do you engage in this learning environments (cf. CBLEs) during the face-to-face tutorial session and via the e-learning platform? **Student:** In tutorials, the teacher provides guide questions. In my groups, I discuss with other about a question assigned and present the findings in front of others for discussions in class. The same is applied during online discussion forum but with different topics. Sometimes questions are complicated, and I have to find assistance from other learning groups. So, I do engage in teaching and learning with colleagues. I like sharing new concepts in different online classes.	Engaging in assessments Interactions Team learning Looking assistance Learning communities Interactions	Assessments Interactions Learning community Group work

Table 10
Summary of in-depth interviews themes, their definitions and key examples of participants quotes

Code (descriptive code scheme)	Definition (probing word (s))	Key quotes presented (selected examples)
Category: Constructivist learning [1]Shareable experiences [2]Self-directed inquiry [3]Active participation	Thought and ideas about constructivist learning	"A good approach that encourages the application of my knowledge to create solution" [2, 3]
		"It is a means of sharing constructive comments with colleagues" [1, 2, 3]
		"A collaborative social learning that enables personal construction and shares understandings with others"[1, 3]
		"It is about personal relevance and sharing guided constructive experiences" [2, 3]
		"At first, I define concepts based on my own knowledge"[1, 2,3]
Category: Student engagement [1]Group work, [2]Interactions, [3]Assessments and [4]Learning community	Ways of students' engagement in CBLEs and how they play a part.	"I share my thoughts via online platform".[1, 2, 4]
		"I attend both tutorials and online discussions to get innovative ideas and solve problems at any time".[2, 3]
		"I participate freely in learning activities"[1, 2, 4]
		"In both the tutorials and the online platform, we help each other"[1, 2, 4]
		"I often prefer doing assignments and tests online" [1, 2, 3]

Note: Superscript number(s) present a code that summarises the main topic of the excerpt

1) During one-to-one interviews, students were asked to share their conceptions about constructivist learning. The results indicate that 75% of the interviewed students had positive conceptions of constructivist learning as they admitted engaging in effective academic work. Students were able to confirm that self-directed inquiry, active participation, shareable experiences, and collaboration embrace their constructivist learning as they engage in CBLEs. The following statements were conveyed: "a good approach that encourages the application of

my knowledge to create a solution", "it is about personal relevance and share guided constructive experiences" and "it is like collaborative social learning that enables personal autonomy, construction and enables sharing understandings with others". Considering these statements, the study of the students' testimonials showed that students had clear thoughts on constructivist learning encouraging the use of prior experiences and guiding new knowledge to construct personalised solutions.

2) When students were interviewed about their engagement in CBLEs, almost all students reported engaging in CBLEs via different learning activities. For example, 95% of interviewed students stated that they were engaging in group work, 65% in learning communities, 95% in assessments and 80% in interactions. It was noted that almost three-quarters of the students demonstrated associations between learning communities and group discussions. The following statement reflects this finding: "I successfully work with my group as a community of learners". Offline and online communications were regarded as a form of interactions by the majority of the students who admitted that "in both tutorials and online we participate and help each other to get information and feedback on time". For example, most of the interviewed off-campus students mentioned working with peers online saved their time of having to travel daily to campus and reduced daily face-to-face interactions with teachers: "I attend both tutorials and online discussions to get innovative ideas and solving problems anytime". Interestingly, some interviewed students divulged that they visit school only for lectures and tutorial sessions where they are supposed to present their work.

Similarly, the analysis of the observational data shows that there is a relationship between student conceptions of constructivist learning and their engagement in CBLEs. For example, students were observed engaged in online discussions, while at the same time performing group assignments, seeking clarifications and explanations from their peers and teachers, which is one of the principles of effective learning. It was observed that peer assessments were conducted during face-to-face tutorial sessions, whereby students were able to evaluate and positively challenge presentations made by their fellow students. Furthermore, it was observed that the majority of students were able to ask questions and seek clarifications from their peers. Additionally, during tutorial presentations, students were thinking that using their own experiences guided by new experiences is what they should use to construct new personalised knowledge. Therefore, students were engaged in CBLEs because their preconceptions related to the concepts being taught.

Furthermore, it was observed that students were engaged in online group discussions that are a form of online learning communities in CBLEs. They were working with all group work posted by teachers on the platform. It was observed that engaging students in individual assignments and group work appeared to work well because students were interested to find out their grades before the next tutorial lessons. Apparently, most of the observed classroom activities were students' initiatives and collaborative works, whereby teachers were guiding the lessons. For example, most of the presentations were organised by students. In general, findings from interviews and observations suggest that even students' conceptions of constructivist learning are related to their engagement in CBLEs because they were able to engage in learning activities.

5. Discussion

This section discusses the results of the current study, implications and contributions of the research and future research directions.

5.1 Students' conceptions of constructivist learning

The results of this study show that Tanzanian students had positive conceptions regarding constructivist learning and that their conceptions should be recognised and considered while engaging them in CBLEs because the study findings revealed that all of the three dimensions measured correlated one another. A possible explanation is that although the teaching and learning experiences of Tanzanian students conform to multiple learning experiences such as traditional chalk-and-talk, e-learning, and social constructivism, the results on their constructivist conceptions support the theoretical assumption that constructivist learning is built on students' autonomy and personal relevance (Andrea et al., 2012). It also involves the ability to create new knowledge and meaning based on their insights, social contexts and prior learning experiences (Garrison & Kanuka, 2004).

Furthermore, the results from interviews and observations indicated that most of the students were able to describe constructivist learning based on different thoughts and ideas. For example, when asked how you would describe active learning, one of the interviewed student said that "it is a means of sharing constructive comments with colleagues in class". The results from the interview further indicate that students were free and courageous to provide valuable experiences, ideas and comments during tutorials. Moreover, it is possibly because constructivist learning entails collaborative social learning and sharing personal knowledge

within a community of learners. Furthermore, the findings contribute to the understanding of students' conceptions of constructivist learning as a prime concern for their engagement in CBLEs. The findings offer new ideas regarding students learning in constructivist learning environments.

5.2 Student's engagement in CBLEs

The results of the present study show that students were engaged in CBLEs through diverse learning activities like group discussions, social interactions, assessments and learning communities. It was observed that as students deeply engage in group work and online learning communities, they improve self-control, working skills and hence, increase the ability to construct the meaning of their learning. This finding supports prior studies about students' learning in CBLEs (Kuh, 2001; Vaughan et al., 2013) that students excel well in learning environments that encourage co-regulations and willingness to consider contributions from other group members. The findings indicated that students engage in CBLEs when they are free to participate and share ideas, compelling learning experiences, concepts and thoughts. For example, Tanzanian students were observed engaging in online interactions and group discussion forums simply because their concerns about having free online discussions at their own time convenience were accommodated.

In fact, student engagement in CBLEs, confirms previous claims that students' conceptions are a primary factor in determining their engagement in a learning environment (Saidalvia & Mansor, 2012), because of being a determinant of what prior experience the learner brings to bear in constructing an understanding (Savery & Duffy, 2011) on diverse academic needs. In other words, active student participation, self-directed learning and collaborative learning are identified as students' conception of constructivist learning. The results indicate that students' interests to engage in CBLEs increases as their interests, concerns and conceptions about learning resemble with what they know and not what they do not know; that is, working on students' conceptions, interests and their prior knowledge determine their engagement within the CBLE. Based on the findings, the student engages in learning activities that develop their openness, flexibility, entrepreneurial mind and share information because of playing an active role in constructing new knowledge and expertise.

5.3 The relationship between students' conceptions of constructivists learning and engagement in CBLEs

The results of the current study found that there was a strong positive significant relationship between students' conceptions of constructivist learning and their engagement in CBLEs. In other words, constructivist learning works well in a collaborative social environment in which students engage more with real problems via constructivist learning activities like interactive demonstrations, peer assessments, learning community and group work. In CBLEs, students engaged in problem-solving when they found that they are responsible for their learning as well as sharing valuable experiences for the sake of authentic learning (Vaughan, 2014). These findings are supported by Holley and Dobson (2008), that students' learning conceptions are the critical success factor in how far they engage in CBLEs.

Furthermore, constructivist learning principles and values allow students to engage in authentic interactive learning activities based on constructivist learning environments. It is necessary to promote students' attention, curiosity and prior experiences which helps them to understand what is eventually constructed. The results further indicate that powerful learning activities like collaborative group work, peer assessments and online and offline discussions increase students' engagement in CBLEs via social interactions in which a community of learners is fostered. For example, both effective online and offline interactions between teacher-students and student-students strengthen the students' engagements in CBLEs.

Although both online and traditional modes of assessments were used, the results further indicate that delayed feedback was associated with a traditional mode of assessments. Moreover, based on the findings, delayed feedback might be because some teachers rely on traditional evaluation methods including paper-based tests, quizzes, group work and individual projects. For example, for the 722 students, the teachers needed two weeks to finish marking and grading their academic tasks. In fact, previous studies support our findings that for practical engagement in CBLEs, multiple assessments strategies and timely feedback should be used as a tool for promoting students' engagement in deep learning. Based on the results, it showed a strong link between how students' conceptions of constructivist learning had implications on their active engagement in CBLEs.

6. Implications of the study

This study has several significant implications for constructivist educators, curriculum developers, researchers and instructional designers who employ digital technologies for

teaching and learning in Tanzania. First, constructivist educators and instructional designers can use the findings to design relevant teaching and learning activities, contents, educational programmes that encourage active student participation, self-directed inquiry and collaborative learning in CBLEs. It is vital to take account of the Tanzania students' conceptions of constructivist learning as a requirement for their engagement in CBLEs.

Furthermore, the results imply that student engagement in CBLEs could be used to design professional constructivist teacher-development programmes in Tanzania. In fact, these programmes could enable teachers to acquire appropriate knowledge related to active student participation, self-directed inquiry and share learning experiences, and henceforth the provision of authentic learning activities which influence students' engagement in CBLEs. Hence, the current study provides profound contributions to the understanding of students' conceptions of constructivist learning and their engagement in CBLEs in Tanzania.

7. Limitations and future research directions

Although the current study outlines significant findings, several limitations should be addressed in future studies. First, as this study involved multiple data collection methods, only a limited number of participants were involved in semi-structured-interviews for the methodological framework and ethical reasons. The study's findings are based on a sample of only 48 interviewed students; hence, its interpretations should be taken with caution and can only be applicable in a similar context. Second, the number of participants (722 students) was still limited for broad generalisations; therefore, the findings are generalizable only to students and universities with similar characteristics. Also, further empirical studies in diverse educational contexts or university with different characteristics should be done to replicate the findings. Third, this study investigated only students' conceptions and their engagement in CBLEs within a single university because studied university integrates constructivist centred-technology instruction with the used of e-learning. In future studies, more research involving more universities (international) with more diverse participating subjects (cf. teachers, instructional designers) from different disciplines should be conducted. Furthermore, this study provides interesting future research directions. As such, the researcher's next research plan can consider this study's results and further investigate students' motivation to learn and their engagement strategies in CBLEs.

8. Conclusion

In conclusion, it is expected that the study provides useful and new understanding of students' conceptions of constructivist learning that could be considered when designing relevant learning activities to be engaged in CBLEs. This is because their constructivist engagement depends on conceptions such as active participation, self-directed inquiry and shareable learning experiences. Furthermore, it is anticipated that students with constructivist conceptions engage in CBLEs. Indeed, this paper offers relevant guidance and new understanding to educational technologists, constructivist researchers and educators regarding the use of constructivist pedagogy and students' engagement in technology-enhanced learning environments. The study provides contributions to understanding student learning conceptions, constructivist learning and their engagement in CBLEs. Such knowledge helps instructional designers, teachers and policymakers to plan and implement constructivist-based teaching and learning practices in CBLEs. In the final analysis, it is also considered that the findings offer knowledge on how to improve and redesign student learning activities which could attract students' active participation, share experiences and enhance self-directed inquiry as they engage in CBLEs, and address their unique learning interests, conceptions, needs and deepen their understanding.

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Appendix A: Questionnaire

Constructivist-based Blended Learning Environments Survey (CBLEs)

PART A: Demographic Information

Put a '√'in the most appropriate place to you

	Respondents' characteristics
1	Gender: Female: ( ); Male: ( )
2	Age: 20-29 ( ); 30-39 ( ); 40-49 ( ); 50-59 ( )
3	Place of residence: On campus residence ( ); Off-campus residence ( )

PART B: Conceptions of constructivist learning

Insert a '√' in the most appropriate place to indicate how you agree or disagree with the following testimonials which relate to constructivist learning (Only one tick is required per statement). The rating scale range from 1 strongly disagree to 5 strongly agree.

	Items	1	2	3	4	5
1	Learning focuses on issues that interest me.					
2	I search for meaning with the issue I have to learn					
3	I think critically about my own ideas.					
4	I think critically about ideas in the readings.					
5	I ask other students to explain their ideas.					
6	Other students ask me to explain my ideas.					
7	I encourage thoughtful reflection on experience.					
8	I make good sense of the teacher's messages.					
9	Other students encourage my participation.					
10	Other students value my contribution.					
11	The teacher stimulates my thinking.					
12	The teacher models an excellent discourse.					

Self-directed (1-4), shareable experiences (5-8), active participation (9-12)

PART C: Student engagement in CBLE activities

Put a '√' in the most appropriate place to indicate your agreement or disagreement on the following constructivist learning activities engaged in CBLEs. The rating scale range from 1 strongly disagree to 5 strongly agree.

	Items	1	2	3	4	5
1	I explain my ideas to other students and teachers					
2	The discussion forum is for sharing knowledge					
3	Teachers encourage me to participate in learning					
4	Other students respond to my ideas					
5	Teacher design and post content on time					
6	Learning is courageous and participative					
7	Teachers are engaged in online learning and tutorials					

8	What I learn help to improve my professional practice					
9	Contents are connected well to create knowledge					
10	What I learn improved my collaborative learning skills					
11	Feedback on assignment received on time					
12	I experience fair on well-designed evaluation modalities					
13	Evaluation is motivating					
14	Formative assessment is flexible					
15	Peer assessment enhance understanding of reasons for errors					
16	The teacher encourages active participation					
17	Team leader engaged me in sharing innovative ideas					
18	I engage in team learning and open learning					
19	Other students encourage joint problem solving					
20	The teacher emphasises communication and timely submission					

Interactions (1-5), learning community (6-10), assessments (11-15), Groupwork (16-20)

Appendix B: Observation sheet

AIM: To collect relevant information regarding students' constructivist learning conceptions. To determine how students, engage in constructivist based blended learning environments

Observers' instructions:

This observation sheet aims at collecting data relevant to this study. Observers are advised to exercise great care, be clear and focused on the whole lesson (both online and offline classes). During online and offline learning activities, each behaviour and practices related to student engagement in CBLEs and constructivist learning should be observed and reported. That is, observer stays at a point to observe everything related to this study.

Students' Observation Checklist

Constructivist and learning practices, behaviours and CBLE	Observations (provide a "√")	
	Observed	Not observed
Teacher-student interactions		
Knowledge construction		
Teacher as facilitates (interactions)		
Authentic activities & contexts		
Effective feedback (online)		
Collaborative experiences		
Multiple perspectives		
Team learning		
Online and offline discussions		
In-class (talk-chalky) learning		

Appendix C: Interview Guide Questions (IGQ)

Interviewers' general tips: Greetings and fine-tuning (state the objectives of the meeting and ensure confidentiality of data as well, get respondents signed a consent form and gave a copy) (5 minutes)

Interview guide questions (30 minutes)

A: Questions related to conceptions of constructivist learning in CBLEs

1. a. How would you describe teaching and learning that encourage collaboration and active learning?

    b. How would you define you think that students actively participate in teaching and learning at this university? How?

B: Questions related to student engagement in CBLEs

2. Please let me know how do you engage in this learning environments (cf. CBLEs) during the face-to-face tutorial session and via the e-learning platform? (**probe:** different ways of engagement in CBLEs).
3. Please, let me know if you had a challenging academic task where and to whom do you seek assistance? (**probe:** engagement in CBLEs via interactions, assessments).
4. Based on your idea (above), let me know how your participation in group work and team learning relate to your conceptions of constructivist learning in CBLEs? (**probe:** engagement via learning community).

Chapter 4

Students' motivational factors and engagement strategies in constructivist-based blended learning environments*

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Chapter 4

Students' motivational factors and engagement strategies in constructivist-based blended learning environments

Abstract

Student motivation to learn is an essential component for the design, development and implementation of technology-mediated learning environments. Engagement learning strategies have been devised to assist students as they learn in constructivist-based blended learning environments (CBLEs). This study investigates the relationship between students' motivational factors and their engagement learning strategies in CBLEs in Tanzanian Universities. Specifically, the study examines, a) student motivational factors to learn; b) gender differences in motivational factors; and, c) relates motivational factors to students' engagement learning strategies. The study is built on the theoretical foundations of engagement learning and constructivist-based blended learning. We used a self-report student motivational factors and engagement learning strategies survey (SMFELSs) to obtain data from 1010 undergraduate students from three universities. The results indicate that students are positively motivated to learn in CBLEs. Our results also reveal that there is a statistically significant correlation between motivational factors and students' engagement learning strategies. The results, on the one hand, enhance our understanding of students' motivational factors to learn in CBLEs and on the other hand, expand knowledge on which student engagement learning strategies should be adopted and implemented in the context of challenging learning environments. Furthermore, the results are important for instructional designers, university teachers and curriculum developers. Our study further helps to improve the design of blended learning courses, constructivist learning environment and learning activities concerning students' motivational factors and engagement learning strategies.

1. Introduction

Student motivational factors and engagement strategies in authentic learning tasks continue to be a critical topic of ongoing research in higher education institutions (HEIs). Innovative instructional technologies, curriculum redesign and implementation of constructivist-based blended learning environments (CBLEs) require a high level of student engagement in meaningful, sustained learning experiences (Duffy & Jonassen, 1992a; Garrison & Archer,

2000; Ramseier, 2001; Ocak & Akçayır, 2016). Studies of Duffy and Jonassen (1992b), advocate that CBLE emphasise on cognitively challenging learning tasks, which enhance active participation in the specific learning environment. Methods that encourage students to reflect on their own learning through the use of multiple collaborative learning tools and engagement strategies are more valuable than a mere limited and traditional teaching and learning (Jonassen, 1991).

Although motivational factors and engagement learning strategies have been researched in diverse learning contexts (Bong, 2001; Ryan & Deci, 2000; Seki, 2014; Umemoto & Tanaka, 2017), still, two areas need more attention. First, previous studies on motivational factors have focused on school, subject level, gender and attitude variables toward learning in general (Gedera, Williams & Wright, 2015; King, 2016; Ramseier, 2001). Second, most studies on motivational factors and engagement strategies have only focused on specific education constructs mostly instructional design, technology diffusion and academic outcomes (Lackey, 2013Thijs & Verkuyten, 2009; Trowler, 2010; Clayton, Blumberg, & Auld, 2010). Consequently, addressing the limitations, our central focus is to examine the relationship between student motivational factors and engagement strategies in CBLEs, measuring four motivational factors of self-efficacy, extrinsic, intrinsic and task value and three engagement learning strategies of capturing, supporting, and fascinating strategies.

However, learning environments that consider multiple perspectives, including digital technologies and constructivist pedagogies, seem to attract student motivation and engagement toward learning in developed countries but have received little attention in challenging learning contexts. Furthermore, as in Tanzania, higher education consists of universities, university colleges and non-university institutions accredited by the Tanzania Commission for Universities (TCU), the National Council for Technical Education (NACTE). Although HEIs are regarded as autonomous bodies, TCU and NACTE are responsible for the provision of quality higher education, continuous quality assurance checks and oversee both public and private HEIs. While curriculum development in HEIs is based on both internal and external stakeholders' demands, its implementation is subject to TCU and NACTE approval.

In this case, adoption and deployment of CBLEs in HEIs is a result of the Tanzania government to priorities and recognise the use of the Internet, digital instructional technologies and multiple delivery modes in education provisions, the same, is well addressed in both old and updated Tanzanian information communication technologies (ICT) policies and education policy (URT, 2016; 2014; 2010; 2007; 2003). Therefore, in Tanzania, there is no single or

similar study which has been done, and that similar, research is needed to establish student motivational factors and engagement strategies employed in CBLEs.

2. Theoretical background

The study is grounded in two theoretical frameworks. The first is engagement learning theory based on motivation and other elements of learning theories (Kearsley & Shneiderman, 1998), and the second is the social constructivist learning framework (Vygostsky, 1978).

2.1 Engagement framework (EF)

Achieving high-quality learning outcomes in challenging sociocultural contexts requires student active participation and involvement in authentic learning activities. As such, the framework influences effective student engagement in dynamic and complex academic learning environment which necessitates teamwork, collaborative learning, shared experiences and co-creation of meaning (Coates, 2006; Kearsley & Shneiderman, 1998). Kearsley and Shneiderman (1998) suggest that in a technology-enhanced learning environment, students engage more effectively in learning activities that are meaningful. As EF is structured on a student-centred approach, the current study, emphasises studying student motivational factors to learn in a technology-supported learning environment. Marshall's (2007) study advocates that technology "can facilitate engagement in many ways which are difficult to achieve otherwise" (p.109). Therefore, the EF principle (cf. relates, create, donate) suggests that for successful student engagement in authentic learning activities, the focus should be on the use of multiple learning perspectives with technology-enhanced learning environments.

2.2 Constructivist framework

Constructivist framework (CF) is regarded as an epistemological study of the nature of knowledge and how human beings learn (Ültanır, 2012), and one's mind actively constructs that "mental structures and operations rather than passively acquired" (Riegler, 2012). Constructivists believe that students individually and socially construct knowledge (Duffy & Jonassen, 1992a; Jonassen, 1994; Jonassen & Rohrer-Murphy,1999; Vygotsky, 1978) and that their engagement in the meaning-making is a prerequisite for their authentic learning (Bruner, 1990). Researchers have argued that constructivist-educators actively engage their students in meaning making and problem-solving (Duffy & Jonassen, 1992b). For example, Ertmer and Newby (1993) suggest that engaging students in constructivist learning enhance their ability to

interpret the world as they interact with contents and learning environments. As such, a constructivist teacher should present information and skills in relevant, interesting contexts because it will enable students to share, reuse and transfer expertise and knowledge in the real-world situations. Furthermore, in CBLEs an emphasis is anchored on the individual active use of what is learned and engaged based on different purposes and times (Duffy & Jonassen, 1992b). Therefore, in the current study, a significant emphasis of CF is that knowledge construction is an essential aspect of the learning environment and that knowledge is an active process, not a product.

2.3 Student motivational factors in CBLEs

Studies have examined student motivation to learn in computer-mediated learning environments (Rasch, 1997). In this study, we operationalise motivational factors as student types of goals and drive to adopt, pursue, engage in authentic learning in CBLEs (Elliot, 2005; Schober & Keller, 2012). Motivating students to engage in authentic learning in CBLEs in a resource-poor context is still a challenge that needs exhaustive research. In such a context, this study aims to establish student motivational factors influencing their engagement in CBLEs. Although there are several motivational factors, intrinsic and extrinsic ones dominate most of the debate in research (Gedera et al., 2015; Lackey, 2013; Parajes, 1996; Pintrich & De Groot, 1990; Ramseier, 2001).

Regarding student motivational factors in CBLEs, this study examines four motivational factors including intrinsic, extrinsic, self-efficacy and task value. On the one hand, *intrinsic motivation* is a personal innermost psychological need for competence and autonomy which is associated with passion and joy of doing a learning activity (Ryan & Deci, 2000). Seki (2014). On the other hand, *extrinsic motivation* refers to personal external distinguishable behaviours toward a task or activity such as good grades, grading systems, high payment, instructional strategies, learning conditions and educational technologies (Gedera et al., 2015). Eccles and Wigfield (2002) further suggest that hard-working and success such as task choice and persistence are determined motives, expectancies and values for constructivist students. Bong (2001) reports that *task-values* are "potential success factors on relatively difficult tasks that are judged to hold greater incentive values" (p.554) which seem to encourage students' authentic learning. Task value in CBLEs is related to most of the academic tasks which promote students' interest, achievement, and enhance self-esteem.

Such tasks accelerate in-depth engagement in the subject matter. Furthermore, Bandura's (1997) study suggests that self-efficacy and pedagogical efficacy have positive impacts on student learning regardless of the learning environments students engaged. For example, in CBLEs students who are self-sufficient and confident demonstrate the ability to deal with challenging academic tasks and are more likely to engage in meaningful learning (Ritchie, 2015; Stephen, 2015). In the context of CBLEs, studies have shown that the combined advantages such as flexibility and personalised learning enhances student motivational factors, achievement and increases task value henceforth deep learning (Radovan & Makovec, 2015; Saeed & Zyngier, 2012).

2.4 Student engagement learning strategies

Engagement refers to the psychological investment and effort devoted to understanding the task the student is encouraged to undertake (Ryan & Deci, 2000; Saeed & Zyngier, 2012). Studies show that student engagement encompasses the complexity of human development domains (i.e., physical, psychological and cognitive) which determine their successful engagement in the learning environment (Skinner & Belmont, 1993; Skinner, Kindermann & Furrer, 2009). Crick and Goldspink (2014) suggest that student engagement is when students are interested in the task or work at hand even when the work is thought-provoking. In the current study, student engagement learning strategies is conceptualised as the plans and techniques students draw up, put forth and carry out to achieve their intended learning outcomes in a well-established and active learning environment. It has been regarded as the quality of students' participation and practices in academic work. Studies have shown that student engagement strategies represent the amount of time and effort students invested into their learning that constitutes their academic achievement (Seki, 2014; Turi, 2012). Trowler (2010) adds that the interaction between time, effort and other relevant resources invested play a significant role to optimise student engagement, learning experiences and enhance achievement of their intended learning outcomes (Thijs & Verkuyten, 2009).

Research studies have explored diverse factors and strategies used to encourage students' engagement in their learning process (Jeffrey, Milne & Sudday, 2012; Seki, 2014). This study focuses on three student engagement strategies such as capturing, support, and fascinating strategies (Jeffrey et al., 2012; Rosegard & Wilson, 2013; Pintrich & Garcia, 1994; Trowler, 2010). Jeffrey et al. (2012) suggest that capturing strategy (cognitive engagement) befall when a teacher at the time of teaching begins with assessing student attention, record observable

individual socioemotional, behavioural and cognitive processes. Moreover, teachers who employ capturing strategy usually assess student orienting to sensory events, mental efforts, detect signals for focal processing and upholding attentive state (Rosegard & Wilson, 2013).

Support strategy (metacognitive engagement) refers to students' ability, awareness and knowledge to use designed instructional objectives, innovative teaching gadgets, guidelines and course syllabi (Clayton et al., 2010; Jeffrey et al., 2012). Learning rubrics that support student learning are regularly modified and improved to assess and accommodate learning relevance, rigour and relationship. Furthermore, elements of support strategy are more likely to involve challenging, authentic tasks and timely feedback (Jeffrey et al., 2012) which promote student engagement in learning. Another important strategy is a fascinating strategy (re-engagement) which refers to behavioural components of self-regulated learning and involves the use of multiple practices, mindtools and socio-academic media which are central to collaborative learning experiences (Coates, 2006; Vaughan, 2014). Findings also show that fascinating strategy attracts strong attention and interest of students to re-engage in authentic learning and hence achieve intended learning outcomes (Clayton et al., 2010; Gedera et al., 2015; McMahon & Zyngier, 2009). Therefore, this study examines student motivational factors and engagement strategies reported by Tanzanian universities' students studying in CBLEs.

2.5 Gender differences in CBLEs

Digital instructional technologies in higher education have changed the landscape of teaching and learning. With technological integration in education, student learning approaches, skills and tactics differ according to gender regardless of changes in the learning environments engaged (González-Gómez, Guardiola, Rodríguez & Alonso, 2012). As like in e-learning, the roles of students and teachers in CBLEs change accordingly (González-Gómez et al., 2012). As such scholars have widely studied the importance of gender differences among students in the different level of education provisions (Stoilescu & Egodawatte, 2010; Voyer & Voyer, 2014). Although there are contradictory results in gender-based studies, most of the studies on gender favour female students in diverse contexts (Dang, Zhang, Ravindran & Osmonbekov, 2016; King, 2016). However, studies have focused on specific variables such as gender and performance; gender and personality; gender and academic achievement (García-Gil & Andreu, 2017).

Moreover, a study on computer science program shows similar ratios of participation between male and female students (Stoilescu & Egodawatte, 2010). Furthermore, a study on

the use of computers and the Internet show that male students report using technology-enhanced education and computers more often than female students (Drabowicz, 2014). In this study, we thought that examining gender differences in CBLEs would reveal exciting findings than another effect on students learning like age, year of study and degree programme. In a nutshell, the primary contribution this study might make available in the literature is what female and male students consider to be most significant regarding motivational factors to learn and their engagement strategies in CBLEs in a Tanzanian context.

2.6 Constructivist-based blended learning environments (CBLEs)

CBLEs refers to an active collaborative learning environment which takes in authentic learning activities with an emphasis on the usage of in-class and digital instructional technologies in meaning-making. Duffy et al. (1992) suggest that the coexistence of in-class and out-of-class learning activities enable student construction of knowledge with the support of computer-assisted delivery and digital instructional technology. The literature also suggests that CBLEs entails knowledge construction with the use of traditional in-class and virtual learning approaches in which mindtools such as computers and computer applications play a crucial role in enhancing teaching and learning (Garrison & Archer, 2000; Peralta & Priego, 2013). Moreover, CBLEs is a formal learning environment that combines the advantages of collaborative web technologies and in-class teaching and learning methods in which students' motivational factors connect through constructivist principles (Garrison & Kanuka, 2014; Vaughan, 2014). CBLEs provides students with opportunities to construct knowledge based on their own prior experiences through experiential and interactive authentic learning tasks with computer-assisted instructions (Bruner, 1990; Garrison, Anderson & Archer, 1999; Tarnopolsky, 2012).

In practice, successful CBLEs exhibits relevant academic collaborative task used to encourage and promote students' engagement and hence contribute to their improvement in their learning practices. Furthermore, CBLEs involves the use of cognitive tools (cf. computers and its applications) and multiplex ties of self-sufficient, computer-delivered, problem-based learning environments in which authentic learning tasks attract student engagement in deep and meaningful learning. The use of CBLEs is centred on well-designed, active and contextualised constructivist principles that attract student attention, motivation and interest to collaborate, teamwork, engage and interact in a community of learners (Garrison & Archer, 2003; Vaughan, 2014). In brief, CBLEs focusses on student collaborative and authentic teaching and learning

in which active student involvement and academic achievement depend on their prior experiences as they embark on constructing their own knowledge through the usage of both in-class and out-of-class learning advantages.

2.7 The relationship between motivational factors and engagement learning strategies

The relationship between motivational factors and engagement learning strategies has been variously studied. Studies have shown that both motivation and engagement help students to achieve sound academic outcomes (Ryan & Deci, 2009; Klem & Connell, 2004). Other studies have shown that students are more likely to employ diverse engagement factors when they are motivated to learn in e-learning (Skinner & Belmont, 1993; Peralta & Priego, 2013; Stephen, 2015).

Although there are some studies on the relationship between motivation and engagement, most of them are not directly addressing the relational aspects of motivational factors and engagement learning strategies (Saeed & Zyngier, 2012; Radovan & Makovec, 2015). However, most of the studies on student's motivation and engagement have intensively focused on academic achievement and qualities of engagement toward authentic learning (Thijs & Verkuyten, 2009; Stephen, 2015). It is suggested that a well-established relationship between student motivational factors and engagement strategies would enable students to engage in authentic learning that may lead to educationally productive activities (Norberg, 2011; Vaughan, 2014). Therefore, our study addresses this gap in the literature by identifying the relationship between a wide range of student motivational factors and engagement learning strategies in CBLEs.

2.8 The purpose of the study

The study investigates the relationship between students' motivation factors to learn and their engagement learning strategies in CBLEs in Tanzanian universities. Specifically, the study aims to: a) identify students' motivational factors and engagement strategies; b) find out gender differences in motivational factors and engagement strategies c) examine if students' motivational factors relate to their engagement learning strategies in CBLEs. These objectives raised three research questions:

a) What are the Tanzanian university students' motivational factors and engagement strategies in CBLEs?

b) Are there gender differences in motivational factors and engagement strategies in CBLEs among Tanzanian university students?
c) How are Tanzanian university students' motivational factors related to their engagement learning strategies in CBLEs?

3. Methods

3.1 Setting and design

The study involved three universities in Tanzania during the 2016/2017 academic year. Selection of universities was based on two major criteria: (a) implementing of LMS (cf., e-learning) and/or CMS (cf., web-based publishing) (b) offering blended learning courses coupled with constructivist pedagogy. Both LMS and CMS either strategically or methodically were used as a blended learning platform, for example, communications within the large university communities, designing, modifying and updating contents, uploading and downloading curriculum contents as well as both online and offline social interactions. Social constructivist epistemology was used for examining student multiple realities, activities and practices whereby indicated meanings were based on student collaborative learning experiences. The CBLEs design involved both in-class methods and digital learning technologies coupled with student sustained learning experiences. However, most CBLEs designs were subject to the discretion of individual teachers and were not institutionalised. The study used multiple non-interactive research design including student survey and structured non-participant observations while collecting quantitative data. Consequently, the strategy assisted on triangulation of relevant findings from various sources.

3.2 Participants

The study involved 1010 undergraduate students 746 (73.9%) from the first universities, 76 (7.5%) from the second university and 188 (18.6%) from the third university. Among the participants, 553 (54.8%) were female, and 457(45.2%) were male students ranging in age from ≤ 20 years to 40 years old. Of these, 594(58.8%) students were in the first year, 148(14.7%) were in the second year, and 268(26.5%) were in the third year of their studies. All participants were enrolled either in two or three blended learning courses. That is, students had reasonable knowledge and skills regarding blended learning approach and constructivist learning principles. As such, students were involved in both online and offline discussion forum, group work and team learning. Table 1 indicates the overall demographics of the sample.

Table 1
Demographics of the sample (n = 1010)

	Categories	N	%
Gender	Male	553	54.8
	Female	457	45.2
Age	≤ 20	153	15.1
	21-30	791	78.3
	31-40	57	5.6
	41+	9	.9
Year of study	1st year	594	58.8
	2nd year	148	14.7
	3rd year	268	26.5
University	U[1]	746	73.9
	U[2]	76	7.5
	U[3]	188	186
Degree programme *(with blended learning courses)*	Business studies	276	27.3
	Economics	48	4.8
	Management studies	224	22.2
	Educational studies	245	24.3
	Computer studies	217	21.5

U[1] = University 1; U[2] = University 2; U[3] = University 3

3.3 Procedures

In this study, we used two sampling procedures: stratified and purposeful sampling. Stratified random sampling was used in selecting three universities while purposeful sampling was used to select respondents who were engaged in CBLEs. Stratified sampling was based on the following starter: (a) implementing of LMS (cf., e-learning system) and/or CMS (cf., web-based publishing) (b) offering blended learning courses backed by constructivist pedagogy. Moreover, the study used multiple steps in data collection. The first step involved both preliminary and actual structured observation whereby the first author together with two research assistants, visited three selected universities (April 2016) for two reasons: (a) observe student experience regarding social constructivist learning practices (b) conduct mini-unstructured interviews with system administrators, e-learning coordinators and students. The approach intended to improve non-participant observation checklists relevant to the topic under study.

On the second step, we conducted actual structured-non-participant-observation in three universities. We observed student engagement and constructivist learning based on learning activities, tasks, learning approaches, ways of engagement, events and behaviours which assisted in acquiring hands-on students' CBLEs experiences. That is, non-participant

observation involved assessing constructivist pedagogies, practices and experiences used to facilitate knowledge construction among students including peer interactions (both online and offline discussion forums), student assessments (online and offline) and student support services. Likewise, structured-non-participant-observation was based on the number of specific days (cf. 21 days per university). The third step involved student survey whereby 1010 questionnaires were administered to students among distinct 10 face-to-face classes. Two research assistants simplified administration of the questionnaires whereby students completed the surveys in a single sitting with a maximum of 20 minutes.

3.4 Instruments and measurements

3.4.1 Questionnaire on student motivational factors and engagement learning strategies

The study used student motivational factors and engagement learning strategies survey (SMFELSs). SMFELSs is a self-developed survey with insight from the work by (Coates, 2006; Crick & Goldspink, 2010; Gedera et al., 2015; Herzberg, Mausner & Snyderman, 1959; Jeffrey et al., 2012; King, 2016; Trowler & Trowler, 2010; Ocak & Akçayır, 2013). Apart from demographic characteristics (5 items, i.e., gender, age, year of study, degree programmes). Because we wanted to optimise the efficiency of test delivery and scoring procedures whereby cognitive attributes would involve generating responses to items, polytomous item response theory was used to develop the SMFELSs (Kim, 2002; Penfield, 2014). Polytomous item response theory is commonly used when developing item having more than two scoring outcomes (Kim, 2015; Rasch, 1960; Penfield, 2014). SMFELSs assumed to measure the motivational factors inventory (MFI) and engagement learning strategies inventory (ELSI). Categorically, MFI involved four subscales including self-efficacy (8 items), task value (6 items), intrinsic (6 items) and extrinsic (4 items). ELSI had three subscales such as capturing (6 items), supporting (5 items) and fascinating (6 items). Our SMFELSs version had 46 variables. SMFELs consisted of a five Linkert-type scoring scales (i.e., 1 strongly disagree to 5 strongly agree). For MFI, the following Cronbach's Alpha reliability of each construct was obtained: self-efficacy (.85), task value (.80), intrinsic (.70) and extrinsic (.74). Furthermore, for ELSI, the following Cronbach's Alpha reliability of the three subscales was found: capturing (.71), supporting (.81) and fascinating (.83).

3.4.2 Observations

Structured observation form (observation checklist) was used to acquire qualitative data based on students' behaviours related to their engagement learning strategies and information relevant to CBLEs (cf. research question one). Structured observation form was logically used for two reasons. First, to assure consistency and trustworthy of data being observed from diverse non-participant observers. Second, to check on validity by comparing information observed between the main researcher and research assistants after debriefing.

3.5 Data analysis

3.5.1 Quantitative data 'motivational factors and engagement strategies'

This study used multiple data analysis techniques as the mixed methods research design was used to collect data. Exploratory factor analysis (EFA) and was used to determine the number of factors generated from the data. Also, confirmatory factor analysis (CFA) was used to re-analyse the instruments and validate the interrelationship between variables (see Appendix I & II) since some instruments and items were from the work of other scholars. We used descriptive statistics (cf. Mean scores), the Mann-U test, correlation analysis and multiple linear regression to analyse quantitative data. On the one hand, the Mann-U test was used to find out gender differences in motivational factors and engagement learning strategies in CBLEs. On the other hand, we used Spearman rank-order correlations to examine the interrelationship between motivational factors and engagement learning strategies. Strategically, multiple regression was conducted to find out the significant predictors of student engagement learning strategies in CBLEs. In the final analysis, the reliability of the categories was computed through Cronbach's alpha.

3.5.2 Student engagement behaviour and practices in CBLEs'

Content analysis was used to analyse student engagement behaviour and practices to predict their engagement learning strategies in CBLEs. An 'outsiders' view was used since the study collect non-participant observation data. Two aspects of student behaviour and practices were in place to measure student engagement learning strategies in CBLEs, and one aspect regarding infrastructure necessary for CBLEs implementation was observed. The aspects include (1) learning activities (cf. online posting and downloading, direct lecture, tutorial sessions, online discussions and assessments); (2) collaborative learning (i.e. group work and team learning); and (3) ICT supportive facilities (i.e. server, student help desk, the internet and e-learning

platform). Three aspects were observed daily within one week from each university, making a total of 63 observed cases. Non-participant observation transcripts were coded and analysed based on two non-participant observers reports who were both unobtrusively used in each university. In the final analysis, both quantitative and qualitative analyses assisted in gaining a holistic understanding and interpretation of the findings.

4. Results

4.1 Motivational factors and engagement strategies in CBLEs

Analysis of the descriptive statistics of Tanzanian university students' motivational factors and engagements learning strategies in CBLEs identified four motivational factors and three engagement learning strategies. Overall, Tanzanian university students were subject to extrinsic motivation factor (M=4.20, SD=.77) than other motivational factors such as task value (M=4.12, SD=.63), self-efficacy (M=4.07, SD=.67) and intrinsic motivation (M=3.91, SD=.70). These results suggest that several factors motivated students although extrinsic factors dominate their motivation to learn in CBLEs. Also, for engagement learning strategies, students in the current sample were highly engaged in CBLEs through supportive learning strategy (M=4.09, SD=.70) and capturing strategy (M=4.01, SD=.65) than fascinating learning strategy (M=3.91, SD=.73). The results indicate that in CBLEs students are more likely to engage in supportive learning strategy suggesting that it was a more preferred strategy than capturing and fascinating learning strategies. However, Cronbach' alphas coefficients were used to assess the internal consistencies of MFI and ELSI scales, of which students' motivational factors and their engagement learning strategies used in CBLEs were assessed. As a result, all scales yielded satisfactory internal consistency. Table 2 provides the results of descriptive statistics for all SMFELSs constructs and Cronbach's alpha.

Table 2
Descriptive statistics for all SMFELSs constructs and Cronbach's alpha

Constructs	Mean	Std. Deviation	Alpha (α)
Motivational factors			
Extrinsic	4.20	.77	.74
Task Value	4.12	.63	.80
Self-efficacy	4.07	.67	.85
Intrinsic	3.91	.70	.70
Engagement strategies			
Supporting strategy	4.09	.70	.81
Capturing strategy	4.01	.65	.71
Fascinating strategy	3.91	.73	.83

4.2 Gender differences in motivational factors and engagement strategies in CBLEs

This study employed a Mann-Whitney U test in determining gender differences in motivational factors and engagement learning strategies in CBLEs. The results show that there were statistically insignificant differences in gender regarding motivational factors in CBLEs (U=120766.5, Z=-1.21, p=.225). The results further reveal that female student (median =4.18; mean rank =548.75) scored higher level of engagement in diverse learning strategies than male students (median =4.12; mean rank =469.76). That is, sampled students are more likely to use different engagement learning strategies based on their gender groups. Further, the findings reveal that there is a statistically significant difference in gender regarding engagement learning strategies in CBLEs (U=106596.5, Z=-4.29, p<.01), and that the difference between the female and male students is small (r=*-.13*). Table 3 provides summary results.

Table 3
Gender differences in motivational factors and engagement learning strategies in CBLEs

	Gender	Median	Mean Rank	Mann-Whitney *U*	*Z-score*	*p*-value
Motivational factors	Male	3.79	495.38	120766.50	-1.21	.225
	Female	3.79	517.74			
Engagement strategies	Male	4.12	469.76	106596.50	-4.29	.000
	Female	4.18	548.75			

4.3 The relationship between student motivational factors and engagement learning strategies

Table 4 shows that there is a statistically significant relationship between students' motivation factors and their engagement strategies in CBLEs. The results indicate that student motivational factors (intrinsic, extrinsic, self-efficacy, task value) to learn in CBLEs are significantly correlated with one another, although they all present an aspect of motivational factors, task value and self-efficacy and show quietly strong correlation ($r=.521;\ p<.01$). This proves the importance of distinguishing between the aspect of motivational factors in CBLE. Our results reveal that there is a moderate level of the relationship among motivational factors to learn in CBLEs, suggesting that students who deploy diverse motivational factors are more likely to learn in CBLEs. The results further show that engagement learning strategies in CBLEs are also significantly related to one another, signifying that students were prone to different engagement learning strategies in CBLEs. The correlations show that the higher the motivational factors to learn, the higher the engagement strategies in CBLEs.

Table 4
Correlations amongst diverse subscales within MFI and ELSI scales toward CBLEs

Constructs	1	2	3	4	5	6	7
Motivational factors							
1. Intrinsic	-						
2. Extrinsic	.263**	-					
3. Task Value	.437**	.393**	-				
4. Self-efficacy	.449**	.420**	.521**	-			
Engagement strategies							
5. CAPs	.341**	.388**	.353**	.395**	-		
6. SUPs	.359**	.406**	.416**	.423**	.508**	-	
7. FASs	.339**	.354**	.413**	.419**	.437**	.536**	-

** $p<.01$
Note: CAPs - capturing strategy; SUPs - supporting strategy; FASs - fascinating strategy

Since there were no gender differences in motivational factors in CBLEs while the results reported gender differences in engagement learning strategies in CBLEs, a series of multiple regressions analyses were run to predict the relationship between student motivational factors from three domains of engagement learning strategies as outcome variables. The findings reveal

that the variables entered statistically significantly predicted CAPs, SUPs and FASs. For CAPs (R^2 =.289, $R^2_{(adj)}$ =.286, F(4, 1005)=101.93, p<.01); for SUPs (R^2=.279, $R^2_{(adj)}$ =.282, F(4, 1005)=98.77, p<.01), and similarly, for FASs (R^2=.339, $R^2_{(adj)}$=.337, F(4, 1005)=128.99, p<.01). These results are supported by a standard error of the estimate ($\sigma_{est.}$) which measure the accuracy of predictions (CAPs, $\sigma_{est.}$=.545; SUPs, $\sigma_{est.}$=.595; FASs, $\sigma_{est.}$=.595).

The results further show that intrinsic motivation (IM), extrinsic motivation (EM), task value (TV) and self-efficacy (SE) were significant predictors with a positive relationship to CAPs, SUPs and FASs. For IM (β_{CAPs} = .206, β_{SUPs} = .159, β_{FASs} =.203, with *VIF = 1.56*), while for EM (β_{CAPs}= .194, β_{SUPs}=.278, β_{FASs} = .266, *with VIF* =1.35). With regards to SE, the results indicate the following SE (β_{CAPs}=.156, β_{SUPs} = .009, β_{FASs} =.163; with *VIF* =1.70) However, the final analysis indicated that task value was a significant predictor of CAPs, SUPs and FASs (β_{CAPs}=.131, β_{SUPs}=.143, β_{FASs}=.122; with *VIF*=1.90). Overall, the findings support the predictions that student motivational factors are related to engagement learning strategies in CBLEs as also detected by a measure of the accuracy of prediction and multicollinearity using VIF. Table 5 provides a summary of multiple regression analyses results of significant predictors of student engagement learning strategies in CBLEs.

Table 5
Predictors of student engagement learning strategies in CBLEs

Predictor	SUPs			CAPs			FASs			CS	
	b	SE(b)	β	b	SE(b)	β	b	SE(b)	β	Tol	VIF
Intrinsic	.158	.033	.159*	.189	.030	.206*	.211	.033	.203*	.64	1.56
Extrinsic	.253	.028	.278*	.163	.026	.194*	.253	.028	.266*	.74	1.35
Self-efficacy	.103	.038	.009**	.150	.035	.035*	.177	.038	.163*	.59	1.70
Task value	.159	.039	.143*	.134	.036	.131*	.130	.039	.112**	.53	1.90
$F_{(4, 1005)}$	98.77			101.93			128.99				
R^2	.282			.289			.339				
R^2 adjusted	.279			.286			.337				
SE of the Est.	.595			.545			.595				

* p<.01, ** p<.001
Note: CS = collinearity statistics, VIF = variance inflation factors, Tol =tolerance; SE=standard error.

However, for the non-participant observations, the findings were coded and analysed based on a two-step analytic process. First, clustering value categories into patterns and themes. Second identifying the key observed values within each university based on the frequency of

occurrence. It was observed that the majority of students were engaged in CBLEs through collaborative learning strategies which involved attending diverse learning activities including group work and team learning, online discussion, online assessment and peer evaluation. Also, it was observed that both online and offline learning activities were facilitated with available ICT infrastructures including e-learning platform, the internet and institutional repositories (e-libraries) which supported accessibility of digital contents (cf. e-books, e-resources). Moreover, it was observed that students were using a variety of multi-media (online google sites, internet, radio, and social media), and learning environment (including teamwork, self-regulated learning, peer-to-peer learning). These learning activities and tools basically assisted students to achieve knowledge, cognition skills and possibly social and communication changes.

It was observed that 70% of the universities ICT infrastructures, support services, facilities and devices were utilised in support of students in teaching and learning. In other words, in surveyed universities, students were motivated and engaged in learning because of available ICT support services and facilities.utilising. During offline learning, 85% of students were observed engaging in direct interaction either between themselves or with their instructors in the classroom. Further, during a debriefing about gender differences among researchers and assistant researchers, it was observed that both female and male students were strategically engaging in CBLEs with a limited number of female students' involvement in online discussion sessions. A possible explanation is that there is a mentality among Tanzanian female students that studies related to hard science and computer applications are for male students, as such few female students opt for science subjects. This might have facilitated the limited involvement of female students in online discussion sessions. In the final analysis, with the availability of ICT facilities, diverse factors motivated students to learn in CBLEs as they were observed using diverse engagement learning strategies during face-to-face sessions. This implies that a variety of motivational factors predict university students' variety use of engagement learning strategies in CBLEs so as to achieve intended learning outcomes. The findings contribute new insights regarding gender disparities among students because very limited female students to were observed engaged in the online discussion forum. As a result, efforts should be made to influence both gender categories particularly female students regarding engagement in online learning.

5. Discussion

Our study investigated the relationship between students' motivational factors to learn and their engagement learning strategies in CBLEs across three sampled Tanzanian universities. Students' motivation factors and their engagement strategies are critical aspects of successful student learning that guide their behaviour toward authentic learning process in CBLEs.

5.1 Student motivational factors and engagement strategies

The findings indicate that Tanzanian university students are motivated to learn in CBLEs based on four motivational factors. However, the results show that students preferred to learn in CBLEs due to external motivation factor rather than intrinsic, self-efficacy and task value. The results imply that Tanzanian university students were involved in CBLEs because of external factors such as instructional strategies, good grades, learning conditions, educational technologies and assessment. Moreover, Brophy (2004) divulged that extrinsic motivation should be used only for arousal of student attention, curiosity, and ambitions to engage in authentic learning. However, it seems that motivating students to learn in CBLE requires accomplishment of many motivational factors associated with multiple engagement learning strategies. Both motivational factors and engagement learning strategies influence authentic learning hence predict achievement of intended learning outcomes.

Although extrinsic motivation factor to learn in CBLEs seems to dominate amongst the sampled students, our research confirms the presence of other motivational factors in CBLEs. The way students engage in CBLEs revealed that supportive engagement learning strategy lead other engagement learning strategies such as capturing and fascinating strategies. The findings may be reasonable because students who are supported are likely to engage in authentic learning activities. Although, Jeffrey et al. (2012) propose that capturing strategy should be first followed by other engagement learning strategies like supportive and fascination. However, our study provides current evidence that supportive engagement learning strategy amongst Tanzanian university students plays a significant role among other strategies in influencing their authentic learning in CBLEs. Overall, for effective student learning in CBLEs, motivational factors and engagement learning strategies are important learning aspects because in a situation where there are no any motivational factors it seems challenging for students to engage in achieving authentic student learning.

5.2 Gender differences in student motivational factors and engagement strategies

Gender differences may influence motivational factors to learn in CBLEs because male and female students may have diverse conceptions and understanding regarding learning environments, engagement strategies, achievement, and educational activities. Studies have shown mixed results regarding gender differences (Dang et al., 2016). In the current study, we found that male and female students share the same motivational factors (intrinsic, extrinsic, task value and self-efficacy), indicating further verdict that Tanzanian university student learning in CBLEs might not differ across gender. Moreover, the absence of gender differences in motivational factors might be plausible because other factors perhaps determine successful student learning in CBLEs such as instructional strategies, teachers' perceptions and types of learning activities. This study supports and extends previous research addressing the absence of gender difference in motivation (Ramseier, 2001).

In contrast, the work of King (2016); Voyer and Voyer (2014) shows that female students tend to outperform male students, and that female students are likely to engage in CBLEs. In support of that, based on their number, it is possible that female students were motivated to learn as they were observed engaging in CBLEs. As such, female students seem to be motivated as they were observed to be strategically engaged in CBLEs. In general, the findings of the current study, add useful evidence-informed insight into the existing knowledge regarding gender issue, motivational factors and engagement strategies in CBLEs and particularly in resources poor contexts.

5.3 The relationship between student motivational factors and engagement strategies

Students employed different motivational factors in CBLEs which in turn influenced their engagement strategies in CBLEs. In this current study, students' motivational factors were significantly correlate to their engagement learning strategies in CBLEs. With the use of different motivational factors based on their sociocultural background and availability of ICT facilities, students were able to apply different engagement strategies so as to learn in CBLEs efficiently. Therefore, we found that students tended to use self-efficacy, task value, intrinsic and extrinsic motivational factors to achieve their intended learning outcomes in CBLEs.

Furthermore, students' engagement learning strategies were correlated with one another in CBLEs, showing that university students with high self-efficacy were highly engaged in CBLEs through different engagement strategies. For example, the findings show that extrinsic and intrinsic motivational factors inspired students who tended to apply supportive engagement

strategy. The findings also suggest that availability of ICT facilities increases students' motivation to engage in CBLEs and achievement of intended learning outcomes and good grades (Klem & Connell, 2004; Ocak & Akçayır, 2013).

Further, student motivational factors were appropriate as it seems to predict their engagement learning strategies. Moreover, it was observed that several factors were in line with students' motivational factors in CBLEs including collaborative learning, and the availability of ICT facilities. For example, it was observed that with the available ICT support services, student are more likely to have an independent study, searching, retrieving information from institutional repositories and engaging in both online and offline group work and team learning.

6. Implications of the study

The current study provides useful insight regarding student motivational factors in CBLEs as university teachers, curriculum developers and instructional designers can use the findings to design appropriate learning environments (cf. CBLEs). Indeed, the study provides an in-depth understanding of gender differences regarding engagement learning strategies. However, issues of limited female students engagement enlight our understanding on which assistance should be directed to female students. As such, our results offer several implications. First, teachers should influence collaborative learning among gender groups as they engage in CBLEs. Second, teachers should design learning activities that encourage students' intrinsic motivation factor. Third, engaging students in CBLEs enhances their knowledge and skills related to the utilisation of ICTs facilities and support services henceforth authentic learning. The study makes a significant contribution to the design of blended learning courses, students' motivational factors, engagement strategies, and learning environments. Third, reflection on how engagement learning strategies should be applied so as to increase awareness on what motivates students to engage in CBLEs. In general, the findings provide exciting findings regarding students' motivational factors, engagement strategies and CBLE design features that would be considered to enhance authentic student learning.

7. Limitations and future research directions

This current study has several limitations. First, although multiple sources of data and random observations were used, the study was limited to survey and structured-non-participant observation. It could be noteworthy that future research benefits from interviews and participant observations. Second, the study strategically collected data from three universities in Tanzania;

future research should involve universities with different characteristics (cf. internationally) and preferably practising CBLEs with different characteristics to obtain a holistic understanding of students' motivational factors and engagement learning strategies. The third limitation is concerned with motivational factors (four factors) and engagement strategies (three strategies) which might be limited to understanding general aspects of student motivational factors and engagement strategies. Further empirical studies are needed to replicate the results in diverse contexts. Fourth, although the current study shows substantial reliability, further research should focus on establishing interrater agreement and employ more observers.

8. Conclusion

In conclusion, this study indicated that intrinsic, extrinsic, task-value and self-efficacy motivational factors predict students' engagement learning strategies in CBLEs. Our study draws the following conclusions: first, students use several motivational factors in CBLEs. Thus, teachers should recognise these motivational factors and make changes in their constructivist alignment. Second, there were no gender differences regarding motivational factors in CBLEs. However, there were gender differences between female and male students regarding their engagement strategies. Third, the conclusion is that students' motivational factors have direct impacts on their engagement learning strategies in CBLEs. As a result, teachers and instructional designers should reflect on the designed instructional objectives and learning activities in CBLEs as well.

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Appendix A: Interrelationship between variables constructs (Fig. 1 and 2) factor analysis (CFA)

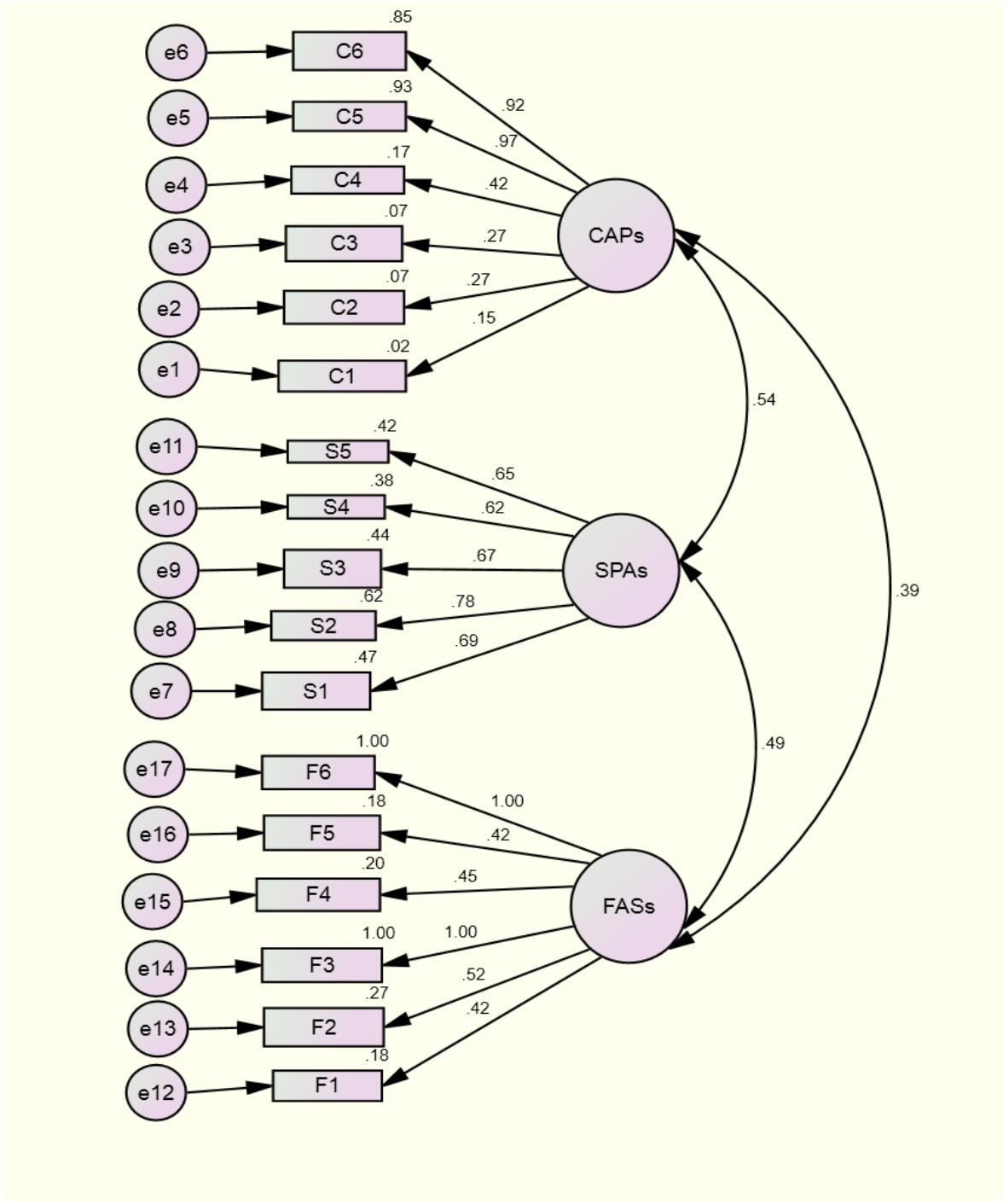


Figure 1. Confirmatory factor analysis indicating interrelationship between student engagement learning strategies in a CBLE

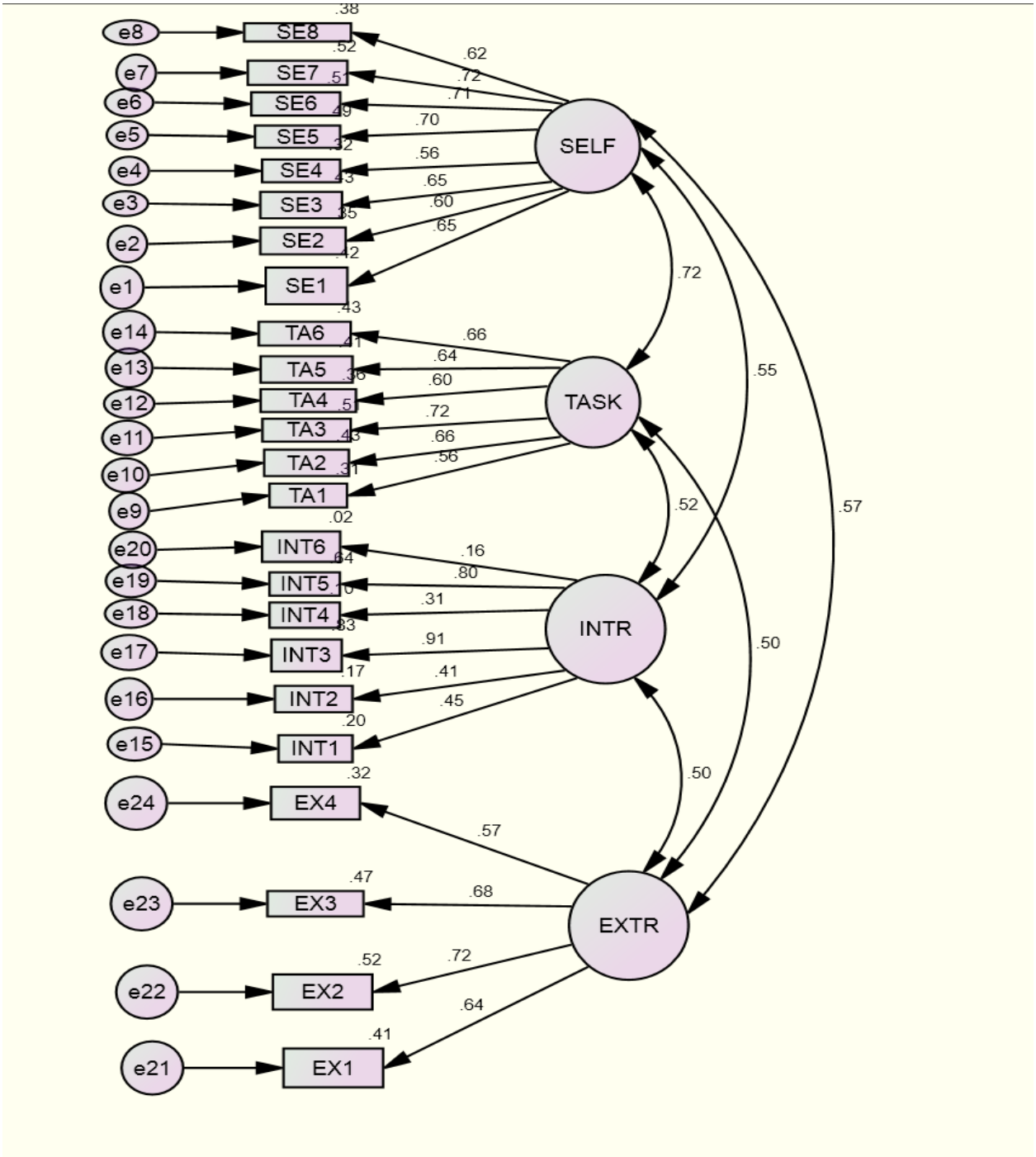


Figure 2. Confirmatory factor analysis indicating interrelationship between student motivational factors in a CBLE

Appendix B: Questionnaire

Student Motivational Factors and Engagement Learning Strategy Survey (SMFELSs)

SECTION A: **Demographic information**

Put a '√'in the place appropriate to you

Respondents' characteristics					
a	Gender:	Female [……]		Male [……]	
b	Age:	>20 [……];	21-30 [……..];	31-40 [……..];	40+ […..]
c	Year of study:	First Year [……];	Secondyear [….];	Third-year […….]	
d	Name of University: [……..]				
e	Degree programmes:	Business studies		:[……]	
		Economics		:[……]	
		Management studies		:[……]	
		Educational studies		:[……]	
		Computer studies		:[……]	

SECTION B: **Student engagement learning strategies**

Please indicate your relative degree of agreement to which you feel the statement is true to you by providing a **'√'**. The rating scale range from 1 strongly disagree to 5 strongly agree.

	Items	1	2	3	4	5
1	Teachers develop rigorous and relevant standards-based tasks					
2	I take greater ownership of my learning via more collaborative work in CBLEs					
3	Teachers focus on a more deliberate set of practices					
4	The teacher begins subject with challenging task for all					
5	CBLEs is challenging and enriching					
6	I learn course materials and find a solution with peers					
7	Collaborative work promotes curiosity and expertise					
8	Teacher rewards me after excellent work done					
9	Teacher use interactive social activities					
10	Teacher share funny and emotionally safe stories					
11	I get the opportunity to create something of real value					
12	Students and teacher show willingness to work with me					
13	Students and teacher value my opinions in CBLEs					
14	The teacher attracts sharing thoughtfully thinking CBLEs					
15	The teacher providing informative and detailed feedback					
16	I get time to go deep on a topic of interest in CBLEs					
17	The teacher presents content in a more creative fashion					
18	In CBLEs, I prefer course material that challenges me so that I can learn new things.					
19	In CBLEs, I prefer course material that arouses my curiosity, even if it is difficult to learn.					

20	The most satisfying thing for me in CBLEs is trying to understand the content as thoroughly as possible.					
21	When I have the opportunity in CBLEs course, I choose course assignments that I can learn from even if they do not guarantee a good grade.					
22	The most satisfying thing for me in CBLEs course is trying to understand the content as thoroughly as possible.					
23	When I take a test in CBLEs course, I think about how poorly I am doing compared with other students.					
24	Getting a good grade in this CBLEs course is the most satisfying thing for me right now.					
25	The most important thing for me right now is improving my overall grade point average.					
26	If I can, I want to get better grades in CBLEs course than most of the other students.					
27	I want to do well and show my ability to my family, friends, employer, or others.					
28	I think I will be able to use what I learn in CBLEs course in other environments.					
29	It is important for me to learn the course material in CBLEs course.					
30	I am very interested in the content area of CBLEs course.					
31	I think the course material is useful for me to learn in CBLEs course					
32	I like the subject matter presented in CBLEs course.					
33	Understanding the subject matter in CBLEs course is very important to me.					
34	I believe I will receive an excellent grade in CBLEs course.					
35	I can understand the most challenging material presented in the readings in CBLEs course.					
36	I am confident I can learn the basic concepts taught in CBLEs course.					
37	I am confident I can understand the most complex material presented by the instructor in BLEs course.					
38	I am confident I can do an excellent job on the assignments and tests in CBLEs course.					
39	I expect to do well in this CBLEs course.					
40	I am sure I can master the skills being taught in CBLEs course.					
41	Considering the difficulty of this course, the teacher, and my skills, I think I will do well in CBLEs course.					

Capturing (1-6), supporting (7-11), fascinating (12-17), intrinsic (18-23), extrinsic (24-27), task value (28-33), self-efficacy (34-41)

Appendix: C Non-participant Observation Sheet

AIM: Collecting data regarding students' engagement behaviours, and practices which determine their engagement strategies in CBLEs

Instructions to observer:

Students' behaviours and practices related to their engagement strategies in CBLEs and constructivist learning should be observed and reported. That is, an observer stays at a point to observe everything related to this study.

Observation checklist				
Observation aspects	Observations (insert a "√" or "X") in the most appropriate place to you			
	Observed	**"√"**	**Not observed**	**"X"**
Learning activities	Online posting and downloading			
	Online discussion			
	Direct lectures			
	Assessments			
	Tutorial sessions			
Collaborative learning	Group work and team learning			
	Roleplay			
	Paring and sharing activities			
	Peer coaching activities			
ICT supportive facilities	Servers			
	The Internet availability			
	Students' help desk			
	eLearning platform			

Chapter 5

University teachers' beliefs and constructivist teaching practices in blended learning courses in Tanzanian universities*

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Chapter 5

University teachers' beliefs and constructivist teaching practices in blended learning courses in Tanzanian universities

Abstract

The study examines the relationship between the university teacher's beliefs and constructivist teaching practices (CTP) in blended learning environment (BLE) courses in Tanzanian universities. The study collects data from 211 teachers in BLE courses. Data analyses involved descriptive statistics, correlational, the Mann-Whitney U-test, Kruskal-Wallis H-test and multiple linear regression. The findings revealed threefold. First, explicit engagement, supportive teaching and interactions were important aspects of CTP in BLE courses. Second, there were no statistically significant differences in teachers' beliefs about gender, academic rank, educational level and teaching experiences in BLE courses. And, third, there was a significant relationship between teachers' beliefs and CTP in BLE courses. Moreover, the findings indicate that teachers' beliefs predict their explicit engagement and supportive teaching are predictors of the beliefs of teachers who teach BLE courses. This study provides important implications and empirical evidence about the beliefs of the university teachers who teach BLE courses and their CTP.

1. Introduction

University teachers hold diverse beliefs in connection to their constructivist teaching practices (CTP) (Zheng, 2009) with different learning environments, subject-matter, approaches (cf. deep, surface and strategic) and activities (Alisaari & Heikkola, 2017; Lameras, Levy, Paraskakis & Webber, 2012). For instance, there is an assumption that most of the teachers' constructivist beliefs depend on their sociocultural background and embedded system or subject-matter. Therefore, it is crucial to examine not only the beliefs of the university teachers who teach BLE courses but also their CTP. Kordaki (2013) describe teachers' beliefs as holistic conceptual perspectives and outlook of what is happening as they engage in teaching. In fact, it includes their views on the subject matter and knowledge (cf. curriculum), teaching environment (cf. BLE), coaching interactions with students, instructional activities and practices (Sun, 2012).

Studies show that technology use in education has a transformative effect on the nature of the curriculum, course management, teachers' beliefs and pedagogical approach (Brown, 2000; Perez & O'Neil, 2003; Saunders & Klemming, 2003; Tabulwa, 2013). In this view, teachers' use of technology can continue to reinforce and supplement their traditional curriculum, teaching methods and instructional practices. As such, it is essential to think about blended learning (BL) in which the integration of digital instructional technologies with conventional methods of teaching and learning is already a feature of universities in Tanzania and elsewhere (Judson, 2006; Laurillard, 2015). BL as a pedagogy refers to thoughtful combinations of multiple instructional deliveries including traditional face-to-face (F2F) and digital learning technologies (Donnelly, 2009; Garrison & Vaughan, 2008). It is determined by the shift from predetermined learning to collaborative learning needs that create a rewarding academic learning environment (Assaf, Elia, Fayyoumi & Taurino, 2009).

Furthermore, Elia, Secundo, Assaf and Fayyoumi (2014) seconded that BL approach combines traditional F2F learning and multi-media instructional delivery which enhance coaching interactions, facilitation and collaboration among the learning communities. BL makes use of the power of F2F and digital instructional technologies to help learners understand ideas, and acquire appropriate information and overcome the limitations of time, size and space (Kemp & Smellie, 1994). When skillfully combined, F2F and digital instructional technologies have the power to evoke emotions, change attitudes, and motivate learning actions. Laurillard (2015) suggest that because of its powerful forces that possibly will change the education system better than the academy engage in BL and lead than avoid and perish.

In this perspective, BLE describes a learning environment that mixes more than one instructional delivery methods designed to provide the most efficient and effective instructional experience (Kanuka & Rourke, 2013; Garrison & Vaughan 2008). As a result, the study of Elia et al. (2014), pinpoints that courses delivered through BL pedagogy can be better than the results of completely e-learning, online and traditional face-to-face courses. In such combinations, courses proffered in BLE takes any form of digital instructional technology (i.e. online recorded lecture, live online lecture, webinar, web-based learning) and traditional F2F learning 'teacher-led-training' (lecture, tutorials, seminars, workshop) in which teacher and student active engage, participate and collaborate (Elia et al., 2014; Saunders & Klemming, 2003).

It has now been indicated that teachers' beliefs about teaching and learning BLE courses, about themselves and their students, are significant factors affecting their teaching roles,

teaching methods, teaching approaches, behaviours and practices (Assen, Meijers & Poell, 2016; Borich, 1999; Erkmen, 2012; Fang, 1996; Köğce, 2016; Pappamihiel, Ousley-Exum & Ritzhaupt, 2017). Haney & McArthur (2002) suggest that understanding the association of teachers' beliefs and their CTP are critical factors for the implementation of any courses in computer-mediated learning environments. Though, scholars have argued that constructivists are more concerned with learning and less about teaching practices (Kordaki, 2013; Lim & Chai, 2008). That is, although, constructivism is a learning theory, however, ever increase of the application of constructivist learning theory in teaching practices create some doubt among educational scientists that need to more research. In this perspective, Perez and O'Neil (2003) suggest that in a technology-enhanced learning environment, the constructivist view of learning offers new practical roles for teachers such as planning, coaching, modelling and facilitation.

Teachers are being asked to adopt a more cognitive stance toward teaching (Mayer, 2003). That is, the one whom cognitive guide works with students on authentic academic tasks, who may offer hits and suggestions for appropriate strategies to solve problematic tasks. As such, it is essential to understand how university teachers' beliefs align with their CTP in BLE courses; and, how teachers' beliefs can determine their CTP in BLE courses since the association between teachers' beliefs and CTP in BLE courses seems to be unwelcomed among constructivists. In the present study, we describe teachers' beliefs as "emotionally-charged memories based on individual's past experiences, teaching styles and sociocultural interactions that can be difficult to examine objectively" (Pajares, 1992, p.310).

Studies have examined teacher's beliefs towards different aspects such as constructivist learning practices role of science teaching (Behar-Horenstein, Parajes & George, 1996; Seung, Park & Narayan, 2011; Zheng, 2009). However, limited studies have observed the beliefs of teachers who teach BLE courses concerning their CTP (Assen et al., 2016; Lim & Chai, 2008). Furthermore, at the university level, and specifically in Tanzanian context, studies are silence about the beliefs of the university teachers who teach BLE courses about CTP. Therefore, this research aims to examine the relationship between the beliefs of the university teachers who teach BLE courses and their CTP in five selected universities in Tanzania. More specifically, this research aims to understand teachers' beliefs of the university teachers of BLE courses about CTP; to examine whether teachers' beliefs of the university teachers of BLE courses differ based on gender, academic rank, levels of education and teaching experiences.

2. Theoretical background

This section deliberates three major parts. Part one gives a conceptual understanding of teachers' beliefs. Part two provides discussions on university teachers CTP, and part three draws on research about the relationship of teachers' beliefs of the university teachers of BLE courses and CTP.

2.1 Teachers' beliefs in BLE courses

Beliefs and teachers' beliefs towards teaching seem to have a direct relation with teaching activities one's engaged and affect their practices (Alisaari & Heikkola, 2017). Beliefs describe psychological constructs and cognitive states that are thought to be true (Chen & Bonner, 2017; OECD, 2009). In this present study, we focus on teachers' beliefs as they engage in BLE courses, as it is the beliefs of teachers hold while engaging in BLE courses that can have either positive or negative impact on their daily work. In this milieu, beliefs can be described as an individual's internal judgement of the truth or falsity of a proposition that links personal and emotional experiences (Zheng, 2009; Pajares, 1992). Beliefs have been described in the literature as a conceptual representation of person's actions, convictions, ideas and events which are context dependent, stable and dynamic (Hermans van Braak & Van Keer, 2008; Safrankovaa & Hrbackovaa, 2015; Temiz & Topcu, 2013; Wang & Du, 2016).

Similarly, Bandura, Barbaranelli, Caprara and Pastorelli (1996) suggests that beliefs are one's internal thoughtful of the world that felt to be true that influence decisions, levels of motivation, quality of analytic thinking and are indicators of future behaviours. However, literature, establish that for knowledge to be right, there should be a justification (Gettier, 1963; Orton, 1996). For example, a constructivist teacher might believe that: "…students learn better by interacting with the teacher and one another than with just listening and memorising what teachers say..." and "…in BLE courses students construct their knowledge based on collaborative learning experiences…". However, these propositions justify teacher teaching method/strategy as one of the teachers' beliefs in BLE courses which may be considered valid in the context of this study. Research studies show that unlike knowledge, beliefs do not require a condition of truth and general agreement (Orton,1996), and that, what is known and believed connotes different understandings unless the claim is justified true belief (Gettier, 1963; Khader, 2012).

From previous research, we also know that beliefs are one's internal thoughtful of the world that felt to be true, however, for knowledge to be right, there should be a justification

(Gettier,1963; Orton, 1996; Pappamihiel, Ousley-Exum, & Ritzhaupt, 2017). For example, a constructivist teacher might believe that: "…students learn better by interacting with the teacher and one another than with just listening and memorising what teachers say..." and "…in BLE courses students construct their knowledge based on collaborative learning experiences…". However, these propositions justify the teachers' beliefs in BLE courses which may be considered valid in the context of this study.

Although teachers' belief is very complicated systems, teachers who engage in positive coaching interactions and collaborate with learners are more likely to be knowledgeable about CTP and hold learner-centred beliefs (Hamre, Downer, Jamil & Pianta, 2012; Hu, Fan, Yang & Neitzel, 2017). However, in an educational setting, many factors contribute to beliefs teachers hold (Jamalzadeh & Shahsavar, 2014; Shun, 2008; Wang & Du, 2016), including individual factors and organisational factors. On the one hand, teachers' beliefs are possibly influenced by their professional development, course management, teaching methods and experiences (Erkmen, 2012) which seem to individual factors. On the other hand, colleges' socioeconomic status, class size, and year of study are organisational factors which can affect teachers' beliefs and practices significantly (Jamalzadeh & Shahsavar, 2014; Prawat, 1992). This study makes use of two teachers' beliefs (cf. teaching methods and course management) based on individual factors as it seems to relate to what teachers do, behave and act in BLE courses.

In the present study, teaching methods refer to diverse beliefs contingent basis approaches and tactic teachers tend to employ while engaging learners in authentic learning. Kumari and Rao (2010) assert that teaching methods teacher use "should lay an emphasis on learning and development analytical, critical and conceptual abilities rather than on memorisation and reproduction (p.131)". As such, teaching methods are central to teachers' work that links the teacher and student in a mutual relationship that leads to reciprocal interactions (Bandura, 1986; Mercer & Mercer, 1993). Studies show that teaching methods motivate and react not only in teachers' mind but also on their entire personality, their work, decisions, judgement, teaching attitudes and values (Biggs, 2014). However, in BLE courses teachers' teaching methods attract students' participation, satisfaction, interactions and activities which seem to hold sound individual, psychological and social benefits in learning. In BLE courses, a teacher who tends to employ authentic teaching methods is more likely to engage in CTP.

Furthermore, course management involves the teacher planning, organisation, preparation and utilisation of all wide-range of teaching infrastructure (i.e., digital multi-media) and

experiences that maximise learning experiences. Mercer and Mercer (1993) report that in course management "teacher frequently check on the behaviour and academic work and adapting instruction to ensure that appropriate instructional match is being maintained" (p.19). In the present study, course management can be referred to as teachers' ability and skills to engage in planning, organising and monitoring teaching in BLE course with positive thinking (Showers, 1985). It involves avoiding mistakes and placing each teaching activities in the appropriate educational processes (Carnegie Mellon University, 2015). In this perspective, effective and efficient course management requires the teacher to plan, organise and focus on digital instructional technologies, course content and intended learning outcomes before engaging in constructive teaching activities. Teachers' skill level, feelings, personality, course conditions and the pressure of the situation play significant roles in BLE course management. Mercer and Mercer (1993) report that teacher needs to have teaching strategy that allows preparation ahead of time which enhances handling the bad feelings that might deter BLE instructional processes, by doing so, teachers can catch errors before extensive practice.

Studying teachers' beliefs has been a research topic for a while in the different level of educational setting. In a higher education setting, research studies on teachers' beliefs and teaching practices have focused on diverse issues. For example, a study by Shun (2008) found no differences between teachers' beliefs and their relations to instructional methods, while Phillips (2009), investigates the beliefs and wise practices of a teacher. These studies, possibly indicate that teachers' belief is a principal factor in higher education research because can have both indirect and direct influences on their CTP, For example, a study by Shun (2008) found no differences between teachers' beliefs and their relations to instructional methods, while Phillips (2009), investigates the beliefs and wise practices of a teacher. These studies, possibly indicate that teachers' belief is a principal factor in higher education research because can have both indirect and direct influences on their CTP, the ways they approach their work, decisions and behaviour (Hamre et al., 2012; Hu et al., 2017; Khader, 2012; Safrankovaa & Hrbackovaa, 2015). However, what teachers think can affect what teachers do/teach (Jamalzadeh & Shahsavar, 2014; Phillips & Borg, 2007).

Teachers' beliefs give the impression of how teachers act, think and behave regarding their CTP, in-depth understanding of the influence of teachers' beliefs in BLE courses in the 21st century add more value to the innovative world of teaching and learning processes. Teachers make decisions based on their practice, context, personal knowledge, thoughts, and beliefs (Borg, 2003). As such, a wide variety research studies on teachers' beliefs show that teachers

professional development and their CTP in BLE courses are the results of their identified teaching methods, course management and curriculum teaching philosophy (Chen & Bonner, 2017; Kagan, 1992; Wu, Palmer & Field, 2011). In gaining a deeper understanding of teachers' beliefs, researchers have been using two main approaches including cognitive approach and sociocultural approach (Jamalzadeh & Shahsavar, 2014).

While the cognitive approach to teachers' beliefs embraces the complexity of teachers' mental lives and duties underlying their teaching practices, awareness about their actions and decision, curriculum and pedagogical issues (Behar-Horenstein et al., 1996; Wu et al., 2011). The sociocultural approach is the 'effects of individual differences and context on teachers' beliefs' (Jamalzadeh & Shahsavar, 2014, p.166). In this study, teachers' beliefs connote sociocultural, cognitive and organisational characteristics established and organised based on individual's practical experiences (cf. teaching strategy and course management), assumptions and theories about teaching and students, as well as learning processes. Consequently, the current study examines the university teachers' beliefs and their CTP in BLE courses.

2.2 Teachers' constructivist teaching practices in BLE courses

University teachers have been encouraged to employ CTP because of its strengths in motivating student interactions and engagements in authentic learning practices. For teachers who practice student-centred teaching are more likely to engage their students in authentic teaching in BLE courses. As some scholars suggest, the concept of CTP in BLE courses promote dialogues on ideas, perspectives and preferences (Windschitl, 1999). Hitherto, the CTP seems to connect well with what Biggs (2014) addressed to be constructive alignment in which teaching is designed to enhance students' engagement and participation in learning activities that optimise their chances of achieving beforehand intended learning outcomes. As such, teachers' beliefs often influence their teaching practices, and that teachers who believe in constructivist view are more likely to interact and engage in CTP and solicit peer coaching interactions, ideas and model excellent learning discourse. In this study, teacher CTP takes into account of three essential aspects of constructivist teaching including explicit engagement (Delialioğlu, 2012), supportive teaching (OECD, 2009) and peer interactions.

On the one hand, explicit engagement pertains to teachers' ability to attract active process of meaning-making whereby free explanations are provided on students demands to advance on knowledge acquisition and meaning constructions (Garrison & Kanuka, 2004; Garrison & Archer, 2000). Teacher explicit engagement depends on the design of BLE courses, teachers'

ability, an open-minded and satisfaction to deliver an effective and efficient discourse in BLE. Studies have indicated that explicit engagement involves both external and internal teachers' observable behaviours. On the one hand, external states would involve teachers active participation in discussions, attending students assignments and providing feedback on time and attending lectures and tutorials) (Vavrus, 2009). On the other hand, internal states include teachers' optimism, interest and curiosity reconsidered for successful constructive teaching and learning (Lord, 1997; Yildirim & Kasapoglu, 2015) in BLE courses. Similarly, constructivist teacher explicitly engages students in their teaching by inviting interactive discourse in which peer coaching and interactive dialogue of teachers and students play a significant role. However, in BLE courses, the constructivist teacher should set the stage for explicit student engagement in active teaching by providing established enlightenments and guidance on practices.

Moreover, CTP in BLE courses involves supportive teaching in which what and how to learn are apparently created to help student share valuable ideas and learning experiences (Biggs & Tang, 2011) as teachers teach. That is, supportive teaching might include offering original contents, learning objectives, guidelines and teaching standards, teaching activities, physical and virtual learning settings. In the present study, supportive teaching is described as teachers' internal and external professional, thoughtful and guidance offered to enhance achievement of intended learning outcomes. As such, what teachers do is to influence the effectiveness of intended teaching-learning outcomes (Biggs & Tang, 2011).

A study by Brophy (2006), suggests that teachers who engage in CTP should "possess sound subject-matter knowledge and related pedagogical knowledge" (p.530). By encouraging student debate on the subject matter, teachers might be able to assist students to generate solutions to the complex problem. However, in a co-construction of student learning, teacher CTP in BLE courses do not only imply that teachers need and ability to guide students' knowledge construction but also need to coach interactions and creativity which reassure engagement in effective and authentic learning (Orton, 1996; Temiz & Topcu, 2013). In this study, interactions refer to teachers' ability to influence the exchange of information, actively engage learners, use a wide range of digital instructional resources and experiences of which co-creation of innovative knowledge is a focal point. Garrison and Vaughan (2008) maintain that CTP in BLE benefits from both teacher and students' interactions in constructivist teaching.

Interactions in BLE courses encourages teacher active involvement and participation in teaching and hence contributes to student understanding knowledge construction and effective

learning of the subject matter. As such, principles of interactions like textual, social, and technological are essential components in describing teachers CTP in BLE courses (Liang & Bonk, 2009). Therefore, in this study, CTP connote what teachers' do, act and behave while engaging in constructivist teaching in BLE courses which might involve explicit engagement, supportive teaching and interactions. That is, the students under teachers' guidance should lead both teaching and learning as active co-collaborators of knowledge construction.

2.3 The relationship between teachers' beliefs and their CTP in BLE courses

University teaching in BLE allows integration of diverse learning environments and strategies including both physical and virtual teaching environments. The study aims to examine if there is a relationship between the university teachers' beliefs and their CTP in BLE courses. Studies have shown that CTP students explicit engagement, supportive teaching and peer interactions depend on how teachers approach their teaching methods and course management in BLE courses (Chen, 2002; Yilmaz-Tuzun, 2008). That is, a constructivist teacher structures his/her teaching scaffolding the creation of knowledge in which student collaborative learning is a focus of teaching. Studies have shown that teachers' belief might relate with their CTP in BLE courses only if constructivist teacher practices inquiry-based teaching (Haney & McArthur, 2002). However, between theory and practice, a relationship between teachers' beliefs and their CTP in BLE courses offer opportunities for the teachers and students collaborate and share experiences in which knowledge construction seems to be the focal points. In this regard, the university teachers' beliefs perhaps predict their CTP in BLE courses. As such, examining the relationship between the university teachers' beliefs and their CTP in BLE courses play a significant role in the ways teacher implement instructional delivery based on the beliefs of a teacher on the use of BL pedagogy.

Studies about beliefs, teachers' beliefs about teaching and knowledge are well-established in the literature specifically in the domain of constructivist learning (Garrison & Kanuka, 2004; Horenstein et al., 1996; Hursen & Soykara, 2012; Seung et al., 2011). As such, the university teachers' beliefs and their CTP have been connected to another level of learning including primary schools, pre-service teachers and student in computer-enhanced learning environments (Lameras et al., 2012; Lim & Chai, 2008). Nevertheless, we know little about the university teachers' beliefs and their CTP in BLE courses (Donetskaya & Golovanova, 2015; Kordaki, 2013). Therefore, the study examining the relationship between the university teachers' beliefs and their CTP in BLE courses based on five selected Tanzanian university is necessary taking

consideration of increased integration and deployment of the technology-enhanced learning environment (cf. BLE and e-learning).

2.4 The purpose of the study

The study examined the relationship between teacher's beliefs of the university teachers of BLE courses and CTP in five selected universities in Tanzania. The following research questions guided the study:

a) What are the beliefs of the university teachers who teach BLE courses?
b) What are the university teachers' CTP in BLE courses?
c) Are there differences in the university teacher's beliefs and their CTP in BLE courses with regard to gender, academic rank, educational level and teaching experiences?
d) How are the beliefs of the university teachers related to their CTP in BLE courses?

3. Methods

3.1 Research design and context

This is a quantitative study in which survey research design was employed to collect data pertinent to the purpose of the study. The study was conducted in five selected universities in Tanzania offering BLE courses in diverse approaches including open and distance learning (ODL); open and distance e-learning (ODeL); and e-learning systems (cf. Moodle, Canvas and Blackboard). Researchers seek and obtained research clearance after meeting ethical research issues of the selected universities. The study received consent from 250 teachers engaged in BLE courses. However, 211 questionnaires were received from teachers (response rate = 84.91%), which is within acceptable response rate for the face-to-face administered survey (cf. 80% - 85%) (Punch, 2003).

3.2 Participants and sampling procedures

The study involved a total of 211 teachers of BLE courses from five universities in Tanzania. Among 211 participants, 134(63.5%) were males, and 77(36.5%) were females, while 13(6.2%) were <25 years old, 68 (32.2%) were 26-35 years old, 112(53.1%) were 36-45 years old, 15(7.1%) were 46-55 years old, and 3(1.4%) were 56+ years old. Regarding academic ranks 39(18.5%) were tutorial assistants, 96(45.5%) were assistant lecturers, 54(25.6%) were lecturers, 14(6.6%) were senior lecturers, and 8(3.8%) were professors. While regarding education level, 39(18.5%) had a bachelor degree, 109(51.7%) had a master degree, and

63(29.9%) had a PhD degree. About teaching experience, 48(22.7%) were of 1-5 years' experiences; 94(44.5%) were of 6-10 years; 29(13.7%) were of 11-15 years; 31(14.7%) were of 16-20 years, and 9(4.3%) were of 21+ years' teaching experiences.

Overall, these differences in the sample indicate that most of the academic personnel in Tanzanian universities are males possibly because of academic and sociocultural backdrop such as early marriage and drop out. The sample divulges that academic personnel is rather young, especially in blended courses because blended learning is regarded as an innovative and promising pedagogical approach. Moreover, perhaps most of the aged academic personnel such as senior lecturers and professors possibly tended to employ direct instructions rather than innovative pedagogical approaches like web-based instruction, e-learning, and BL which might be due to some beforehand noted inconsistency on utilising learning management systems. Table 1 gives a summary of the demographics of the sample. Stratified random sampling was used to select universities based on three subgroups of universities with BLE courses. The subgroups were: a) universities offering ODL (one university), b) universities with an e-learning system (three universities), c) universities with ODeL (one university). Purposive sampling was used to select teachers who were engaging in constructivist teaching and utilising either one or more subgroups above.

Table 1
Demographics of the sample (N=211)

Respondents' characteristics	Categories	N	%
Gender	Male	134	63.5
	Female	77	36.5
Academic ranks	Tutorial Assistants	39	18.5
	Assistant Lecturers	96	45.5
	Lecturers	54	25.6
	Senior Lecturers	14	6.6
	Professors	8	3.8
Educational level (attainment)	Bachelor	39	18.5
	Master	109	51.7
	PhD	63	29.9
Teaching experiences	1-5 years	48	22.7
	6-10 years	94	44.5
	11-15 years	29	13.7
	16-20 years	31	14.7
	21+	9	4.3
Age	<25	13	6.2
	26-35	68	32.2
	36-45	112	53.1
	46-55	15	7.1
	56+	3	1.4

3.3 Instruments, reliability and data collection process

This study used self-developed teacher's constructivist teaching beliefs and CTP survey (TBCTPS) with insight from the work of Gales and Yan (2001), Lameras et al. (2012) and Canto-Herrera and Salazar-Carballo (2010). The TBCTPS with Likert scoring scales ranging from 1(*strongly disagree*) to 5(*strongly agree*). TCTBS consists of three major sections. Section one asked demographics characteristics (cf. gender, age, educational level, academic rank and teaching experiences) of the sample. Items in this section intended to understand respondents' trends of utilising BL pedagogical approach and web-based instructions.

Section two enquired about the university teachers' beliefs about the nature of their CTP in BLE courses. Two subscales including 'teaching strategies' (8 items with Cronbach's α =.78) and 'course management' (5 items with Cronbach's α =.76) were used measure teachers' beliefs. 5-point Linkert scoring scales requesting teachers to identify their agreement in each item statement were presented in the survey. The design of TBCTPS was consistency with what teachers think, feel, behave, act and do while engaging in BLE courses. For example, some of

the items asked the following statements: *"I believe in guiding students learning and control assessment tools"* and *"I trust I am responsible for what students learn in my course" and "I believe that debating and discussion are everything about teaching".* Based on Canto-Herrera and Salazar-Carballo (2010) insight on teachers' beliefs, we thoughtful designed questionnaire items examining what teachers feel, think and behave as they engage in BLE courses, possibly, might reveal essential components of their beliefs.

Section three with three subscales (cf. explicit engagement - 11 items with Cronbach's α = .78; supportive teaching – 8 items with Cronbach's α =.79 and interactions – 8 items with Cronbach' α =.72) regarding CTP. The following were some of the item statements used to measure teacher CTP *"I carefully plan my teaching to minimise time lost between activities" and "My teaching focuses on increasing students' active engagement"*. Moreover, the design of CTP section was guided by the insight from the work of Gales and Yan (2001), that constructivist teacher's instructional practices are the results of their beliefs which affect their participation, engagement and achievement in BLE courses.

Data were collected in two phases. Phase one involved the second semester of 2015/2016 academic year and phase two involved first semester of 2016/2017 academic year. In both phases, researchers visited selected universities and administered questionnaires to teachers who were engaging in constructivist teaching and learning. Phase one involved some observations specifically on computer-based learning environments to diagnose teaching situation relevant to constructivist principles. The following checklist was used: use of multiple perspectives, knowledge constructions, teacher as facilitates, collaborative experiences, effective and elaborated feedback, teacher-student interactions, authentic learning activities. The checklist was meant for an informed decision on BLE teachers with constructivist teaching and not for actual data collection. The reason was that the computer-aided learning environments are described by its designers to include different learning features linked with constructivist principles (grade book, blogs, tagging, video sharing, discussion forums, coaching interactions, podcasts, and wiki).

3.4 Data Analysis

In the present study, step-by-step non-parametric statistical analyses (cf., Spearman's rank-order correlation, Mann-Whitney U-test, and Kruskal-Wallis H test) was used because our data were either ordinal and/or continuous but not normally distributed. First, descriptive statistics (i.e., mean scores and standard deviations) were used to measure the beliefs and CTP of

university teachers who teach BLE courses since we wanted to examine what beliefs they hold while engaging on BLE courses as well as kind of their CTP in BLE courses. Second, Spearman's rank-order correlation was employed to measure the direction and strength of the relationship between teachers' beliefs and their CTP. Third, the Mann-Whitney U-test was used to find differences between identified teachers' beliefs and gender. Fourth, Kruskal-Wallis H test (cf., one-way ANOVA on rank) was used to find differences between identified teachers' beliefs and academic rank, levels of education and teaching experiences. Finally, multiple linear regressions were further conducted to examine if teachers' beliefs were related to their CTP in BLEs.

4. Results

This section presents the findings of the study. First, we present descriptive statistics of teachers' beliefs of the teachers of BLE courses about CTP. Second, results about differences in teachers' beliefs of the teachers of BLE courses for gender, academic rank, the educational level and teaching experiences are reported. Finally, the findings of the relationship between teacher's beliefs of the teachers and their CTP in BLEs.

4.1 Teachers' beliefs and CTP in BLE courses

Table 2 report descriptive statistics about the university teachers' beliefs and their CTP in BLE courses. Subject to mean and standard deviation scores of teachers' beliefs variables: teaching methods (M=4.09, SD=.57) and course management (M=4.12; SD=.66). The results suggest that the university teachers were likely to have high beliefs in BLE courses based on teaching methods and course management which include contents, students works, participation and curriculum. The results also indicate that teachers' beliefs in BLE courses include the ability to use diverse teaching methods and course management strategies.

However, in determining teachers' CTP in BLE courses, the results indicate that teachers who teach BLE courses were employing CTP in different levels as suggested by mean scores of supportive teaching (*M=4.12, SD=.57*), explicit engagement (*M=4.10, SD=.52*), and interactions (*M=3.82, SD=.64*) resultantly. In other words, the results indicate that teachers were more likely to practise supportive teaching and explicit engagement than peer interactions in BLE course. In the final analysis, the results suggest that the university teachers with constructivist teaching beliefs tended to employ CTP in BLE courses because they appeared to be knowledgeable and aligned with constructivist teaching principles.

Table 2
Descriptive statistics for the variables among TBCTP subscales

Variables	Mean	SD	Cronbach's Alpha (α)
Teachers' beliefs			
Teaching methods	4.09	.59	.78
Course management	4.12	.66	.76
CTP			
a. Explicit engagement	4.10	.52	.76
b. Supportive teaching	4.12	.57	.79
c. Interactions	3.82	.64	.72

4.2 Differences in the university teachers' beliefs in BLE courses regarding gender, academic rank, educational level and teaching experiences

To determine differences in teachers' beliefs in BLE courses for gender, a Mann-Whitney U test was conducted. The findings indicate that there was a statistically insignificant difference between gender groups on the university teachers' beliefs in BLE courses (U = 4982.5, Z=-.414; p = .679). The descriptive statistics show that male teachers scored (Median = 4.23; means rank = 107.32) while female teachers scored (Median = 4.23; mean rank = 103.7), indicating that the university teachers' beliefs were the same across gender categories (cf. Table 3). Further, a series of Kruskal-Wallis H test was conducted to determine the differences in the university teachers' beliefs in BLE courses for educational levels, academic ranks and teaching experiences. For educational levels, the findings divulge that there was the statistically insignificant difference in the university teachers' beliefs across the different educational levels ($\chi^2(2)$ =.562, p =.755), with a mean rank of 102.99 for Bachelor holders; 104.33 for Master holders, and 110.76 for PhD holders.

However, the results indicate that there was a statistically insignificant difference in the university teachers' beliefs in BLE courses across teachers academic ranks ($\chi^2(4)$ =2.110, p =.716), with a mean rank of 104.56 for tutorial assistants; 101.50 for assistant lecturers; 110.94 for lecturers; 108.39 for senior lecturers, and 129.50 for professors. The results further show that there was a statistically insignificant difference in the university teachers' beliefs in BLE courses across teaching experiences ($\chi^2(4)$ = 1.233, p = .873), with a mean rank of 103.73 for 1-5years; 104.49 for 6-10years; 115.05 for 11-15 years; 102.16 for 16-20 years and 117.94 for 21+ years. In summary, the results indicate that the university teachers' beliefs and their CTP in BLE courses are the same across categories of educational level, academic rank and teaching experiences.

Table 3
Gender differences in the university teachers' beliefs and their CTP in BLE courses

	Gender	Median	Mean Rank	Mann-Whitney *U*	*Z*-*score*	*p*-value
Teachers' beliefs (TM+CM)	Male	4.23	107.32	4982.5	-.414	.679
	Female	4.23	103.71			

4.3 The relationship between the university teacher's beliefs and their CTP in BLE courses

In Table 4, the overall results show that the university teachers' beliefs (cf. teaching methods, course management) were statistically significantly related to their CTP (explicit engagement, supportive teaching and interactions) in BLE courses, suggesting that the university teachers were practising constructivist teaching in BLE courses. The results further indicate that there was a statistically significant relationship between the university teachers' beliefs (teaching methods) towards their CTP (explicit engagement, r_s=.517, p<.01), supportive teaching (r_s=.479, p<.01) and interactions (r_s=.285, p<.01) in BLE courses. The findings suggest that the university teachers are more likely to practises CTP in BLE courses. Furthermore, the findings show that university teachers beliefs (course management) were significantly related to their CTP (explicit engagement, r_s=.562, p<. 0.01), supportive teaching (r_s=.514, p<.01) and interactions (r_s=.272, p<.01) in BLE courses. The overall results indicate that teachers were engaged in different CTP in BLE courses. The findings contribute to the understanding of teachers teaching practices.

Table 4
Correlation between variables of teachers' beliefs and CTP variables in BLE courses

	1	2	3	4	5
1.Teaching methods	-				
2. Course management	.562**	-			
3. Explicit engagement	.517**	.562**	-		
4. Supportive teaching	.479**	.514**	.596**		
5. Interactions	.283**	.272**	.400**	487**	-

** p<.01

Moreover, multiple regressions were further conducted to find out if the university teachers' beliefs (cf. teaching methods (TM) and course management (CM) was related to their CTP (cf.

supportive teaching (ST), explicit engagement (EE) and interaction (IN) in BLE courses. The results indicate that the variables entered (cf. TM, CM) statistically significantly predicted CTP (cf. EE and ST) in BLE courses. For example, with regard to EE, the results reported that (R^2 =.505, $R^2_{(adj.)}$ =.501, F(2, 208)=106.22, p<.001). For ST the finding was reveal that (R^2 =.376, $R^2_{(adj.)}$ =.370, F(2, 208)=62.78, p<.001). With regard to IN, the results suggested that (R^2 =.173, $R^2_{(adj.)}$ =.165, F(2, 208)=21.68, p<.001), however, TM was a statistically insignificant predictor to IN (p=.273). The results further show that TM was a statistically significant predictor to EE, ST (β_{EE} =.278, β_{ST} =.259), while statistically insignificant predictor to IN (β_{IN}=.101), indicating that in BLE courses university teachers with constructivist teaching beliefs (TM) tended to practise supportive teaching and engaging students while maintaining minimal interactions. Moreover, the results showed that CM was a statistically significant predictor to EE, ST and IN (β_{EE} =.482, β_{ST} =.399, β_{IN} =.336), suggesting that the university teachers' beliefs (TM and CM) were related to CTP in BLE courses. In Table 5, summary results are hereunder.

Table 5
Predictors of the university teachers' CTP in BLE Courses

Predictor(s)	EE			ST			IN			C.S	
	B	SE B	β	B	SE B	β	B	SE B	β	*Tol.*	*VIF*
TM	.251	.064	.278**	.256	.079	.259**	.112	.102	.101	.471	2.12
CM	.389	.057	.482**	.352	.070	.399**	.332	.091	.336**	.471	2.12
$F_{(2, 208)}$	106.22**			62.78**			21.68**				
R^2	.505			.376			.173				
R^2 (adjusted)	.501			.370			.165				
SE of the Estimate	.373			.459			.592				

*** p<.01*

Key: EE = explicit engagement, ST = supportive teaching, IN = interaction, TS = teaching methods, CM = course management, C.S = collinearity statistics

5. Discussion

The study examines the relationship between the university teachers' beliefs and their CTP in BLE courses from five selected universities in Tanzania. Research on the university teachers' beliefs and CTP in BLE courses in a resource challenging context like Tanzania is scarce. Therefore, the study was designed to examine the following: a) the university teachers' beliefs and their CTP in BLE courses; b) differences in the university teachers' beliefs and their CTP in BLE courses with regard to gender, academic rank, educational level, and teaching experiences; c) relationship between the university teachers' beliefs and their CTP in BLE

courses. This study indeed found that teachers' beliefs of the BLE courses align with their CTP. We found no difference in teachers' beliefs in BLE courses with regard to their gender, educational level, academic rank and teaching experiences. Further, the results found a meaningful relationship between the university teachers' beliefs and their CTP in BLE courses.

5.1 Teachers' beliefs and their CTP in BLE courses

In this study, we examine the university teachers' beliefs in BLE courses. The university teachers who teach BLE courses hold an absolute belief (skills, feelings and strategies) as they execute their responsibilities. For example, in the current study, two aspects, including teaching methods and course management were identified as the university teachers' beliefs which determine their teaching, guidance to student activities and performance as they teach in BLE courses. The university teachers tend to hold diverse beliefs regarding their teaching including direct instruction and constructivist teaching (Yilmaz-Tuzun, 2008). Moreover, the beliefs teachers hold present important aspect in higher education digital instructional technologies and deliveries. As such, our research on teachers' CTP in BLE courses proffer well-established knowledge on how to effect knowledge construction with an emphasis on what teachers know, feel, behave, act and do in BLE. The same is applied to teachers who teach BLE courses, because based on their beliefs, learning in BLE can be personalised to provide chances to experience in their own time, pace and space.

Our findings support a study by Laurillard (2015) that a digital learning environment can use individual performance and preferences to adapt the level of content or difficulty of activity to the person's needs. As such, the university teachers' beliefs in BLE courses were directly well-matched to one another, and perhaps, make their teaching and learning process, BLE courses more effective and satisfactory to teachers who become facilitators (Assaf et al., 2009). In BLE courses, teachers with personalised learning help their learners to manage many challenges related to complexities of course management, teaching methods, time, cost and henceforth, enhance attractiveness, interactivity, participation and engagement in authentic teaching and learning.

Regarding the university teachers CPT in BLE course, the teachers were likely to practise CTP in BLE courses. As a result, CPT variables were statistically significant correlated to one another. The findings perhaps suggest that identified teachers' beliefs play a significant role in promoting CTP in BLE courses. In other words, consideration of teachers' beliefs seems to influence adoption, deployment and implementation of BLE courses because such beliefs may

reassure quality teaching specifically on addressing teachers need and desire to facilitate successful student learning. The results support the assumption that teachers who employ constructivist teaching principles provide quality teaching and learning (Temiz & Topcu, 2013), and that their beliefs are concomitant with CTP because teachers need to achieve personal objective based on an interest in the BLE course.

5.2 Differences of teachers' beliefs of BLE courses with regard to gender, academic rank, educational level and teaching experiences

Differences of teachers' beliefs of the university teachers of BLE courses for gender, academic rank, educational level and teaching experiences were measured. It seems that university teachers of BLE courses were engaged in CTP regardless of their diverse characteristics. Subsequently, CTP attains to distinctive constructivist principles of which any university teachers might engage regardless of their gender, seniority, educational level and teaching experiences. For instance, we found no differences in teachers' beliefs of the university teachers of BLE courses for gender, educational level, academic rank and teaching experiences. The finding contradicts with Kordaki (2013) who claim that teachers who possess higher degrees tend to hold more modern and progressive perspectives toward CTP. A possible explanation for this might be that university teachers of BLE courses have strong knowledge-based and the same constructivist principles which strengthened their beliefs.

However, a study by Assen et al. (2016) agrees with our findings that differences in gender, educational level, academic rank and teaching experiences do not automatically lead to changes in their beliefs of BLE courses involved. The results seem to agree with the assumption that such compatible teachers' beliefs might be an important indicator of the quality constructivist teaching of BLE courses, and that their curiosity shapes teachers' beliefs for involvement in any task (Kordaki, 2013). Moreover, identified beliefs divulge that most of the teachers' instructional practices are results of their long-lived beliefs associated with their open-minded and a wide range of characteristics.

5.3 The relationship between the university teachers' beliefs and their CTP in BLE courses

In this current study, the focus was to examine the relationship between the university teachers' beliefs and their CTP in BLE courses. The results indicate that there is a direct correlation between teachers' beliefs and their CTP because the university teachers' beliefs seem to

influence their CTP in BLE courses. The influence might have been caused by several teachers' beliefs including distinct perspectives about teaching methods, student learning, courses management, curriculum and pedagogy (Behar-Horenstein et al., 1996; Lim & Chai, 2008).

However, teachers who possess practical constructivist perspective consider the values, experiences, and knowledge students bring to class, and that teachers use the same constructivist teaching perspective as they engage CTP in BLE courses. The finding echoes previous research in which teachers with the constructivist principles, align their teaching and learning experiences on students' prior knowledge for the effective implementation of CTP (Chen, 2002; Gales & Yan, 2001). In itself, aligning the beliefs teachers hold with their CTP entails personalised learning which in turn save time, cost of travel and accommodation, and that it influences course flexibility, affordability and individual achievement and satisfaction.

However, to gain a better understanding of teachers' beliefs and its relation to their CTP in BLE courses, teachers are thought to be at the centre of inquiry-based teaching experiences, aligning their teaching beliefs and constructivist principles. As a result, for the studied university teacher's beliefs in BLE courses, it is evident and expected that teachers' beliefs predicted supportive teaching and explicit engagement. As such, teachers who offer supportive teaching and consider transparent student engagement in teaching practices yield quality teaching and learning experiences. It seems that teachers who explicitly engage students in their teaching practices with supportive teaching are likely to provide authentic teaching experiences that strengthen their beliefs (Haney & McArthur, 2002). That is, university teachers' beliefs (TM and CM) predict their CTP (EE and ST) in BLE courses and these beliefs should be encouraged during the design stages of teacher training so as to transform their teaching and learning practices.

Another surprising finding of interest was that teachers' belief (TM) was not a significant predictor to CTP (IN) in BLE courses. It seems interesting because teachers who embrace constructivist teaching are more likely to attract interactions on their CTP. A probable reason might be the sample and context of the study as well as the most practised teaching philosophy (cf. teacher-centred methods). Furthermore, it should be noted that teachers tend to teach in the way they were taught (Yilmaz-Tuzun, 2008), and that, it perhaps most of the Tanzanian university teachers of BLE courses were the outcome of the teacher-centred philosophy (Tabulwa, 2013). As a result, their teaching methods had sailed and long-lived in their mind which seems to be a challenge on adopting innovative instructional technologies which emphasis constructivist student-centred teaching and learning. Nonetheless, with a growing

number of students enrolled in five studied Tanzanian universities, large group direct instruction seems to be encouraged with less sensitive to interactive learning. However, the practical teaching method is a unique factor for enhancing constructivist teaching, and that when accurately coordinated enhance peer interactions through coaching in BLE courses.

6. Implications of the study

The findings from this study bring important implications for higher education sector specifically institutions which implement BLE courses, the university teachers who teach BLE courses, BLE courses instructional designers and researchers who are likely to gain a holistic understanding of the beliefs of the university teachers about CTP in BLE courses. First, the results can be utilised for the design of appropriate constructivist teaching program and courses ("constructive alignment") based on teachers' beliefs of the university teachers of BLE courses, and that belief about CTP can be used to improve effective teaching among university teachers of BLE courses, enhance efficiency (cf., cost savings). That is, for both universities and teachers' constructivist alignment in BLE courses minimises time away from the job, increases teachers' sense of course ownership and favour the reduction of drop out among students. Also, this study sheds light on the influence of teachers' beliefs in BLE courses, and that, the university teachers' CTP are more likely to be affected by their beliefs in BLE courses. However, the university teachers' CTP in BLE courses should align with their beliefs for successful quality university teaching processes.

Second, the results indicate that there were no differences in the university teachers' beliefs and their CTP in BLE courses regardless their gender, academic rank, educational level and teaching experiences. The findings offer a valuable lesson to teacher education practitioners and higher education sector that university teacher education programs and in specific BLE courses should be designed to accommodate teachers' beliefs and their CTP which allow multiple teaching perspectives and learning diversity. Third, knowledge about CTP in BLE courses might be used to influence inquiry-based teaching among teachers and enhance their beliefs about teaching practices in BLE courses. That is, there should be an effort to encourage interactive teaching in BLE courses in the context of higher education in Tanzania. In this way, the university teacher should abide by their beliefs based as they engage in CTP for successful BLE courses design and deliver.

Fourth, professional development regarding constructivist teaching methods and principles should be offered to the university teachers of BLE courses to reinforce peer interactions and

peer coaching. As such, knowledge and skills achieved could lead to a productive relationship between teachers' beliefs and their CTP (interactions) in BLE courses. In the final analysis, that information on the university teachers' beliefs reveals valuable practical implication on the provision of flexible opportunities for the university teachers and higher education sector which makes the BLE courses. The use of the innovative resources remotely such as simulators or virtual laboratories since BLE courses allow for an effective combination of digital instructional technologies and traditional face-to-face approach characterised by digital instructional content and real-world practice.

7. Limitations and future research directions

This study provides significant findings of the subject under study, and that, any generalisation should be limited to the population of the same characteristics. That is, although CTP might be the same, BLE courses may vary from country to country due to different criteria including university teacher education programs, teaching philosophy, technological advancement, education policies and systems. Another limitation should do with respondents (cf. 211 teachers) and participating universities (cf. 5 universities), although there are few university teachers involved and universities offering BLE courses, still too limited for broad generalisations.

Moreover, to replicate this study, future research studies should focus on involving a more substantial number of both respondents and universities (cf. regional and international). Besides, the study focuses on the university teachers' beliefs and their CTP in BLE courses. To better understand the influence of teachers' belief and their CTP in BLE courses, the future research should focus on examining factors related to teachers' knowledge, instructional support, supportive activity and teacher self-actualisation in their beliefs and practices so as to encourage inquiry-based teaching and teacher effective teaching.

Another possible avenue for future research is the need to examine probable effects of teachers' beliefs on their activities, behaviours and teaching practices in BLE courses because the in-acquiring deep understanding of teachers' beliefs and the ways they approach their works would provide very important in teaching and learning process. Moreover, the study revealed that understanding teachers' beliefs as they engage in BLE courses are crucial determinants of their CTP. In the future researchers in teachers' beliefs and CTP in BLE, courses may like to investigate other variables related to teacher teaching contexts like teachers' motivational factors, perceived roles, needs and teaching styles.

Furthermore, teachers' beliefs and their performance aligned with intended learning outcomes they want to achieve should be regarded as another significant area for the future research in BLE courses. In the final analysis, we recommend researchers on teachers' beliefs, would benefit from multiple data collection with multiple research instruments such as interview, observations and post-lesson reflections so as to increase teachers' awareness on BL pedagogy, stimulation and implementation of BLE courses.

8. Conclusion

University teacher plays a significant role in the preparation of the current and future workforce, and that for successful constructivist teaching in BLE courses their beliefs should align with their teaching practices. The study provides useful insight regarding the teachers' belief and their CTP, and however, the study adds contributions to the literature on the crucial factors predicting the CTP in BLE courses. The study shed light and provide possible information regarding teachers' mental processes, feelings and their passion for BLE courses. Furthermore, it is also expected that the study provides the university teachers of BLE courses, teacher education practitioners and instructional designers with knowledge and guidance on how to align teachers' beliefs and their CTP. University teachers tend to draw upon their beliefs and knowledge to set attainable goals and select appropriate CTP and strategies to accomplish intended learning outcomes. Therefore, the quality of university teachers' CTP in BLE courses are based on their beliefs, and that to enhance university teachers CTP in BLE courses teachers' beliefs specifically in teaching methods and course management should attain to constructivist principles, of which inquiry-based teaching should be at the centre of their teaching practices.

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Appendix: Questionnaire

Teachers' Beliefs and Constructivist Teaching Practices Survey (TBCTPs)

SECTION A: Background Information

Please provide a tick '√'in the most appropriate place to you.

	Respondents' characteristics
1.	Gender: Female [ ] ; Male [ ]
2.	Age: <25 [ ]; 26-35 [ ]; 36-45 [ ]; 46-55 [ ]; 56+ [ ]
3	Level of education: Bachelor [ ]; Master [ ]; PhD [ ]
4	Academic rank (position): Tutorial assistant: [ ]; Assistant lecturer: [ ]; Lecturer: [ ]; Senior Lecturer: [ ]; Professor: [ ]
5	Teaching experience: 1-5 years [ ]; 6-10 years [ ]; 11-15 years [ ]; 16-20 years [ ]; 20+ years [ ]

SECTION B & C: Teachers' beliefs and constructivist teaching practices in BLE courses

Please read and decide the extent to which you agree or disagree on the following statements and **circle** the number to the right of the statement that best matches your choice based on the following rating scales (1= strongly disagree, 2=disagree, 3=unsure, 4=agree and 5=strongly agree).

	Statements	Rating Scales				
1.	I trust that teaching in this course pertains to delivering content and assignment	1	2	3	4	5
2.	I believe active participation while teaching promote team learning in my course	1	2	3	4	5
3.	I believe that I make teaching easy for students and guide on solving problems	1	2	3	4	5
4.	I trust in helping students meet standards of what it takes to succeed in my course	1	2	3	4	5
5.	I believe that debating and discussion is everything about teaching	1	2	3	4	5
6.	I share useful teaching resources which make student learning in my course	1	2	3	4	5
7.	I trust that managing student learning behaviours is important part of teaching	1	2	3	4	5
8.	I believe in engaging students in tasks that promote thoughtful construction of knowledge	1	2	3	4	5
9.	I believe in guiding students learning and control assessment tools	1	2	3	4	5
10.	I believe what students need to know about the assignment is important in BLE course	1	2	3	4	5
11.	I think I need to be in control of the direction of teaching and assessment tools in BLE course	1	2	3	4	5

12. I trust I am responsible for what students learn in my course	1	2	3	4	5
13. I trust in recording, giving feedback and handling students grades on time	1	2	3	4	5
14. I do not develop instructional activities using empirically derived and supported principles	1	2	3	4	5
15. I prioritise learning objectives and select what to teach	1	2	3	4	5
16. I do not spend much time on carefully classifying information for teaching	1	2	3	4	5
17. I present content in small subtopic to easy instruction	1	2	3	4	5
18. I carefully plan my teaching to minimise time lost between activities	1	2	3	4	5
19. My teaching focuses on increasing students' active engagement	1	2	3	4	5
20. I always use positive and negative strategies while teaching	1	2	3	4	5
21. I won't use attention signal to get students' attention	1	2	3	4	5
22. I design practice activities that promote and reinforce engagement and participation	1	2	3	4	5
23. I monitor students' progress and use these data to inform the future teaching	1	2	3	4	5
24. Different aspects of instruction are considered before, during and after teaching	1	2	3	4	5
25. I organise the teaching environment to match the style of teaching	1	2	3	4	5
26. I do not provide feedback on correct and incorrect behaviour	1	2	3	4	5
27. I create teaching settings that maximise interruptions	1	2	3	4	5
28. I will not support a teaching environment that promotes discourse on shared understanding	1	2	3	4	5
29. Students are not autonomous and self-motivated in their learning environments	1	2	3	4	5
30. I maximise structure of and for communication with students	1	2	3	4	5
31. I assess the strengths of students and provide opportunities to demonstrate their abilities	1	2	3	4	5
32. I provide recognition to the student and communicate that achievement to others	1	2	3	4	5
33. I will not create opportunities for reinforcing peer interactions	1	2	3	4	5
34. In my course sharing of individual success and other meaningful facts	1	2	3	4	5
35. Students' ideas and methods are the starting points for instruction	1	2	3	4	5
36. Students thinking, and interaction are more important than the size of the group I teach	1	2	3	4	5
37. Everybody's effort to follow teaching is respected and reinforced	1	2	3	4	5
38. I plan and involve students on tasks for groups and individuals	1	2	3	4	5
39. In my class, most of the students will not ask questions	1	2	3	4	5
40. I will not assess the strengths of students and demonstrate their abilities	1	2	3	4	5

Teaching methods, (1-8), Course management (9-13), explicit engagement (14-24), supported environment (25-32); interactions (33-40)

Chapter 6

Teachers' perceived roles and constructivist engagement practices in constructivist-based blended learning environment courses*

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Chapter 6

Teachers' perceived roles and constructivist engagement practices in constructivist-based blended learning environment courses

Abstract

This study examines the relationship between teachers' perceived roles and their constructivist engagement practices in constructivist-based blended learning environment (BLE) courses in Tanzanian universities. The study used a mixed-methods research design with multiple data collection techniques to collect data from 261 teachers across ten selected universities. Step-by-step statistical analyses and content analysis were used. The results show that teachers' main perceived role is one of support, followed by leadership and design roles in constructivist-based BLE courses. The results also suggest that collaboration was a preferable mode of engagement to motivation or facilitation regarding teachers' constructivist engagement practices in constructivist-based BLE courses. The findings further reveal that there is a statistically significant correlation between teachers' perceived roles and constructivist engagement practices in constructivist-based BLE courses. The results advance the knowledge base regarding teachers' perceived roles, teachers' constructivist engagement practices and constructivist-based blended learning. Furthermore, the results could be beneficial to higher education institutions (HEIs) attempting to implement constructivist-based BLE courses, demonstrating that the deployment and implementation of constructivist-based BLE courses in teacher education should align with teachers' perceived roles and their constructivist engagement practices.

1. Introduction

Teachers' perceived roles in technology-enhanced learning environments have drawn great attention in educational research and teaching practices (Eka, 2014; Laurillard, 2012; Zhu, 2010). It has been observed that teachers perceive themselves to have several roles, including those of facilitators, leaders, designers, technical partners, collaborators, instructional supporters, guides and counsellors (Fryer & Bovee, 2016; Laurillard, 2015; Raphael & Mtebe, 2016). These perceived roles refer to teachers' expected ability to design, plan, execute and construct appropriate, meaningful knowledge through the process of teaching and learning. Teachers' perceived roles are described as the positions, functions, responsibilities and competencies of teachers in technology-enhanced learning environments (Goodyear, 2015;

Kali, McKenney & Sagy, 2015). In fact, most of these perceived roles reflect the principles of constructivist teaching and learning practices (Goodyear, 2015; Jonassen, 1994; Kwan & Wong, 2015). The reasons for this might be because, in constructivist-based blended learning, teachers' perceived roles involve designing, leading, supporting and arranging a context in which learning can flourish (Dinham, 1989; Goodyear, 2015).

Similarly, scholars have shown that teachers' perceived roles in constructivist-based blended learning environment (BLE) courses emphasise constructivist engagement strategies (Biškupić, Lacković & Jurina, 2015; Fryer & Bovee, 2016). Constructivist engagement practices assume that teachers employ their professional knowledge and competences to facilitate, motivate and collaborate with students to construct meaningful knowledge in constructivist-based BLE courses (Jonassen, 1994; Jonassen, Peck & Wilson, 1999). In this present study, constructivist engagement practices can be described as a teacher's involvement in the active cognitive processing that leads students to an in-depth understanding of the subject matter under study.

Hence, teachers' constructivist engagement practices entail an in-depth understanding and active participation in the process of knowledge construction (Mayer, 1999; Kirschner, 2015). For example, teachers' prior knowledge, abilities and understanding of the subject matter have a unique effect on their active participation in the process of new knowledge construction (Craig, Goold, Coldwell & Mustard, 2011; Edgenuity, 2017). On the one hand, increasing integration of digital instructional technologies, blended learning and related courses implementation in HEIs might be the reason for introducing constructivist engagement practices in the constructivist-based blended learning environment (BLE) courses. On the other hand, scholars have found that constructivist-based BLE courses influence the effectiveness of interactive teaching, whereby both teachers and students are working in partnership (Goodyear, 2015; Owston, Garrison & Cook, 2006).

However, in the context of this study, neither teachers' perceived roles nor constructivist engagement practices as deployed in constructivist-based BLE courses are a well-established topic in the literature, regardless of the enormous increase in the deployment and implementation of digital instructional technologies and ICT infrastructures in Tanzanian universities (Pima, Odetayo, Iqbal & Sedoyeka, 2016; Macharia & Nyakwende, 2010). Therefore, the need to examine teachers' perceived roles and constructivist engagement practices are gaining importance in Tanzanian universities (Lwoga, 2014; Makuu & Ngaruko, 2014), as an understanding of these perceived roles and engagement practices can have

implications for and contribute to research and practices. Therefore, this study extends the previous related research and fills in the research gaps, first of all by identifying both the perceived roles of teachers and the constructivist engagement practices in constructivist-based BLE courses in Tanzanian universities. Following this, the study examines the relationship between these perceived roles of teachers and their accompanying constructivist engagement practices. The paper continues with a literature review on constructivist-based BLEs, constructivist-based BLE courses, the perceived roles of teachers, and constructivist engagement practices. Next, the methods and main findings are presented and discussed. The conclusion, implications and limitations of the study conclude the paper.

2. Theoretical background

2.1 Constructivist-based BLEs and constructivist-based BLE courses

The term 'constructivist-based BLEs' refers to teaching and learning environments that allow the teacher to support, encourage, motivate, facilitate, interact with and assist students as they engage and participate in knowledge construction (Laurillard, 2015; Machumu & Zhu, 2017). Constructivist-based BLEs involve the use of both digital instructional technologies and traditional face-to-face instructional delivery in the process of student knowledge construction (Al-Huneidi & Schreurs, 2012; Poelmans & Wessa, 2015). Studies have indicated that skilfully designed and employed constructivist-based BLEs encourage both active student and teacher participation in constructivist-based BLE courses (Wilson, 1997; Kwan & Wong, 2015). Similarly, constructivist-based BLE courses can be described as university courses offered using digital instructional technologies, traditional face-to-face and constructivist pedagogy.

In this study, constructivist-based BLEs are treated as teaching and learning environments that are perceived to enhance active engagement, productive thinking, collaboration and interaction between students and teachers. Therefore, it is worthwhile examining the relationship between teachers' perceived roles and constructivist engagement in constructivist-based BLE courses in the context of Tanzanian universities, since these are regarded as innovative teaching and learning courses that depend on the complementary use of digital instructional technologies, traditional face-to-face learning, and constructivist pedagogy.

2.2 Teachers' perceived roles in constructivist-based BLE courses

Teachers' perceived roles are determined by the ability of the teachers to design and construct appropriate knowledge, to lead fruitful dialogue, and to ensure success in the course of teaching

and learning. In constructivist-based BLE courses, teachers perceive themselves as fulfilling several roles, including those of facilitator, moderator, supporter, designer and leader (Grasha, 1994; Smith, Sheppard, Johnson & Johnson, 2005). Teachers need to establish relevant knowledge, competence and skills in executing what they perceive as their roles in implementing constructivist-based BLE courses (Eka, 2014). In this way, teachers' perceived roles seem to depend on the learning objective, content and structure of learning environments. For this study, university teachers will be perceived to play three key roles: leader, designer and supporter. The teacher as a leader provides direction and cognitive guidance, which enhances students' collaborative knowledge construction (Goodyear & Zenios, 2007). The teacher-as-leader engages in multiple interactions with the learning community, including with parents, students and other teachers (Brown & Edelson, 2003; Reeves & Lowenhaupt, 2016).

In general, in constructivist-based BLE courses, the perceived leadership role of teachers is that of the cognitive guide, whereas the perceived role of students is likely to be that of sense-maker. On the other hand, the teacher-as-supporter is perceived to offer teaching and learning assistance and information pertinent to the subject under study (Lavery, 2007). In most cases, supporters might structure their constructivist-based BLE courses in a way that allows students to enjoy the flexibility of developing their own concepts and strategies to deal with the assigned learning activities (Dennen, 2002). Killion (2010) suggests that "supportive teachers help students understand the importance of what they are learning, how it will impact their educational practice and lives, and how to apply what they are learning in authentic settings" (p.7). Consequently, teachers who assume a supportive role establish collaborative working 'ground rules' together with students, agreeing on guidelines and model social behaviour, and establishing their own identities (Craig et al., 2011; Nihuka & Voogt, 2011).

Finally, it has been observed that the teacher-as-designer develops and creates relevant learning content, activities and assessments, or acts as a dispenser of information (Mayer, 1999). One of the focal points of constructivist-based BLE courses is "instructional design". Instructors are involved in the formulation and development of instructional materials, learning activities, ways of delivery, and methods of evaluation (Biškupić et al., 2015; Goodyear, 2015). Research has shown that, in constructivist-based BLE courses, the teacher-as-designer emphasises on the design of learning activities, curricula, syllabuses, lessons, instructional objectives and constructive components that facilitate student engagement, interaction and collaborative learning tasks (Barger & Byrd, 2011; Kerres & De Witt, 2003). Research into teachers' perceived roles in constructivist-based BLE courses is, however, fundamental and

calls for an assessment of teachers' constructivist engagement practices which may, for some, be difficult to achieve in challenging contexts.

2.3 Teachers' constructivist engagement practices in constructivist-based BLE courses

Constructivist engagement practices are built on the philosophy that "to teach is to engage students in learning" (Smith et al., 2005). In today's context of technology-enhanced teaching and learning, a teacher needs to engage in the process of knowledge construction through facilitation, motivation and collaboration (Hughes, 2007). Teachers employing constructivist practices enhance their students' ability to formulate and deliver tangible solutions to real-life problems. Nanjappa and Grants (2003) suggest that constructivist teachers collaborate with their students in a friendly learning environment, which helps stimulate student thinking and reasoning in constructivist-based BLE courses. In this context, facilitation, collaboration and motivation are the primary components of constructivist engagement practices. Lavery (2007) describes facilitation as a teacher's ability to contextualise learning, build participant knowledge and create shared learning resources. In fact, a teacher who facilitates learning is keen to guide, support and engage students in meaningful learning (Smith et al., 2012). Research has shown that teachers' constructivist engagement practices can range from being highly structured and pre-planned to being substantially free or involving open discussion (Hughes, 2007; Karimi & Ahmad, 2013).

Teachers in constructivist-based BLE courses are expected to demonstrate knowledge competence as they motivate students to engage in the course. Teachers who offer students autonomy as they engage in these courses support them in fulfilling the intended learning outcomes (Kirschner, 2015). Research into motivation in constructivist-based BLEs has shown that motivation is described as individual teachers' internal or external desired multiple constructivist characteristics for their engagement in meaningful learning activities and practices (Jansen in de Wal, den Bonk, Hooijer, Martens & van den Beemt, 2014). These characteristics might be internally or externally driven. From this perspective, teachers can be seen to stimulate students' engagement and participation in constructivist-based BLE courses, based on the desired learning outcomes of the course, using multiple teaching approaches (Mayer, 2003). Tarnopolsky (2012) suggests that there is no single approach suitable to engage teachers or students in constructivist practices and that an appropriate 'blend' of teaching and learning approaches - such as exposition-based, personalised learning and collaborative techniques - may be required. In this way, teachers in constructivist-based BLE courses can

discourage insufficient performance by combining student portfolios and multiple approaches to accord with student preferences and thus improve performance.

According to Gokhale (1995), collaboration involves the process of forming groups or pairs of students to achieve academic goals. A teacher who engages in collaboration-based instructional practices allows students to share diverse learning experiences in small groups. Constructivist-based BLE teachers should be able to facilitate both online and offline collaboration among students, so as to achieve the intended learning outcomes (Tarnopolsky, 2012; Ulmane-Ozolina, 2011). Research has shown that teachers' employing both online and offline collaboration "gives students an opportunity to interact based on discussion forums, take responsibility for their learning, construct their own learning experiences and therefore achieve the intended learning outcome (Schweizer, Paechter & Weidenmann, 2003). In this sense, collaboration enables teacher and student engagement in essential academic tasks by interacting and working as a team to tackle a specific problem (Avgerinou, 2008). In many cases, a teacher who engages in collaboration tends to create and manage meaningful learning experiences and stimulate students' ability to solve real-world problems (Oliver, Herrington & Reeves, 2006). Thus, teachers in constructivist-based BLE courses can encourage thoughtful reflection on experiences and stimulate student thinking through collaborative learning.

2.4 Gender differences in teachers' perceived roles in constructivist-based BLE courses

Studies have shown that for a while male have been favoured regarding their participation and engagement in digital instructional technology, online educational discussion forum, educational technology and technology-enhanced learning environments (Cuadrado-García, Ruiz-Molina & Montoro-Pons, 2010; Thayalan, Shanthi & Paridi, 2012). In line with present changes in learning environments due to technology integration in HEIs gender differences can have impact related to teachers' perceived roles in technology-enhanced learning environments, as in case of e-learning (González-Gómez, Guardiola, Rodríguez & Alonso, 2012). It is indicated from current research that issues related to gender differences still receive considerable attention in research (Dang, Zhang, Ravindran & Osmonbekov, 2016; Padilla-Melendez, Aguils-Obra & Garrido-Moreno, 2013). Therefore, it is believed that teachers' perceived roles change in line with the kind of learning environments, teaching styles, learning approaches and types of courses they facilitated (McSporran & Young, 2001). Unlike in traditional face-to-face learning environments courses, online courses and e-learning courses which are often observed in a single focal point (i.e., technology use) rather than multiple

viewpoints (i.e., pedagogical, knowledge and technological) as in the case of constructivist-based BLEs courses. Therefore, this study also, probes if there are gender differences in teachers' perceived roles in constructivist-based BLEs courses to unveil any significant impacts in understanding the way gender might influence their engagement in facilitating constructive discourse in constructivist-based BLE courses.

2.5 The relationship between teachers' perceived roles and constructivist engagement practices in constructivist-based BLE courses

In the literature, an explicit distinction between curriculum-centred and student-centred learning approaches is drawn. This distinction "foreshadow the recent distinction between non-constructivism and constructivist visions of education" (Mayer, 2003, p.130). On the one hand, the prescription of student-centred is based on "learning is an active process, the student is the focus, and the end-point" (Dewey, 1902, p. 9). In the process, students and teachers should be regarded as collaborative learning partners (Mayer, 2003). According to Dewey, (1902, p. 8), the curriculum-centred conception is to "subdivide each topic into studies; each study into a lesson; each lesson into specific facts and formulae. The student is regarded as immature, and empty mind who is to be feed" However, constructivist engagement practices seeks to activate cognitive processing that leads to understanding through innovative instructional technologies. Zhu (2010) reports that innovative interactive methods of instruction in the knowledge society emphasise adaptability, flexibility and the transformative nature of teachers' perceived roles in digital learning environments. Importantly, constructivist-based BLEs are intended to provide shareable learning experiences, which Tarnopolsky (2011) regards as a constructivist blended learning approach.

Moreover, for effective student knowledge construction within constructivist-based BLEs, teachers' roles need to be perceived as those of designers, leaders and supporters, who can collaborate with, facilitate and motivate students while engaging in authentic learning experiences. Given these facts, there is an urgent need for research addressing the relationship between teachers' perceived roles and their constructivist engagement practices in constructivist-based BLE courses, especially due to the increase in the adoption of innovative digital instructional technologies (Doolittle & Hicks, 2012; Kirschner, 2015). In particular, the existing research is silent about how teachers' perceived roles (i.e., leader, designer and supporter) relate to their constructivist engagement practices (facilitation, collaboration and motivation) in constructivist-based BLE courses in Tanzanian universities. From this

perspective, without established research and understanding of what teachers perceive their roles to be and how they constructively engage in constructivist-based BLE courses, it is difficult to determine how successfully knowledge is being constructed. The present study examines the relationship between teachers' perceived roles and their constructivist engagement practices in constructivist-based BLE courses. Specifically, we sought to answer the following research questions:

1. What are the teachers' perceived roles in constructivist-based BLE courses?
2. What are the teachers' constructivist engagement practices in constructivist-based BLE courses?
3. Are there gender differences in teachers' perceived roles in constructivist-based BLE courses?
4. How are teachers' perceived roles related to their constructivist engagement practices in constructivist-based BLE courses?

3. Research methods

3.1 Research designs

The study used a mixed-methods research design, whereby multiple data collection techniques consisting of a questionnaire, observations and interviews were triangulated. Collecting the qualitative data involved context-based research to determine the range of constructivist teaching and learning activities, practices and academic work that teachers do. The use of multiple methods, in particular, integrating semi-participant observation and informal interviews enhanced our understanding of teachers' perceived roles and their constructivist engagement practices in constructivist-based BLE courses in selected universities.

3.2 The context and sample

In general, higher education in Tanzania consists of universities, university colleges and non-university institutions offering bachelor and advanced degrees (TCU, 2012). Teachers qualifying for university teaching posts should hold a second-class upper-division bachelor's degree and/or the highest academic degree in their specified academic discipline, along with additional requirements. The requirements and conditions are also stipulated in Part III Section 20 and Part IV of the Universities Act, 2005, and the Harmonised Scheme of Service for Academic Staff in Public Universities and Constituent Colleges (URT, 2005; URT, 2014). The integration of innovative teaching and learning approaches led by the adoption of digital

instructional technologies in higher education is stipulated in the 2003 National ICT Policy (URT, 2003).

Of Tanzania's 49 universities and university colleges (TCU, 2016b), only a few have managed to integrate digital instructional technologies and computer-mediated learning environments. The study involved ten universities in Tanzania, situated across four regions including Morogoro (three universities), Dar es Salaam (four universities), Mbeya (two universities) and Dodoma (one university). The four regions were selected on the grounds of their having at least one university or university college integrating instructional technologies in the process of teaching and learning. The constructivist-based BLE courses were selected following a pilot study to determine whether university teachers in the selected regions were practising constructivist learning principles and engaging in blended learning delivery concurrently. Thus, the results of the pilot study assisted in the selection of the ten universities, university colleges and constructivist-based BLE courses.

Three primary criteria were used to select study participants: the selected teachers (1) practised constructivist learning, (2) made use of digital instructional technologies, and (3) conducted collaborative learning approaches. In the current study, the participants were 261 university teachers, with an average of 26.2 teachers recruited from each university, all of whom engaged in constructivist-based BLE courses. Of these, 158 (60.5%) were males, and 103 (39.5%) were females, which reflects the real situation of the university teaching profession as well as the education system in Tanzania, wherein most university teachers are males. With regard to age, 120 (46%) respondents were aged 26–35 years; 112 (42.9%) were 36–45 years; and 29 (11.1%) were 46–55 years old, indicating that most of the participants were between early and mid-adulthood. Regarding respondents' education levels, the study collected data from 60 (23%) bachelor's holders, 116 (44.4%) master's holders, and 85 (32.6%) doctorate holders. The same distribution indicates that most of the participants should engage in professional development to obtain advanced academic agrees (e.g., PhD), which is the highest qualification required for a teaching position in HEIs (TCU, 2012; 2016a). The teaching experience of our participants ranged from 0–20 years (M=2.11, SD=1.10); of these, 103 (39.5%) had 0–5 years, 69 (26.4%) had 6–10 years, 47 (18.0%) had 11–15 years and 42 (16.1%) had 16–20 years' teaching experience. Finally, 10 participants were randomly selected for individual interviews.

3.3 Instruments and scale of measurements

This research used the teachers perceived roles and constructivist engagement practices survey (TPEP) questionnaire. The TPEP is a self-developed survey questionnaire drawing on the work of Grasha (1994), Grasha & Riechmann-Hruska (1990), Garrison & Vaughan (2008), Zhu (2010), and Eka (2014). The polytomous item response theory model - also known as the polytomous Rasch model (cf., Rasch, 1960; Salzberger, 2015) - was used to develop, design and validate the TPEP questionnaire. The TPEP presumed to measure two aspects of constructivist-based BLE courses: teachers' perceived roles, comprising three constructs (leader (five items), supporter (five items) and designer (five items)); and teachers' constructivist engagement practices with three constructs (facilitation (five items), collaboration (five items) and motivation (six items). Most of the items were either self-developed or modified from other scholars' works to reflect the context of the study. Respondents were invited to provide a Likert-type response from "strongly disagree" (1) to "strongly agree" (5) to all items, except in Section One which focused on respondents' demographics. The other TPEP sections corresponded to the teachers' perceived roles and their constructivist engagement practices.

3.3.1 Teachers' perceived roles in constructivist-based BLE courses

In the current study, the teachers' perceived roles subscale was used to measure teachers' knowledge of their perceived functions, accountability, responsibilities and positions as they engage in constructivist-based BLE courses. Teachers' perceived roles was the first topic of the questionnaire, which aimed to capture respondents' understanding of what was meant by teachers' roles. Items were developed from an in-depth analysis of the following: (1) literature based on the core functions of teachers in technology-enhanced learning environments; (2) the ways teachers adopt and implement digital instructional technologies; (3) 20 course syllabi, learning resources and learning activities; and lastly, (4) the assessment criteria used in HEIs in Tanzania. These items for example, *"In my view, a teacher in constructivist-based BLE courses needs to design hands-on activities for students"* or *"In constructivist-based BLE courses, the teacher needs to observe student performance and give timely feedback"* were developed by the first author, who has ten years' experience in a Tanzanian university teaching. However, the second author also revised and structured the instrument both before and after the pilot study. Items in the teachers' perceived roles subscale were polytomously scored (rated on a

scale of 1 to 5). The Cronbach's α value for the teachers' perceived roles subscale was .88, indicating acceptable reliability.

3.3.2 Constructivist engagement practices in constructivist-based BLE courses

Constructivist engagement practices in constructivist-based BLE courses were assessed using 16 (closed-ended) items designed to probe teachers' knowledge of constructivist principles and their engagement practices (cf., Smith et al., 2012; Grasha & Riechmann-Hruska, 1990). The design of the constructivist engagement practices subscale focused on the following: (1) how teachers engage in encouraging effective knowledge construction; (2) how they employ technological environments resourcefully; and (3) how they facilitate guided participation in authentic academic tasks. The following items, for example, *"I seek and use student feedback to improve my teaching"* or *"I stimulate student thinking and reasoning in my course"* were designed to reflect constructivist practices in various Tanzanian universities. Participants were invited to select one of the five suggested alternatives showing their agreement or disagreement with the statement. The constructivist engagement practices items were polytomously scored (rated on a scale of 1 to 5). The Cronbach's α value for the constructivist engagement practices scale was .85, signifying satisfactory reliability.

3.4 Procedures

In this present study, the respondents were university teachers coordinating constructivist-based BLE courses. It should be noted that research ethics clearance was applied for and granted to the study. Teachers were approached and agreed to participate in the study. Regarding the quantitative data, participants were requested to complete the questionnaire and return it to the researchers with the agreement that the activity would be completed in one sitting, because of the teachers' tight schedules. Respondents had 20 minutes to complete a questionnaire. The activity was conducted in the teachers' respective offices. In addition, 50 respondents requested and were provided with 20,000/- Tanzanian shillings (approximately US$7 at the time of the survey) as compensation for their participation (i.e., opportunity costs); most of these were selected for individual interviews. For the qualitative data, one-to-one interviews, and participant and non-participant observations were employed. Along with two research assistants, the first author visited the ten selected universities to observe what was going on in each university regarding constructivist-based BLE courses.

Beyond this, the researchers observed teachers' constructivist practices, such as their engagement, interaction and association with students in the process of teaching and learning. Teachers' teaching styles and the approaches they used to guide and communicate with students were also observed. Moreover, both offline and online assessments modalities and actual face-to-face classrooms teaching were observed. We observed how teachers interacted with students both offline and online within the e-learning platform, in class and out of class. To avoid interfering with students' study time during in-class observation, the research assistants (who were also postgraduate students) assisted in observing what the teachers did during the face-to-face time within the class. The interviews with teachers followed one week after the observations and survey. Specific teachers' offices, university libraries and tea rooms were used for one-to-one interviews, which lasted 20 minutes each. Teachers were interviewed regarding what their perceived roles were in constructivist-based BLE courses and how they practised their constructivist-based BLE courses.

3.5 Analyses

In the present study, three basic elements of the scale were analysed to evaluate the measurement scale: validity, reliability and dimensionality (Hair, Anderson, Tatham & Black, 1998). First, the questionnaire was piloted with five experts to test the content validity. Second, to analyse the reliability of the scale, Cronbach's alpha (α) was used. In all subscales, the Cronbach's alpha values obtained were as follows: for the teachers' perceived roles subscale with three constructs (leader =.88; supporter =.81; designer =.71), and for the constructivist engagement practices subscale with three constructs (facilitate =.70; collaborate =.82; motivate =.86). The test of reliability being above .7 indicated that the reliabilities of all the individual constructs were acceptable. Third, to analyse unidimensionality and test the underlying factor structure of the TPEP instrument (both the teachers' perceived roles (TPRs) subscale (10 items) and constructivist-based engagement practices (CEPs) subscale (11 items)), a principal components exploratory factor analysis was conducted. The results divulged three factors for teachers' perceived roles and three for constructivist engagement practices.

On the one hand, the TPRs variables entered reported results for the Kaiser-Meyer-Olkin (KMO) test (=.843), Bartlett's test of sphericity ($\chi 2$ (105) =1126.693, $p<.001$), and eigenvalues which, in combination, explained 40.04% of the total variance and which was also supported by a scree plot. On the other hand, the CEPs variables entered reported results for the KMO test (=.784), Bartlett's test of sphericity ($\chi 2$ (120) =1129.104, $p<.001$), and eigenvalues which

explained 33.72% of the total variance with the support of a scree plot. The results indicated that correlations between items were sufficiently feasible for factor analysis. Furthermore, the constructs assumed can be thought of as representing liking for the different TPRs (leader, supporter and designer) and CEPs (facilitation, motivation and collaboration).

Finally, because the questionnaire was used for the first time, confirmatory factor analyses (CFA) were conducted in AMOS 21 to verify the interrelationship between constructs and whether the factor constructs fitted our sample or not. The factor structure of the three constructs for the TPRs subscale was tested regarding teachers' perceived roles (i.e., leader, designer and supporter). Following this, the factor structure of the three constructs was tested regarding facilitation, collaboration and motivation practices. It was observed that each item loaded to its proposed constructs and subscale (TPRs and CEPs) (see Appendices A & B). The findings of the CFA indicated that the data fit the sample used and that the scale had the suggested dimensions and acceptable reliability. Figure 1 presents the structural interrelationship among the factors generated from the teachers' perceived roles and constructivist engagement practices scales, respectively.

4. Results

4.1 Analysis of validity and reliability measurement scale (TPRs and CEPs subscales)

In the present study, three basic elements of the scale were analysed to evaluate the measurement scale including validity, reliability and dimensionality (Hair, Anderson, Tatham & Black, 1998). First, the questionnaire was piloted with five experts to test the content validity. Second, to analyse the reliability of the scale, the Cronbach's alpha (α) was used. In all subscales the Cronbach' alpha obtained were as follows: for the teachers' perceived roles subscale with three constructs (leader =.88; supporter =.81; designer =.71), and for constructivist engagement practices subscale with three constructs (facilitate =.70; collaborate =.82 and motivate =.86). The test of reliability being above .7 indicated that reliabilities of the individual constructs were acceptable. Third, to analyse unidimensionality and test the underlying factor structure of the TPEP survey instrument (both TPRs subscale (10 items) and CEPs subscale (11 items), a principal components exploratory factor analysis was conducted. The results divulged three factors for teachers' perceived roles and three for constructivist engagement practices.

The TPRs variables entered reported the Kaiser-Meyer-Olkin (KMO) = .843, Bartlett's test of sphericity (χ^2 (105) =1126.693, $p<.001$), and with eigenvalues in combination explained

40.04% of the total variance which also supported by scree plot. Regarding the CEPs, variables entered reported the KMO =.784, Bartlett's test of sphericity (χ^2 (120) =1129.104, $p<.001$) and eigenvalues explained 33.72% of the total variance with the support of scree plot. The results indicated that correlations between items were sufficiently feasible for factor analysis. Furthermore, the constructs assumed can be thought of as representing liking for the different TPRs (leader, supporter and designer) and CEPS (facilitation, motivation and collaboration).

Finally, because the questionnaire was used for the first time, confirmatory factor analyses (CFA) in AMOS 21 were conducted to verify the interrelationship between constructs and whether the factor constructs fitted our sample or not. The factor structure of the three constructs for TPRs subscale was tested regarding teachers perceived roles (i.e., leader, designer and supporter). Furthermore, the factor structure of the three constructs was tested regarding facilitation, collaboration and motivation practices. It was observed that each item loaded to their proposed constructs and subscale (TPRs and CEPs) (see Appendices A & B). The findings of the CFA indicated that the data to fit the sample, the scale had the suggested dimensions and acceptable reliability. Figure 1 presents the structural factor for our TPRs and CEPs scales.

4.2 Teachers' perceived roles in constructivist-based BLE courses

The study employed descriptive statistics (i.e., mean and standard deviation) to determine the teachers' perceived roles variables. Table 1 illustrates the three teachers' perceived roles variables identified in constructivist-based BLE courses. Of these, the role of supporters (M=4.11; SD=.77) scored the highest, compared to that of leaders (M=3.95; SD=.92) and designers (M=3.92; SD=.72). The results also show that the correlations between the three detected variables were positive ($r_s=.48$ to .65, $p<.01$). Thus, the results provide support for the concept of teachers' perceived roles in constructivist-based BLE courses.

Table 1
Descriptive statistics and correlations between the teachers' perceived roles variables

Variables	1	2	3
1. Leader	-		
2. Supporter	.60**	-	
3. Designer	.48**	.65**	-
Mean	3.95	4.11	3.92
S. Deviation	.92	.77	.72

** $p<.01$

4.3 Teachers' constructivist engagement practices in constructivist-based BLE courses

In Table 2, we present the three teachers' constructivist engagement practices variables detected from our findings: collaboration (M=4.18; SD=.74), motivation (M=4.09; SD=.77), and facilitation (M=4.02; SD=.68). Although all the teachers' constructivist engagement practices variables produced high results, with a mean above average, collaboration scored the highest mean among teachers' constructivist engagement practices. The results further indicate that teachers who are likely to practice collaboration also tend to facilitate discourse constructively and motivate authentic learning in constructivist-based BLE courses. Similarly, we found positive correlations among the three constructivist engagement practices variables (r_s=*.47 to .51, p<.01*). Thus, the results supported the research design and validated the concept of constructivist engagement practices in constructivist-based BLE courses.

Table 2
Descriptive statistics and correlations among the teachers' constructivist engagement practices variables

Variables	1	2	3
1. Facilitation	-		
2. Collaboration	.47**	-	
3. Motivation	.51**	.50**	-
Mean	4.02	4.18	4.09
S. Deviation	.68	.74	.77

** p<.01.

4.4 Gender differences in teachers' perceived roles in constructivist-based BLE courses

In this current study, we sought to examine gender differences among teachers' perceived roles variables in constructivist-based BLE courses. The results from the Mann-Whitney *U* test showed that there were statistically insignificant gender differences among TPRs (i.e., leader and designer) in constructivist-based BLE courses: for the leader role, U= 2848.0 (Z=-.291, p=.777), and for the designer role, U=2741.5 (Z=-.677, p=.498). Our results also revealed that there were statistically insignificant gender differences regarding the other TPR (i.e., supporter) (U= 2826.0, Z=-.372, p=.710). Furthermore, both female and male teachers were revealed to have the same perceptions about the leadership role (median =4.40; mean rank for male =80.80; mean rank for female =78.61). Thus, the findings indicate that a teacher's gender has nothing to do with teachers' perceived roles in constructivist-based BLE courses. In Table 3, we provide a summary of the results.

Table 3
Gender differences in teachers' perceived roles in constructivist-based BLE courses

Variables	Gender	Median	Mean Rank	Mann-Whitney *U*	*Z-score*	*p-value*
Leader	Male	4.40	80.80	2848.00	-.291	.777
	Female	4.40	78.61			
Supporter	Male	4.40	81.02	2826.00	-.372	.710
	Female	4.20	78.22			
Designer	Male	4.00	78.14	2741.50	-.677	.498
	Female	4.00	83.23			

4.5 The relationship between teachers' perceived roles and their constructivist engagement practices

Multiple regression analyses were performed to examine the relationship between a dependent variable and a set of independent variables, and to use the relation to predict the relevance of the topic under investigation. The relationships between the teachers' perceived role constructs from three domains of the constructivist engagement practice constructs were examined as outcome variables. The findings revealed that the entered variables predicted facilitation, motivation and collaboration with statistical significance: for facilitation (R^2=.475, $R^2_{(adj)}$=.465, F (3, 155) =46.83, p<.01); for motivation (R^2=.356, $R^2_{(adj)}$=.343, F(3,155)=28.54, p<.01), and likewise, for collaboration (R^2=.332, $R^2_{(adj)}$=.319, F (3, 155) =25.71, p<.01). These results are supported by the standard error of the estimate ($\sigma_{est.}$), which measures the accuracy of predictions (facilitation, $\sigma_{est.}$=.463; motivation, $\sigma_{est.}$=.536; and collaboration, $\sigma_{est.}$=.514).

The results further show that a perceived leadership role was an insignificant predictor with a positive relationship to facilitation and collaboration ($\beta_{facilitation}$=.091, p=.207; $\beta_{collaboration}$=.273, p=.011), and a negative relationship to motivation ($\beta_{motivation}$=-.081, p=.314) and an overall VIF of 1.53. However, a perceived supporter role was a significant predictor with a positive relationship to all three engagement practices ($\beta_{facilitation}$=.377, p<.01; $\beta_{motivation}$=.423, p<.01; and $\beta_{collaboration}$=.273, p<.01), with a VIF of 2.51. Similarly, the final analysis indicated that a perceived designer role was also a significant predictor with a positive relationship to facilitation, motivation and collaboration ($\beta_{facilitation}$=.305, p<.01; $\beta_{motivation}$ =.263, p<.01; $\beta_{collaboration}$=.191, p<.05) and a VIF of 2.09. Our findings support the prediction that the teachers' perceived role constructs are related to constructivist engagement practices in constructivist-based BLE courses, as was also detected by measuring the accuracy of the predictions and multicollinearity using VIF. In Table 4, we provide a summary of the regression

analysis results for the significant predictors of constructivist engagement practices in constructivist-based BLE courses.

4.3 Interviews and observation results

In the current study, formal interviews were conducted in tandem with semi-participant observation. We examined what were perceived to be teachers' roles and how teachers constructively and practically engage in constructivist-based BLE courses. The semi-participant observation involved attending classroom lectures and observing whether the teachers were employing constructivist principles while engaging in constructivist-based BLE courses or not. The interviewed and observed teachers were practising direct instruction, and their universities were given pseudonyms before and during the interviews.

The findings revealed that, in constructivist-based BLE courses, teachers were perceived to hold diverse roles as they facilitated, collaborated in and motivated authentic learning experiences. Terms like 'cognitive guide', 'supporter', 'leader', 'designer', 'developer' and 'assistance' were frequently invoked by teachers. A professor at AA University said the following: "As a teacher, I lead my students, design appropriate learning activities and assess learning outcomes". Furthermore, the results divulged that although teachers were likely to engage in facilitation and collaboration throughout their constructivist-based BLE courses, almost 75% of interviewed teachers admitted that they only engaged in motivating students at the beginning of the courses and not otherwise.

Most of the observed teachers (60%) utilised electronic devices and e-resources to facilitate learning through group assignments, discussion groups and presentations. For example, a senior lecturer at AD University had the following to share: "I think, in constructivist-based BLE courses, a teacher should be a leader of what he is doing". Another lecturer at AC University opined, "I always go through students' work and comment accordingly". The results suggest that teachers in constructivist-based BLE courses make teaching enjoyable and create shareable experiences for themselves and their students. Furthermore, at AE University, an instructor added, "Before engaging in any teaching, I search for current aspects of the curriculum…I review innovative results and share with both teachers and students to encourage constructivist engagement practices in the process of teaching and learning."

However, communication as a means of collaboration and facilitation also emerged during an interview with an associate professor at AB University: "More importantly, in constructivist-based BLE courses, e-learning platform makes it easy to communicate and share diverse

contents with students". Table 5 provides detailed information regarding the interviewed respondents.

Table 4
Predictors of teachers' constructivist engagement practices in constructivist-based BLE courses

Predictor	Facilitation				Collaboration				Motivation				CS	
	b	SE(b)	*β*	*p*	b	SE(b)	*β*	*p*	b	SE(b)	*β*	*p*	T	VIF
Leader	.075	.053	.091	.207	.168	.065	.273	.011	.069	.068	.081	.314	.65	1.53
Supporter	.347	.085	.377	.000	.247	.094	.273	.009	.406	.098	.423	.000	.40	2.51
Designer	.292	.080	.305	.000	.179	.089	.191	.049	.263	.093	.263	.000	.48	2.09
$F_{(3, 155)}$	46.836				25.711				28.540					
R^2	.475				.332				.356					
R^2 adjusted	.465				.319				.343					
SE of the Est.	.463				.514				.536					

Note: CS = collinearity statistics, VIF = variance inflation factors, T = tolerance, SE=standard error

Table 5
Characteristics of the interviewed respondents: discipline, academic rank, gender and teaching experience

Teaching experience	Academic rank	Discipline	Gender	University
20 years	Professor	Production engineering	Male	AA
12 years	Associate professor	Educational psychology	Male	AA
18 years	Associate professor	Sociology	Female	AE
11 years	Senior lecturer	Computer science	Male	AB
14 years	Lecturer	Computer science	Female	AB
15 years	Professor	Applied linguistics	Male	AD
10 years	Senior lecturer	Mathematics	Male	AC
9 years	Lecturer	Educational management	Female	AD
7 years	Assistant lecturer	Curriculum and teaching	Male	AE
5 years	Assistant lecturer	Library and archives	Female	AC

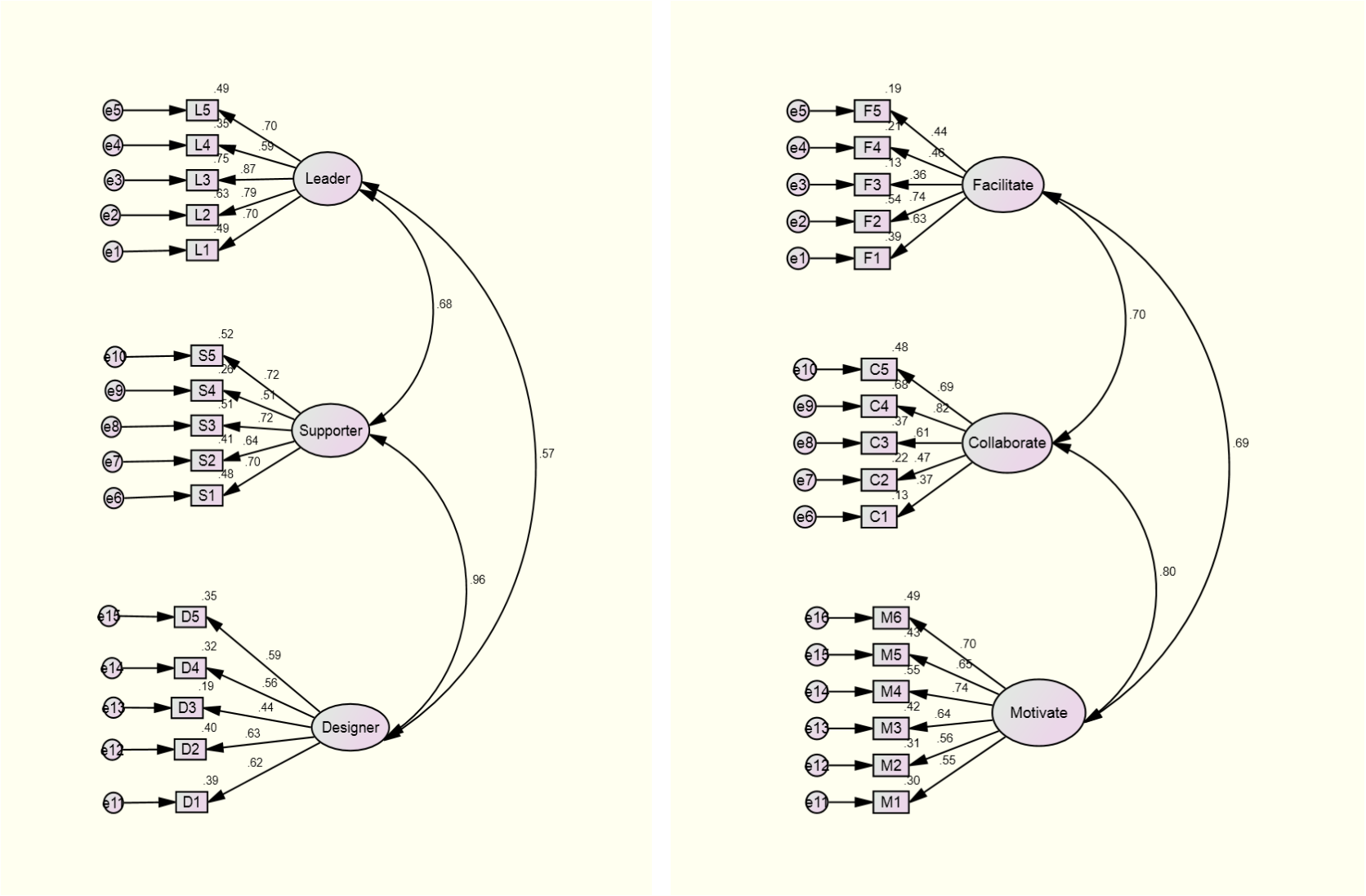


Figure 1. Standardised results of CFA of teachers' perceived roles and constructivist engagement practices for the total sample

5. Discussion

5.1 Teachers' perceived roles in constructivist-based BLE courses

The findings of our examination of the relationship between teachers' perceived roles and their constructivist engagement practices in constructivist-based BLE courses seems to answer our research questions. The first research question required us to identify teachers' perceived roles in constructivist-based BLE courses. As assumed, three perceived roles were identified among teachers: namely, the roles of leader, supporter and designer. Although respondents were likely to be perceived that they are having a supportive role ("supporter") in constructivist-based BLE courses, leadership and designer roles were also perceived.

The teachers' perceived role variables (supporter, leader and designer) correlated positively with one another with statistical significance, meaning that they represent what teachers perceive to be their roles in constructivist-based BLE courses. Thus, our set of teachers' perceived roles in constructivist-based BLE courses appears to confirm the notion that the use of both digital instructional technologies (e.g., blended learning approaches) and pedagogies of engagement (e.g., constructivism) suggest innovative and exciting roles for teachers (Ellis, Hughes, Weyers & Riding, 2009; Kirschner, 2015), which enhance teachers' professional knowledge and ability to execute constructivist-based BLE courses.

These findings have crucial implications for teacher education and teachers' perceived roles. For example, the results expand the current understanding of the perceived roles of teachers who prefer to practise constructivist-based BLE courses and of their professional requirements (Laurillard, 2012), thus indicating that constructivist-based BLE courses are applicable in the Tanzanian context. The results show that the teaching of professional knowledge regarding constructivist-based BLEs could enhance teachers' perceived roles, which would, in turn, have a significant effect on courses taught through constructivist-based BLEs. The results suggest that constructivist-based BLE courses allow teachers to deliver instruction effectively and to reach every student.

5.2 Teachers' constructivist engagement practices in constructivist-based BLE courses

The second research question examined constructivist engagement practices in constructivist-based BLE courses; the results show that teachers constructively practised facilitation, collaboration and motivation as they engaged in constructivist-based BLE courses. Among the three detected constructivist engagement practices, collaboration dominated, indicating that although both the other constructivist engagement practices were practised, teachers were more

likely to engage in collaboration. The findings indicate that constructivist-based BLE course teachers practise different engagement methods as they execute their roles (Goodyear & Zenios, 2007). However, positive and statistically significant correlations were noticed between all three of the identified constructivist engagement practice variables.

These findings emphasise the vital role of pedagogies of engagement in constructivist learning, through which teachers facilitate, motivate and collaborate with students as they engage in teaching constructivist-based BLE courses (Nanjappa & Grants, 2003). As teachers of constructivist-based BLE courses were possibly more likely to engage in collaboration than facilitation and motivation, the results further indicate a correlation between collaboration and facilitation, which reported the highest value among all the variables. However, these results perhaps contradict what was observed during both offline and online learning experiences. The findings indicate that, although collaborative learning and discourse facilitation were the dominant practices observed, teachers were also likely to motivate their students by either rewarding satisfactory performance or emphasising the essential aspects of learning experiences such as shareable authentic experiences.

5.3 Gender differences in teachers' perceived roles in constructivist-based BLE courses

The differences in teachers' genders might appear to offer significant information on what, how and why they constructively engage in CBLE courses. For example, female and male teachers might perform their perceived roles differently. However, in this current study, both female and male teachers were seen to execute their perceived roles in the same way. Comparable findings reported insignificant differences between genders (females and males) in blended learning environment courses (Thayalan et al., 2012). One probable reason might be that nearly all teachers engaging in CBLE courses seem to receive almost identical training in their introduction to computer courses and blended learning environments. However, we did find that male teachers were slightly more likely to perceive their role as one of a supporter when compared to female teachers. It is likely that this slight, insignificant gender difference in the perception of teachers as supporters might be related to the blended learning component, which is more favoured by males than females (Kay, 2006; Rovai & Baker, 2005).

It has been indicated that, in the Tanzanian context, male teachers are more likely to engage with CBLE courses. This study supports and extends previous research addressing the absence of gender difference in the deployment of motivational practices in technology-enhanced learning environments (Fryer & Bovee, 2016). Generally, the findings reflect current evidence

regarding gender aspects among teachers in technology-enhanced learning environments, indicating that both female and male teachers are perceived to hold diverse roles, regardless of their gender identity.

5.4 The relationship between teachers' perceived roles and their constructivist engagement practices in constructivist-based BLE courses

Teachers are perceived to take on diverse roles as they facilitate, collaborate with students and motivate authentic learning in constructivist-based BLE courses. In this regard, teachers who are likely to facilitate discourse also tend to be engaged in either collaborative learning or motivating authentic learning experiences in constructivist-based BLE courses. In the present study, teachers' perceived roles were significantly related to their constructivist engagement practices in constructivist-based BLE courses. Teachers' roles play a significant factor in addressing what teachers do in technology-enhanced learning environments. We found that several of the perceived roles of teachers can be used to predict teachers' constructivist engagement practices in constructivist-based BLE courses.

Teachers who demonstrated a leadership role while engaging in constructivist-based BLE courses also effectively facilitated good discourse, as they were able to collaborate and share useful, thoughtful knowledge within a well-coordinated course (Edgenuity, 2017). Based on the findings, the teachers in this study [almost all] were likely to be leaders, designers and supporters. Also, almost all teachers tended to practice collaboration, facilitation and motivation as their central constructivist engagement practices.

Furthermore, teachers' constructivist engagement practices correlated with one another, indicating that university teachers were likely to engage in constructivist-based BLE courses through diverse practices based on different teaching and learning goals. For example, the findings show that teachers who tended to employ facilitation practices were also constructively engaged in collaboration and motivation aspects (Kwan & Wong, 2015). Previous findings also suggest that constructivist-based BLEs attract teachers' constructivist engagement practices in the context of constructivist-based BLE courses and hence accelerate the achievement of intended learning outcomes and strengthen teachers' functions (Machumu & Zhu, 2017).

However, teachers' perceived roles also enhanced constructive teacher engagement in constructivist-based BLE courses in a way that strategically adapts instructions to the needs of the student and saves both teachers and students learning time. It was observed that the availability of both pedagogical and technological support regarding constructivist-based BLE

courses including collaborative learning experiences, the design of digital content and the reliable internet services encourage teachers in fulfilling their roles and constructivist practices. For example, it was observed that, with reliable internet and related support services, teachers are more likely to facilitate good discourse at a distance, designing and implementing learning activities and assignments, and attending both online and offline group work and team learning.

6. Implications of the study

The present study provides vital information about teachers' roles, constructivist engagement practices and pedagogical aspects in constructivist-based BLE courses. The findings suggested practical implications for universities regarding teacher education—specifically how to influence teachers' appropriate constructivist engagement practices—alongside theory development regarding pedagogies of engagement and blended learning in constructivist-based BLE courses. Moreover, the findings imply that, for successful teaching and learning in constructivist-based BLE courses, university teachers should significantly invest in designing appropriate learning activities and supporting and leading students in the process of knowledge construction. Researchers interested in blended learning technologies, teacher educators and constructivist pedagogies will benefit from the findings by engaging in further research related to teachers' roles and constructivist learning environments.

Additionally, the study provides information for educational policymakers and analyses important ideas regarding teachers' constructivist engagement practices and constructivist-based BLEs. The study contributes to the understanding of influential factors concerning teachers' constructivist engagement practices in constructivist-BLE courses. Indeed, the study provides an in-depth understanding of gender differences regarding constructivist engagement practices in constructivist-based BLE courses. The findings also imply that knowledge construction in constructivist-based BLE courses depends upon the functions of teachers and their constructivist engagement practices.

However, the results also demonstrate that teachers' facilitation, collaboration and motivation practices are all essential aspects of constructivist-based BLE courses. The findings add to the current knowledge base regarding teachers' perceived roles, constructivist engagement practices and courses offered in technology-enhanced learning environments. Furthermore, teachers should influence collaborative learning among gender groups as they engage in constructivist-based BLE courses. The adoption of constructivist-based BLEs in some Tanzanian universities highlights the importance of tapping the benefits that

implementing constructivist-based BLE courses can provide to students' learning and teachers' teaching.

7. Limitations and future research directions

The results of the present study should be considered with circumspection because of the specific application context. The study only used ten universities to collect the relevant information, as a result of various geographical diversity, practical, ethical and administrative reasons specific to Tanzania. Consequently, researchers should exercise care while interpreting the results. The study was limited to observation, a survey and interviews; thus, it could also have benefited from a focus group discussion, which can be used to generate open and clear information from a larger group of participants than individual interviews. Another limitation of the study was its use of content analysis as a response to a large amount of information gathered during interviews and observations. As a methodological challenge, future research could use other aspects of qualitative analysis as well as quantitative data analysis. The study collected data within ten universities from a sample of 261 teachers engaged in CBLE courses; future research should involve more teachers, more universities and possibly a mix of regional and international backgrounds, as well as more CEPs in CBLE courses. Further empirical studies are needed to replicate the results for other contexts, using both longitudinal data and other research designs based on diverse cultural contexts.

8. Conclusion

This study found that teachers' perceived roles such as leader, supporter and designer can predict teachers' constructivist engagement practices (collaboration, facilitation and motivation) in constructivist-based BLE courses. The perceived functions that a teacher adopts in the context of teaching and learning in constructivist-based BLE, coupled with a constructivist pedagogy, can successfully govern that teacher's engagement practices. Our study draws the following conclusions: first, teachers perceive themselves to have diverse roles as they engage in constructivist-based BLE courses. This suggests that universities should optimise teacher education programmes by employing digital instructional technologies which will affect their new instructional roles and practices and hence enhance students' learning.

Second, for the successful implementation of a constructivist blended learning approach, teachers who prefer engaging in constructivist-based BLE courses should align with the observed constructivist engagement practices which seem to offer instructional benefits to both

teachers and students. Third, no gender differences are affecting two of the teachers' perceived roles (i.e., leader and designer); as such, both female and male teachers who engage in constructivist-based BLE courses perceive themselves to be leaders and designers. However, there is a slight gender difference between female and male teachers regarding the supportive role, whereby male teachers seem more likely to perceive themselves as "supporters" than female teachers, in the context of constructivist-based BLEs.

Third, teachers' perceived roles have a valuable impact on the employment of constructivist engagement practices in constructivist-based BLE courses. As a result, university teachers, teacher education programmes, constructivists and instructional designers should reflect on the teachers' perceived roles and how they engage with constructivist-based BLE courses. Understanding these variables would be of benefit to teachers, helping them to enhance the design of learning activities, which in turn would optimise their constructivist engagement practices in constructivist-based BLE courses.

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Appendices

Appendix A: Factorial analysis and reliability related to TPRs subscale

TPRs statements	Factor loadings			Reliability (α)
Leader				.88
Lead2	.887			
Lead3	.883			
Lead1	.859			
Lead5	.608			
Lead4	.559			
Designer				.71
Design3		.823		
Design2		.687		
Design1		.661		
Design5		.420		
Design4		.418		
Supporter				.81
Support4			.815	
Support1			.740	
Support2			.570	
Support3			.489	
Support5			.624	

Note: Factor loading more than .41 was considered for interpretation

Appendix B: Factorial analysis and reliability related to CEPs subscale

CEPs statements	Factor loadings	Reliability (α)
Motivation		.86
Motive3	.801	
Motive1	.756	
Motive6	.749	
Motive4	.702	
Motive2	.663	
Motive5	.620	
Collaboration		.82
Collabo2	.844	
Collabo1	.822	
Collabo3	.740	
Collabo5	.692	
Collabo4	.699	
Facilitation		.70
Facilite5	.728	
Facilite1	.733	
Facilite4	.712	
Facilite2	.673	
Facilite3	.428	

Note: Factor loading more than .42 was considered for interpretation

Appendix C: Questionnaire

SECTION A: Demographic Information

Please insert a tick '√'in the place appropriate to you.

	Respondents' characteristics
1.	Gender: Female ( ) ; Male ( )
2.	Age: <25 ( ); 26-35 ( ); 36-45 ( ); 46-55 ( ); 56+ ( )
3	Level of education: Bachelor ( ); Master ( ); PhD ( )
4	Teaching experience: 1-5 years ( ); 6-10 years ( ); 11-15 years ( ); 16-20 years ( )

SECTION B: Teachers' perceived roles and constructivist engagement practices

Please read and decide the extent to which you agree or disagree (the rating scale ranges from 1 = strongly disagree to 5 = strongly agree) with the following statements. **Circle** the number to the right of the statements that best matches your choice.

	Statements	Rating Scales				
1	In my view, teachers in constructivist BLE courses need to lead students to become independent learners	1	2	3	4	5
2	I think in constructivist BLE courses teacher should maximise student learning time	1	2	3	4	5
3	In constructivist BLE courses, the teacher needs to help students construct meaning rather than memorising facts	1	2	3	4	5
4	In constructivist BLE courses, the teacher needs to prepare students for assessments	1	2	3	4	5
5	In constructivist BLE courses, the teacher needs to observe student performance and give timely feedback	1	2	3	4	5
6	In my view, teachers in constructivist BLE course should focus on academic intervention and student improvement	1	2	3	4	5
7	In my view, teachers in constructivist BLE courses need to encourage online discussion and sharing	1	2	3	4	5
8	In constructivist BLE courses, the teacher needs to collaborate with students on their learning	1	2	3	4	5
9	In constructivist BLE courses, the teacher should communicate and share information	1	2	3	4	5
10	In my view, teachers should facilitate student engagement in the constructivist BLE courses	1	2	3	4	5
11	In my opinion, the teacher should design teaching and learning resources in constructivist BLE courses	1	2	3	4	5
12	In constructivist BLE courses, I think the teacher should plan, devise and improve course outline and contents	1	2	3	4	5
13	In my view, a teacher in constructivist BLE courses need to design student hands-on activities	1	2	3	4	5
14	In constructivist BLE courses, the teacher should plan what to teach and update teaching styles and approaches	1	2	3	4	5
15	In my view, in constructivist BLE courses, the teacher needs to develop online material easy to reuse and repurpose	1	2	3	4	5
16	I focus on issues that interest my students and me	1	2	3	4	5
17	I search for meaning with the issue I have to teach	1	2	3	4	5
18	I engage in critical thinking and reading before teaching	1	2	3	4	5
19	I make good sense of the student's messages	1	2	3	4	5
20	I use student portfolios to improve teaching performance	1	2	3	4	5
21	I use multiple approaches to meet my student preferences	1	2	3	4	5
22	I work in close collaboration with students both in and the out of the classroom	1	2	3	4	5

23	I encourage thoughtful reflection on experience	1	2	3	4	5
24	I try to build students cooperative and friendly relationship	1	2	3	4	5
25	I seek and use student feedback to improve my teaching	1	2	3	4	5
26	I stimulate student thinking and reasoning in my course	1	2	3	4	5
27	I discourage students poor performance in my course	1	2	3	4	5
28	I value student contribution, sharing and feedback	1	2	3	4	5
29	I intend to use the constructivist BLE in teaching activities	1	2	3	4	5
30	I communicate with the student to exhibit proper learning	1	2	3	4	5
31	I share problem-solving tactics with student					

Lead (1-5), Support (6-10), Design (11-15), Facilitate (16-20), Collabo (21-25), Motive (26-31)

Appendix: D Observation Sheet

Purpose: To determine the range of constructivist teaching and learning activities, practices and academic work that teachers do while engaging in BLE by collecting relevant data.

Instructions to observer:

Observers are advised to exercise great care, be clear and focused on the activities under study. Each observable behaviours and practices related to engagement practices, constructivist teaching and learning activities should be observed and reported. That is, observer stays at a point to observe information based on a checklist below.

Observation Checklist

Observable aspects	Insert a "√" in the most appropriate place		
		Observed	Not observed
Teacher actual classroom teaching	Encourage creativity		
	Critical thinking		
Teacher-student interactions	Online via eLearning		
	Offline		
Teacher as facilitates	Team learning		
	Participation		
	Share experiences		
Teacher teaching styles	Instructive		
	Interactive		
Approaches used to guide student learning	Student-centred		
	Teacher-centred		
Assessments modalities	Online assessment		
	Offline assessment		

Appendix E: Interview Guide Questions (IGQ)
Teachers' perceived roles and constructivist engagement practices in constructivist-based blended learning environment courses.

General interview tips:
Greetings, introduction and fine-tuning (state the objectives of the meeting and ensure confidentiality of data, get interviewees signed a consent form and gave a copy) (5 minutes).

Semi-structured interview guide questions (20 minutes)

1. How do you think what would be your perceived roles while teaching in constructivist-based BLE courses? (probing teachers' perceived roles).
2. Please, let me know how do you engage constructivist-based BLE courses? (probing teacher practices).

Chapter 7
General discussion and conclusion

Chapter 7
General discussion and conclusion

Abstract

In this closing chapter, we provide an abridgement, discussion and conclusion regarding the conduct of the dissertation. The chapter discusses the main findings corresponding to five specific research objectives and questions presented in chapter 1. The theoretical contributions and practical implications reported in the previous chapters are expounded. Lastly, the limitations of the studies, directions for future research and reflections on the use of constructivist-centred technology integration (CBLEs) in Tanzanian HEIs are ascribed.

1. Introduction

The aim to conduct this research project aligns with the general research objective, specific research objectives and research questions of the dissertation presented in chapter 1. The use of coherent and specific chapter orientation evolves from the theoretical background and research perspectives (constructivist epistemology) presented in chapter 1 (see Figure 1 in chapter 1). The dissertation focuses on three epistemological perspectives: student learning, teacher teaching and higher education learning environments (in this context CBLEs). All perspectives are in connection with constructivist beliefs and constructivist-centred technology integration in higher education. This dissertation is guided by the following primary research question: What are the students' and teachers' variables influencing their constructivist-centred technology integration in the context of Tanzanian HIEs? Seventeen research questions were formulated from five specific research objectives ahead of answering the main research question. In the dissertation, we used five specific research objectives as a blueprint for conducting five research studies.

2. Answers to the general research question

Five research studies were conducted based on specific research objectives ahead of answering the general research question. The first research study examined students' conceptions of learning approaches and their engagement in BLE learning activities. The second research investigated the relationship between students' conceptions of constructivist learning and their engagement in CBLEs at Mzumbe University (MU). MU was selected because of its considerable experience of using e-learning as a platform for blended learning delivery and its

proximity location to a country tech-startup-ecosystem in Dar es Salaam (World Bank, 2017). The third research investigated students' motivational factors to learn and their constructivist-based engagement in CBLE courses. The fourth research examined the relationship between teachers' beliefs and constructivist teaching practices (CTP) in BLE courses. The last empirical study examined teachers' perceived roles (TPRs) and their constructivist engagement practices in BLE courses.

Furthermore, the results of this research found appropriate students' and teachers' variables related to constructivist-centred technology integration in the context of Tanzanian HEIs. The results establish essential aspects of students' conceptions of learning approaches and constructivist learning in CBLEs. Further, findings related to teachers' beliefs, constructivist engagement and perceived roles in CBLEs are unveiled. It was found that students are motivated to engage in learning activities when support strategy is employed while teachers' perceived roles found to be a "supporter", leader and designer" in CBLEs. The PhD research results suggest that students' and teachers' variables are significant aspects regarding their engagement in constructivist-centred technology integration in the Tanzanian HEIs. In general, the findings reveal valuable students' and teachers' variables in relation to their engagement constructivist-centred technology integration in the Tanzanian HEIs. The summary of the research objectives and primary results are presented in the following section.

3. Summary of the research objectives and main results

The theoretical background presented in chapter 1 and the subsequent literature reviews in each research study identified essential student and teacher variables in the dissertation. In this dissertation, the unit of analysis included undergraduate university students, university teachers and learning environments (cf. CBLEs). While CBLEs cut across five studies reported in this dissertation, three studies (chapter 2, 3 and 4) focused on students' variables in HEIs who were engaging in CBLEs. The fourth and fifth studies (chapter 5 and 6) focus on university teachers' variables related to their engagement strategies and practices in CBLEs and related courses in HEIs.

In the first study (chapter 2), we examined three thematic areas including students' conceptions of learning approaches, student engagement in BLE learning activities and the relationship between student learning approaches and their engagement in BLE learning activities. Study two (chapter 3) focused on students' conceptions of constructivist learning, determinants of their engagement in a CBLE and how their constructivist conceptions could

relate to their engagement in a CBLE. As there are several motivational factors in place which could attract student engagement in CBLEs (Al-Huneidi & Schreurs, 2012; Russell, 2013), our third study (chapter 4), was set up to examine students' motivational factors, gender differences in motivational factors and engagement strategies, and the relationship between students' motivational factors and their engagement strategies in CBLEs.

The fourth study (chapter 5) assumed that knowing teachers' beliefs could determine their CTPs in CBLEs (Levin, 2015). As such, we dealt with university teachers' beliefs connected to their CTPs. Further, we examined how teachers' beliefs are related to their CTPs as well as the extent to which teachers' beliefs predict their CTPs in CBLEs. Diverse teachers' roles appear to influence teaching practices for many reasons such as additional roles based on pedagogic shifts and the incorporation of digital instructional technologies in their teaching and learning practices (Wang, 2001). Our fifth study (chapter 6) established different TPRs and teachers' constructivist engagement practices.

Moreover, the gender difference was analysed to establish which observed perceived roles differed based on gender. The relationship between TPRs and their constructivist teaching practices were divulged. In the final analysis, predictors of teachers' constructivist engagement practices were divulged. In chapter one, 17 research questions were addressed. The main results regarding the 17 research questions are presented in the subsequent paragraphs.

RO 1: examines students' conceptions of learning approaches and their engagement in BLE learning activities

Chapter 2 reported findings based on 446 undergraduate students from two universities in Tanzania. Descriptions regarding the selection of the students and universities are presented in chapter 2, which was based on a survey conducted to answer three research questions raised specifically to address research objective one (RO1). The main findings for each research question under RO 1 are specified hereafter.

RQ 1: Means scores and bivariate correlation were analysed to determine students' conceptions of surface, deep and strategic learning approaches. The results show that Tanzanian students hold three conceptions of learning approaches including strategic approach, deep approach and surface approach. Our findings support other studies that find that diverse learning approaches tend to serve different levels of knowledge attainment and subject matter (Hattie & Donoghue, 2016); our results also indicate that students who hold constructive conceptions about strategic approaches also hold conceptions of deep and surface learning approaches.

RQ 2: Findings indicate that students have almost the same high level of engagement in BLEs including group work, assessments, learning community and interactions in BLEs. The results further show four BLE learning activities that students engage statistically significant correlate to one another. That is, students who engage in one type of BLEs learning activities also engage in other types of BLEs learning activities.

RQ 3: We examined whether different students' conceptions of learning approaches can predict their engagement in BLE learning activities. The results indicate that students' conceptions of deep learning approach can significantly predict interactions, learning community and group work activities in BLEs while the conceptions of strategic learning approach can predict interactions, learning community and assessments learning activities. However, the result shows that the conceptions of surface learning approach cannot predict student engagement in BLE learning activities, thus suggesting that the students with surface learning approach were less likely to engage in BLE learning activities.

RO 2: investigate the relationship between students' conceptions of constructivist learning and their engagement in a constructivist-based blended learning environment

In the context of this dissertation, a mixed-method research design with multiple data collection techniques was used including interviews and a self-developed survey instrument. Objective two was achieved through three research questions (RQs) were addressed. Further, 772 undergraduate students based at the Mzumbe University participated in this research.

RQ 4: Three subscales were set to measure students' conceptions of constructivist learning (i.e. self-directed, active participation and shareable experiences) in a CBLE. The findings reveal that students hold several conceptions of constructivist learning such as, "self-directed learning", "active participation" and "shareable experiences". The findings also disclose that students' conceptions of constructivist learning in a CBLE statistically significant correlate to one another. Furthermore, interviews the findings indicate that students have robust conceptions of constructivist learning as they admit to engaging in academic works. Similarly, the findings show that students divulged that they participate in meaningful learning through direct engagement in learning activities both online and offline.

RQ 5: To understanding the extent of student engagement in a CBLE, four CBLE activities (i.e. group work, interactions, learning communities and assessments) were examined. The results indicate that group work has a high level of engagement, which is followed by a learning community, and then assessments and interactions in tandem. The results divulge that four

CBLE learning activities that students engage in are significantly correlated to one another. Interview results show that 95% of interviewed students explicitly state that they are engaging in group work, 65% in learning communities, 95% in assessments and 80% in interactions.

RQ 6: The results show that there is a significant relationship between students' conceptions of constructivist learning and their engagement activities in a CBLE. The results further indicate that constructivist learning dimensions (shareable experiences and active participation) predict interactions, explaining 10.1% of the total variance. Also, we found that constructivist learning constructs (active participation and self-directed) predict learning community (explaining 8.6% of the total variance); Further constructivist conceptions (shareable experiences and active participation) predict assessments (explaining 8.5% of the total variance); Finally, we found that constructivist learning conceptions (shareable experiences) predict group work (explaining 3.5% of the total variance), respectively. Surprising, interview results indicate an explicit relationship between students' conceptions of constructivist learning and their engagement in CBLE activities. Similarly, observed data show students engage in diverse constructive activities such as online discussions, while at the same time performing group assignments, and seeking clarifications and explanations from their peers and teachers, which is one of the constructivist principles. The overall findings divulge that students' conceptions of constructivist learning are related to their engagement in CBLE activities.

RO 3: studying the relationship between student motivational factors to learn and their constructivist-based engagement in CBLE courses

In this research objective, four motivational factors (cf. extrinsic, task value, self-efficacy and intrinsic) and three engagement learning strategies (cf. supporting, capturing and fascinating) were examined. The results are addressed hereafter.

RQ 7: The results show that although Tanzanian examined university students are more subject to extrinsic motivation, other motivational factors such as task value, self-efficacy and intrinsic motivation are also present students' motivational factors to learn in CBLEs. Similarly, we found that although students use diverse engagements strategies in CBLEs such as supporting, capturing and fascinating, they are likely to engage in CBLEs when support strategy is applied. The results suggest students use several engagement strategies such as supportive, capturing and fascinating learning strategies.

RQ 8: The results show insignificant gender differences in motivational factors to learn in CBLEs among students. The results further reveal that female students score higher levels on

all engagement strategies than male students, and that Tanzanian university students are likely to use different engagement learning strategies regarding their gender groups. Similarly, slight gender differences were found among gender categories regarding their engagement learning strategies in CBLEs.

RQ 9: Our results reveal that students' motivation factors to learn was statistically significant correlated to their engagement strategies in CBLEs. That is, examined Tanzanian university students with diverse motivational factors are likely to learn in CBLEs. The findings further show that the higher the motivational factors to learn, the higher the engagement strategies in CBLEs. Observation results show that students utilised available universities ICT services, facilities and infrastructures (i.e. the Internet, computer labs, e-books, online and e-learning) and ICT devices. They were observed engaging in online learning through university learning platform as well as university computer labs. In short, diverse factors motivate students to learn with diverse engagement strategies in CBLEs.

RO 4: examine the relationship between teachers' beliefs and constructivist teaching practices (CTP) in BLE courses

In this research objective, we examined Tanzanian university teachers' beliefs alongside their constructivist teaching practices in BLE courses. As such, the following three research questions assisted the collection of the findings.

RQ 10: Analysis of teachers' beliefs who teach BLEs courses were subject to mean scores. The results indicate that the Tanzanian university teachers are likely to have two kinds of beliefs when engaging in BLE courses which are "course management" and "teaching methods". The results suggest that the Tanzania university teachers engage in BLEs due to their beliefs on teaching methods used and course management.

RQ 11: Three university teachers' CTP were identified (i.e. supportive teaching, explicit engagement and interactions). The results indicate that teachers who teach BLE courses do employ CTP in different levels as suggested by the mean scores. The results show that Tanzanian university teachers are likely to practice supportive teaching, explicit engagement and interactions in BLE course.

RQ 12: Gender differences in teachers' beliefs were examined through descriptive statistics (i.e. median) and a Mann-Whitney U test. The findings indicate no differences between gender groups regarding the university teachers' beliefs in BLE courses. That is, the university teachers' beliefs were the same across gender categories. Moreover, the findings through

Kruskal-Wallis H divulge that there is no difference in the university teachers' beliefs across the different educational levels, academic ranks and teaching experiences. In short, the results indicate that the university teachers' beliefs and their CTP in BLE courses are the same across categories of gender, educational level, academic rank and teaching experiences.

RQ13: The overall results show that the university teachers' beliefs statistically significantly correlated to their CTP in BLE courses. Surprisingly, the results indicate that although the university teachers are practising CTP "supportive teaching" and "explicit engagement", little is reported about "interactions" in BLE courses. As a result, multiple linear regression was used to predict the interrelationship between teachers' beliefs and CTP using one of the teachers' beliefs as the dependent variable with a set of CTPs as independent variables. The findings indicate that teachers' beliefs are statistically significant predictors of explicit engagement (explaining 50.5% of the total variance) and supportive teaching (explaining 37.6% of the total variance) in BLE courses. Although CTP ("course management") significantly predicted interactions with 17.3% of the total explained variance, teaching methods did not predict interactions. In short, a positive relationship exists between teachers' beliefs and their CTP in BLE courses.

RO 5: studying the relationship between teachers' perceived roles and their constructivist engagement practices in CBLE courses

Three research questions were addressed to achieve RO 5, which could yield important findings related to Tanzanian university teachers' perceived roles (i.e. leader, designer and supporter) as well as their constructivist engagement practices in CBLE courses. We collected data from 261 Tanzanian university teachers from ten HEIs using a mixed-methods research design with multiple data collection techniques. The main findings are presented hereafter.

RQ 14: The findings show that Tanzanian university teachers are likely to perceive their role as that of a "supporter" compared to a "leader" and a "designer", respectively. The findings further report positive correlations between three teachers' perceived roles, suggesting that university teachers perceive that they hold more than one role in CBLE courses. Findings from interviews reveal that in CBLE courses, teachers perceive holding diverse roles as they facilitate, collaborate and motivate authentic learning experiences. As such, cognitive guide, supporter, leader, designer, developers and assistance are frequently in teachers' mouths.

RQ15: The results indicate that collaboration scores the highest mean among teachers' constructivist engagement practices. As such, all teachers' constructivist engagement practices

are high with a mean above average, indicating that Tanzanian university teachers who are likely to practice collaboration also facilitate constructive discourse and motivate authentic meaning-making in CBLE courses. The results also show that Tanzanian university teachers are likely to engage in direct instruction through lectures, facilitating tutorials and, somewhat, via online discussion forums. The findings divulge that Tanzanian university teachers engage in CBLE courses since they enhance sharing diverse curriculum contents, communication and interactions with the students.

RQ 16: In this research, we examine gender differences among teachers' perceived roles in CBLE courses assuming that teachers are self-regulated regardless of their age, level of education and seniority, but who somewhat tend to impose gender issue on their roles. The results show no differences in gender categories among teachers' perceived roles in CBLE courses. Our research findings indicate that Tanzanian university teachers constructively engage in CBLE courses regardless of their gender identity because teachers' roles have nothing to do with their gender categories.

RQ 17: The findings reveal that teachers' perceived roles significantly predict facilitation, motivation and collaboration. As such, facilitation explained 47.5% of the total variance, motivation explained 35.6% of the total variance, and likewise, collaboration explained 33.2% of the total variance. The results also are supported by a standard error of the estimate ($\sigma_{est.}$), which measure the accuracy of predictions (facilitation, $\sigma_{est.}$=.463; motivation, $\sigma_{est.}$=.536 and collaboration $\sigma_{est.}$=.514). In summary, our findings supported the predictions that TPR constructs are related to their constructivist engagement practices in CBLE courses.

4. General discussion

In this subsection, we discuss general findings related to studies on students' variables addressed in chapters 2, 3 & 4 as well as the findings related to studies on teachers' variables addressed in chapters 5 and 6.

Students' conceptions of learning approaches and their engagement in blended learning environments

Students' conceptions of learning approaches play a significant role in evaluating and assessing their intention to engage in BLE learning activities. In this dissertation, the following students' conceptions of learning were reported: surface, deep and strategic learning approaches. This indicates that even in poor resource context like that of Tanzania, students vary in their

conceptions of learning approaches in technology-enhanced learning environments. The reason might be because of many factors including educational and sociocultural background, recent learning experiences, the topic under study, design features, instructional strategies and teachers' teaching styles (Frey, Fisher & Hattie, 2017). Also, In the context of Tanzanian universities, students are exposed to diverse background learning belief systems including that of international schools which are well-established regarding teaching and learning resources and other from community schools with lack of innovative teaching and learning resources and traditional belief learning system. However, our findings indicate that students are likely to engage in BLE learning activities that promote meaningful learning. That is, surveyed university students were engaging in BLE learning activities to achieve intended learning outcomes.

The results seem to confirm Tanzanian university students with different conceptions of learning approaches are likely to engage in diverse BLE learning activities. The findings offer new insights that there are neither self-sufficient learning approaches nor BLE learning activities in all learning context, and that, we need to rethink different sociocultural background and context of which teaching and learning are provided. Our research supports the idea that students hold diverse conceptions of learning approaches, although its applications are shaped by many factors including learning environments, recent learning experiences and sociocultural background knowledge, and technology used (Hattie & Donoghue, 2016). Moreover, an idea of interest is that to improve students' engagement in BLEs learning activities, it is essential to understand how they conceive diverse learning approaches in different learning contexts. Therefore, our findings add to the available literature that students' conceptions of learning approaches and their engagement in BLE learning activities vary depending on several factors including student ability, socio-cultural background, teaching styles, learning environments and the nature of learning activities.

Students' conceptions of constructivist learning and their engagement in CBLEs

The results show that measured Tanzanian university students comprehend constructivist learning as active participation, self-directed learning and shareable experiences while engaging them in CBLEs. That is, students who actively participate in teaching and learning process they tend to share learning experiences with their colleagues. The results of the current study found a positive relationship between students' conceptions of constructivist learning and their engagement in CBLEs. In other words, students with constructivist learning conception actively

participate in collaborative learning, share learning experience and maximise their learning times through self-directed learning in which students engage more with real problems via meaningful learning activities such as interactions, peer assessments, learning community and group work. Our findings support the idea that students' learning conceptions are the critical success factor in how far they engage in CBLEs (Kahn, Everington, Kelm, Reid, & Watkins, 2017). The finding supports that well-established instructional activities such as group work, peer assessments and online and offline discussions determine student engagement in CBLEs.

These results influence effective online and offline interactions between teacher-students and student-student to strengthen student engagement in CBLEs, hence improving learning performance. Our results further indicate that students complained about delayed feedback due to traditional modes of assessments. This seems to be true because, in a large classroom of about 200 to 350 students like in the context of the study, it would be tedious for a single teacher to finalise marking all exams scripts with only two weeks as required by some of the university students-by-laws. As it was observed in most exams questions and students works, students were required to compose long answers of about 3-5 pages. In exams, students were required to do at least 3 to four essay questions in a single sitting. This is because some teachers rely on traditional evaluation methods including paper-based tests, quizzes, group work and individual projects. However, some interviewed students who were engaging in CBLEs declared that they do so because of multiple assessment strategies and timely feedback which help them to improve their learning strategies.

Students' motivational factors to learn and their constructivist-based engagement strategies in CBLEs

The results show that surveyed university students use different motivational factors to learn in CBLEs such as intrinsic, extrinsic, self-efficacy, and task value. In other words, the use of different motivational factors influences students' different engagement strategies in CBLEs. Alternatively, the findings indicate that surveyed Tanzanian university students are involved in CBLEs due to external factors such as instructional strategies, good grades, learning conditions, educational technologies and assessments. Although, this is not the case for all Tanzanian students, but only students under this study, the reasons among other might be due to the nature of teaching styles, student-learning background, insufficient teachers' knowledge to execute CBLEs. In our findings regarding gender differences, we found no gender differences in motivational factors in CBLEs. The underlying reason is that other factors perhaps determine

successful student learning in CBLEs such as instructional strategies and teachers' perceptions. Our findings add useful evidence-informed insights into the existing knowledge regarding gender issues, motivational factors and engagement strategies in CBLEs and particularly in poor resource contexts. Moreover, the study contributes new knowledge on how students should be assessed in the context where constructivist centred-learning technology is applied. The study also adds valuable contributions regarding students expectations based on the school work and that they expect timely feedback in both traditional face-to-face learning environments and technology-enhanced learning environments.

Furthermore, the findings indicate that students' motivational factors significantly predict their engagement learning strategies in CBLEs. This implies that several factors are in line with students' motivational factors in CBLEs including collaborative learning and the availability of ICT devices, services, facilities and infrastructures. However, our findings go further and indicate that with available ICT support services, students are likely to engage in both personalised and collaborative learning activities through diverse strategies. This study contributes tan understand that motivational factors to learn in CBLEs specifically in the context of Tanzania whereby most of the students engage in traditional instructional methods are in tandem with several factors such as student learning experiences and availability of innovative learning resources.

Teachers' beliefs and their constructivist teaching practices in CBLE courses

The results show that teachers' beliefs (cf. teaching methods and course management) are central to their teaching and learning practices in CBLE courses. Teachers' beliefs within constructivist, collaborative and personalised learning principles with the students' abilities, help their students to manage many challenges related to the complexities of course management and teaching methods. Teachers' beliefs enhance interactivity, participation and engagement in effective forms of teaching and learning (Levin, 2015). The findings suggest that teachers' beliefs play a significant role in promoting CTP in CBLE courses. In other words, teachers' beliefs seem to influence their adoption, deployment and implementation of CBLE courses because such beliefs may assure quality teaching and quality course management. On the one hand, it was found that surveyed university teachers use diverse teaching methods and course management strategies believed to support them to accomplish their responsibilities. On the other hand, surveyed university teachers identified that explicit engagement and supportive teaching are central practices they do employ while coordinating CBLE courses. Our results

show no differences in teachers' beliefs and their CTP in CBLE courses for gender, academic rank, educational level and teaching experience. In other words, surveyed Tanzanian university teachers' beliefs related to their CTP in CBLE courses regardless of their diverse characteristics. This finding adds new knowledge that differences in gender, educational level, academic rank and teaching experience do not automatically lead to changes in their beliefs in technology-rich environments courses. This also justifies the research focusing on teachers' beliefs as essential indicators of quality constructivist teaching in technology innovative pedagogy.

The results of the current research indicate that there is a significant correlation between teachers' beliefs and their CTP in CBLE courses. This result may have been due to several teachers' beliefs including teaching methods, student learning, course management, curriculum and pedagogy (Levin, 2015). The finding adds to the literature the idea that university teachers who possess constructivist teaching and learning beliefs use the same perspectives as they practice teaching in CBLE courses. It is important to note that understanding teachers' beliefs and their CTP in CBLE courses might help to improve their teaching and learning experiences in technology-enhanced environments. In the context of the study, we argue that these beliefs (teaching methods, course management) should be encouraged at the beginning of CBLE courses designing, planning and after reviews for successful implementation.

Surprisingly, our results about teachers' beliefs in "teaching methods" do not predict interactions practices in CBLE courses because we expected that teachers who embrace innovative teaching and learning methods are more likely to attract interactions in CBLE courses. The results might have been influenced by the sample and research context as well as the most practised teaching philosophy (i.e. direct instruction) which seem to influence the teaching and learning process in the context of the study. This finding offers new insight regarding the design and implementation of the CBLE courses in the context of this research. The findings add more valuable information that teaching methods in not only aspects that influence interaction in courses taught in constructivist-centred learning technology environments. The results show that we cannot ignore teachers' sociocultural backgrounds during the planning and design stages; as such, Tanzanian university teachers' teaching methods seem to be established in teachers' minds, which seems to be a challenge in adopting digital instructional technologies with an emphasis on constructivist student-centred learning.

Teachers' perceived roles and their constructivist engagement practices in CBLE courses

Tanzanian university teachers are perceived to execute diverse roles as they facilitate, collaborate and motivate authentic learning in CBLE courses. A teacher who is likely to facilitate discourse is expected to constructively engage in either collaborative learning or motivating authentic learning experiences. The results of this research indicate that TPRs are significantly related to their constructivist engagement practices in CBLE courses. Teachers' roles are a significant factor in addressing what teachers do in CBLE courses. Our findings are concomitant with the assumption that teachers who demonstrate a leadership role while engaging in CBLE courses efficiently facilitate good discourse as they are used to collaborating and sharing useful, thoughtful knowledge in well-coordinated CBLE courses (Edgenuity, 2017). The findings show that Tanzanian university teachers are likely to be leaders, designers and supporters in CBLE courses; they tend to practice collaboration, facilitation and motivation as their central constructivist engagement practices.

The results of the current research on gender difference regarding TPRs indicate that both female and male teachers execute their perceived roles (cf., leader and designer) in the same way. This finding is in line with those of Adas and Samais (2011), who report no significant differences between teachers (females and males) in BLE courses. The results further find that male teachers are perceived slightly as supporters compared to female teachers. This is because males prefer face-to-face, blended learning components. This finding supports and extends previous research addressing the absence of gender difference in motivation (Fryer & Bovee, 2016).

The findings also show that Tanzanian university teachers who tend to apply facilitation are also constructively engaging in collaboration and motivation aspects. Previous findings also suggest that CBLEs attract teachers' constructivist engagement practices (CEPs) and, henceforth, accelerate achievement of intended learning outcomes and strengthen teachers' functions (Kwan & Wong, 2015). An educative note is that TPRs enhance constructive engagement in CBLE courses in a way that strategically offers instructions to the needs of the students and saves both teachers and students learning time. It was observed that the availability of both pedagogical and technological support regarding CBLE courses including collaborative learning experiences, the design of digital contents and availability of internet services enhance teachers' understanding of their roles in technology-enhanced-learning environments. This is because, with reliable internet and related support services, teachers are likely to facilitate discourse at a distance, design and implement learning activities and assignments, and attend both online and offline group work and team learning.

5. Theoretical contributions and practical implications of the findings

Based on the research findings highlighted, this dissertation provides theoretical contributions and practical implications on how to execute CBLEs under the current rapid increasing desire of HEIs in developing countries to engage in digital instructional technologies practices.

5.1 Theoretical contributions

This dissertation provides several theoretical contributions regarding multiple identified student and teacher variables related to constructivist-centred technology integration (cf. CBLEs) in the context of the Tanzanian HEIs. The research studies contribute to the understanding of how student learning approaches are applied, used and implemented in the context of blended learning and BLEs, not only in the surveyed Tanzanian universities but also in other related contexts such as universities utilising constructivist-centred technology integration as well as BLEs. The use of relevant learning approaches in BLEs strengthens and enlighten our understanding of how learning approaches should be dealt, applied and practised in the context of higher education with related characteristics. Also, the dissertation contributes to the growing body of literature on an understanding of relevant engagement learning activities implemented in BLEs.

The current research contributes literature to the growing constructivist-based blended pedagogy in research are which accommodate constructivist-centred technology integration. Moreover, understanding of students' conceptions of constructivist learning, motivational factors, engagement learning strategies and CBLE activities in HEIs sharpen our knowledge regarding studied variables such as active participation, shareable experiences and self-directed learning. Indeed, the research also provides an in-depth understanding of gender differences regarding student and teacher variables such as engagement learning strategies and practices. The research studies make significant theoretical contributions to curriculum developers, teachers, instructional designers and educational policymakers regarding their accountability in the design and execution of CBLEs by considering stakeholders' concerns.

The research studies also contribute to the knowledge base about constructivist teaching practices that influence inquiry-based teaching among teachers and enhance their beliefs about teaching and learning practices in CBLE courses. Also, the findings add to the literature new understandings about teachers' beliefs, which are connected to their knowledge about interactive teaching and learning practices in the context of Tanzania higher education. Lastly, the results contribute to the theoretical understanding of influential factors that attract teachers'

constructivist engagement practices, pedagogies of engagement that encourage the use of collaboration, team learning and motivation among teachers in CBLE courses.

5.2 Practical implications

The presented research studies provide the following important practical implications for teaching and learning practices in CBLEs in the context of Tanzania HEIs. First, the findings indicate that investigated Tanzanian students employed several learning approaches as they engaged in BLEs. As a result, any attempt to implement constructivist-centred technology integration in HEIs need to take account several students' learning approaches. That is, an attempt to activate students' higher order thinking in CBLEs, through more space for interactive learning opportunities should encourage. The research studies strengthen the idea that HEIs should align university teachers' continuous professional training with innovative, practical skills that link learning approaches and BLE activities. Hence, university teachers should be able to encourage student engagement in diverse learning activities through several learning approaches.

Second, the findings provide practical implication to university teachers in the context that most of the learning activities, curriculum and syllabi should be designed to reflect both teachers and students are teaching and learning context. As such, designed context-based learning activities assist and develop student ability to engage in meaningful learning in CBLEs. The research implies that active participation, self-directed learning and shareable experiences are important requirements while thinking to implement CBLEs. However, teacher professional development trainingg courses related to constructivist-centred technology integration need to be provided for appropriate knowledge acquisition among teachers, hence motivate student engagement in CBLEs.

Third, our research findings implies that motivational factors should be used to strengthen student's engagement learning strategies in CBLEs and related courses. Moreover, Tanzanian university teachers implementing constructivist-centred technology integration are urged to have a reflective research agenda that considers multiple motivational factors, engagement strategies and students' background characteristics while implementing CBLEs. The findings will help teachers' reflection on student engagement learning strategies to increase awareness of what motivates students to engage in CBLEs.

The fourth practical implication is that Tanzanian university teachers' teaching methods and course management need to be aligned with their teaching practices for successful teaching

and learning in CBLEs. That is, teachers' beliefs and engagement in CBLEs depends on numerous factors including flexibilities among university teachers and HEIs' utilisation of available innovative resources such as virtual laboratories. Also, research studies imply that for practical reasons teacher education programmes should be designed to influence teachers' appropriate constructivist engagement practices. In other words, for effective teaching practices in CBLEs, teacher education should align with teachers' beliefs in order to yield meaningful learning. Indeed, the research provides an in-depth understanding of gender differences regarding constructivist engagement practices in CBLE courses, and that for practical purposes there is no need to assign teacher roles based on gender groups in CBLEs teaching and learning processes.

The research also implies that knowledge construction rests on teachers' responsibilities in an attempt to assist students' authentic learning in CBLE courses and the design of appropriate constructivist engagement practices. Furthermore, the research studies imply that for effective teaching and learning in CBLE courses, university teachers should invest significantly as a supporter, leader and designer, respectively. The adoption of CBLEs in some Tanzanian universities goes in tandem with teachers' passion for practical technology use with hybrid pedagogy. As such, by taping the benefit of implementing CBLEs, a reflective practitioner approach should be applied to engage appropriate stakeholders from planning stages to delivery of the most practical results

6. Limitations, prospective research and recommendations

6.1 Limitations of the studies and prospective research

The research has several limitations that need to be addressed in future research. The sample of the research was based on a limited number of HEIs implementing blended learning and mostly CBLEs related courses in Tanzania. However, it should be noted that the sample and HEIs are consistent with the characteristics under consideration, but an attempt to generalise these findings to other population should be taken with caution. Although we hope that this research provides useful insights regarding student and teacher variables in CBLEs, the number of students, teachers, courses and HEIs used prevented the drawing of broad generalisations. Therefore, future empirical studies need to be aligned with diverse educational institutions which do not have similar characteristics to replicate the findings. Moreover, to deliver the most practical results, multiple large and small-scale research in HEIs is still needed.

The second limitation is concerned with student variables (i.e. motivational factors, engagement strategies, constructivist conceptions and engaging learning activities), which seem to be limited to understanding general aspects of student learning in CBLEs in the context of Tanzanian HEIs. As such, efforts towards analysing more variables in diverse educational contexts such as environmental factors, satisfaction and dissatisfaction with CBLEs is therefore needed. The research is also limited to general CBLEs in HEIs; further research is needed focusing on other aspects of technology-enhanced learning environments such as the design feature of CBLEs, measuring appropriate blended learning models and e-learning environments. Therefore, research studies should focus on involving a more substantial number of respondents and universities with different characteristics (cf. within the municipality, regional and international).

As illustrated in chapter 5, CTPs might be the same, however, BLE courses may vary due to different national and transnational criteria including university teachers' education programmes, teaching philosophy, technological advancement, education policies and systems. Future research should be directed towards analysing multiple CTPs and BLE related course criteria to generate sound cumulative impacts of implementing CBLEs. To better understand the influence of teachers' beliefs and their CTPs in BLE courses, future research should focus on examining factors related to teachers' knowledge, instructional support, supportive activity and teachers' self-actualisation in their beliefs and practices so as to encourage inquiry-based teaching and teacher-effective teaching.

As a methodological challenge, a mixed method research design was used with multiple data collection and analyses in some studies (i.e. chapters 2, and 5, 6), but not in all studies and variables. For example, qualitative methods were used to triangulate quantitative data in some variables because of the nature of the research questions and data in the request. The research used limited qualitative data analysis such as content analysis of the interview and observation; future research could include comprehensive analysis.

6.2 Recommendations for university teachers, higher education institutions policymakers and constructivist-based blended learning practitioners

Research on student and teacher variables in CBLEs in the context of higher education in Tanzania provides valuable insights regarding student and teacher teaching and learning processes. The research suggests that students' and teachers' constructivist conceptions, learning approaches, engagement strategies, beliefs, teaching practices in HEIs need attention

from the early stage of integrating constructivist-centred technology (cf. CBLEs). This is to encourage students' engagement and teachers' practices in CBLEs. However, the following recommendations are provided to university teachers, e-learning systems users, blended learning champions, HEIs and CBLEs' instructional designers:

- Students and teachers need to have appropriate knowledge, facilities, devices and support services for successful engagement in CBLEs from the beginning, since, enables students to grasp concepts easily and teachers connect theory and application proficiently.
- Students need to know that learning is ultimately their own responsibility and that their own meaning-making facilitates an in-depth understanding of subject matter for their lifelong learning.
- Tanzanian teachers should their beliefs about teaching and learning affect their teaching and learning in constructivist-centred technology integration environments. As a result, is recommended teachers' beliefs (cf., teaching methods and courses management) should be aligned with their engagement practices.
- The research recommends that HEIs in Tanzania allocated appropriate funds for teacher continuous professional development regarding the implementation of constructivist-centred technology integration environments.
- Tanzanian HEIs and university teachers who teach in constructivist-centred technology integration environments should make sure that students are skilful and knowledgeable in using instructional technologies and related learning environments so as to effect meaningful learning.

In Tanzanian HEIs where blended learning and CBLEs' utilisation are in the middle stage of operation, teachers need to align their beliefs and practices with constructivist principles and digital learning technologies

6.3 Reflections on the use of blended learning and CBLEs in Tanzanian HEIs

As of 22nd February 2016, Tanzania had about 49 HEIs (cf. public and private universities, university colleges and institutes) permitted to offer both undergraduate and postgraduate programmes (TCU, 2016). Intrinsically, the PhD research findings reveal that few Tanzanian universities have been implementing blended learning and constructivist-centred technology integration environments (i.e., CBLEs) concurrently. Moreover, it has been found that

Tanzanian universities' e-learning systems (mostly Moodle) have been used as a blended learning platform for both BLEs and CBLE courses (Mwalumbwe & Mtebe, 2017).

The findings indicate that most implemented blended learning courses, e-learning systems and CBLEs users have been associated with the following Tanzanian universities: Mzumbe University, the University of Dar Es Salaam, Mbeya University of Science and Technology, Sokoine University of Agriculture, Kilimanjaro Christian Medical University College, the Open University of Tanzania and the University of Dodoma. On top of that, in this PhD research project, we found that although there is a growing concern among Tanzanian universities to deploy and implement digital instructional technologies, blended learning and constructivist-based blended learning, students' and teachers' lack of know-how, technical support, awareness and infrastructural resources, to some extent, impinge upon the use of both blended learning approaches and CBLEs. In this regard, studies related to blended learning, e-learning implementation, constructivist pedagogy and innovative digital instructional technologies in Tanzanian universities support the results of this PhD (Mwalumbwe & Mtebe, 2017; Raphael, 2016). On the one hand, with an increase in technology use, blended learning support services, infrastructural facilities and continuous professional development provided to teachers and students, the adoption and implementation of blended learning and CBLEs in Tanzanian universities will continue to grow drastically. On the other hand, an increase of research on students and teachers' constructivist conceptions, engagement strategies, constructivist practices, and beliefs, as well as blended learning and constructivist-based blended learning, will enhance the appropriate design of context-based blended learning activities and authentic teaching and learning in Tanzanian universities.

Furthermore, the results of this PhD provide more insights related to students and teachers' variables, which open new avenues on how blended learning and CBLEs could be deployed and implemented in Tanzanian universities. This is because of other relevant existing studies (cf., Mahenge & Sanga, 2016) focus solely on the students' experiences, challenges, technology use, support services, satisfaction and academic achievements. In this way, the PhD results offer more aspects on blended learning and constructivist-based blended learning in such a way that the increased use of learning management systems and blended learning should go in tandem with students and teachers' conceptions, beliefs, engagement strategies, practices, teaching and learning activities and learning approaches. This is in line with the successful provision of quality higher education in Tanzanian universities in which blended learning approaches, and constructivist-based blended learning should not only be viewed through the lens of teachers

and students' technology use, but also the methodical and pedagogical aspects (cf. constructivist beliefs) in higher education teaching and learning processes.

However, in this research project, the results shed light on the design and development of context-based blended learning approaches and constructivist-based blended learning courses in Tanzanian universities because consideration of students and teachers' teaching and learning conceptions, beliefs, engagement strategies and practices need to be incorporated in the processes of blended learning curriculum planning, development and implementation. On that note, the CBLEs support the design of blended learning models, which take account of students and teachers' different technological and pedagogical variables. Moreover, in the end, teachers and students' variables (i.e. motivational factors, learning approaches, constructivist conceptions, beliefs, practices, engagement strategies and learning activities) should act as specific guidelines for HEIs in Tanzania. The PhD findings further propose that for successful engagement in CBLEs, both teachers and students are encouraged to utilise possible available opportunities such as infrastructural facilities, technical support services, technological and pedagogical resources bearing in mind that resources related to digital instructional technologies are always scarce.

7. Conclusion

This dissertation focused on students and teachers' variables related to CBLEs in the context of Tanzanian HEIs. The student variables studied revealed that in CBLEs student learning approaches, constructivist learning conceptions and motivational factors influence their engagement in diverse CBLE learning activities. Also, students' authentic learning in CBLEs is a result of appropriate engagement learning strategies. In this research, CBLEs offer suitable prerequisites for students to engage in higher order thinking, which enhances authentic student learning. Similarly, constructivist pedagogy in this research has been found to offer opportunities for engaging students in team learning and problem-solving.

Furthermore, we found that several motivational factors that promote authentic student learning in CBLEs such as their engagement learning strategies are subject to specific motivational factors. The research also found that students are more extrinsically motivated to engage in CBLE courses compared to other motivational factors; we found no gender difference in motivational factors. The research on teachers' variables concludes that teachers' beliefs play key roles in addressing teachers' practices and success in CBLE courses. As such, findings show a positive relationship between teachers' beliefs and constructivist teaching practices in

CBLE courses. The research also concludes that both female and male teachers perform diverse roles, which in turn influence their constructivist teaching practices in CBLE courses.

In summary, this PhD research offers specific, practical and theoretical insights to policymakers, HEIs, teachers and instructional designers that constructivist pedagogy, which should be seriously considered in twenty-first-century teaching and learning processes. Therefore, the following notable insights can be used for successful planning, development and utilisation of blended learning and constructivist-based blended learning in Tanzania. First, students' constructivist conceptions shed light on the understanding of their engagement in CBLEs. In this way, blended learning specialists should consider students' concerns while planning engaging blended learning programmes.

Second, learning approaches indicate students' ways and means of tackling educational problems in blended learning courses and CBLEs; hence, the findings of this PhD indicate that to achieve students' intended level of engagement in blended learning, and subsequently knowledge construction, blended learning courses should embrace deep learning approaches in higher education. Third, motivational factors indicate students' desires and concerns to learn and engage in CBLEs; therefore, this PhD research found that for meaningful knowledge construction, extrinsic motivation should act as an important bridge to intrinsic motivation among students engaging in the blended learning programme. Fourth, teachers' engagement strategies illustrate the tactics that teachers use to engage in CBLEs; as such, this PhD found that teachers' engagement strategies needed to be aligned with their beliefs in order to influence authentic learning. Fifth, it revealed that teachers' beliefs should be considered while developing and using blended learning and CBLEs, and how these beliefs are utilised to influence teachers' constructivist teaching practices. Finally, the dissertation provides theoretical and practical contributions to the understanding of diverse TPRs, which are notable aspects in blended learning and CBLEs. Teachers' perceived roles in CBLEs are found to influence their constructivist engagement practices in such a way that fosters teachers' innovative minds, adaptability and flexibility in digital teaching and learning environments.

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Summary

Constructivist-based blended learning environments in higher education: student and teacher variables in the Tanzanian context

In higher education, constructivist epistemology "constructivist theory of knowledge" is an established research field with several scientific research communities and related scientific studies. Constructivists focus on individual student engagement in the process of knowledge construction based on what is already known or prior acquired knowledge and skills. Despite extensive scientific literature and rapidly growing studies which integrate constructivist pedagogy and related digital instructional technologies, there is an increase of students and teachers being engaged and exposed to one of the following(s): digital instructional technologies, blended learning environments and/or constructivist pedagogy. In this dissertation, it is, therefore, argued that several gaps persist in and between constructivist pedagogy, digital instructional technologies and blended learning environments from local to global contexts. Though, when these teaching and learning praxes are combined to foster authentic learning in the 21st century, 'a constructivist-based blended learning environment'- "CBLE(s)" is preserved as an important educational environment. Indeed, for effective utilisation of CBLE(s), students and teachers need to be knowledgeable and demonstrate proficiency in the following ways. First, basic computer operational skills. Second, basic ICTs skills. Third, practical use of the internet. Fourth, the e-learning system evaluation skills, and lastly, pedagogical skills for both within and out of classroom management (Meiers, Knight & White, 2009).

This dissertation aims to unveil student and teacher instrumental variables related to their engagement learning activities, strategies and practices in CBLEs in the context of Tanzanian higher education institutions (HEIs). The dissertation contributes to the better understanding of these influential variables in CBLEs. In this dissertation, each chapter collects relevant data, presents and discuss findings based on students and teachers who were engaging in blended learning. In this dissertation, the general research question was: "What are the student and teacher variables influencing their constructivist conceptions, engagement learning activities, engagement strategies and practices in CBLEs in the context of Tanzanian higher education institutions?" Five research studies based on five specific objectives with 17 formulated

research questions (cf. chapter 1 - Table 2) were conducted. Likewise, the setting of the dissertation is articulated alongside with the research problem presented in chapter 1. The theoretical bases of the dissertation capitalise on the constructivist theory of knowledge (Bruner, 1960) and engagement learning theory (Kearsley & Shneiderman, 1998). These theories are the basis for five studies reported in this dissertation and aid in placing our research project from global to local research contexts. Also, the theories assist in explaining, developing and validating research assumptions relating to examining student and teacher variables in CBLEs in HEIs. The other part of chapter 1 offers the structural organisation of the dissertation and the conduct of five research studies.

In this dissertation, chapter 2 (study 1) examines students' conceptions of learning approaches (i.e., surface, strategic and deep) and their engagement in blended learning environments (BLEs) learning activities (i.e., group work, assessments, interactions and learning community). A survey conducted among 446 undergraduate students in two universities revealed that students had strong conceptions regarding learning approaches. The findings unveiled that strategic learning approach dominated deep and surface learning approaches. Also, the results indicated that students held a high level of engagement in group work activity compared learning community, assessments and interactive activities. The results indicated that students' conceptions of the deep learning approach could significantly predict interactions, learning community and group work activities and not assessments activity in BLEs. The students' conceptions of strategic learning approach could predict interactions, learning community and assessments are learning activities and not group work activity. However, the result showed that the conceptions of surface learning could not predict student engagement in BLE learning activities, suggesting that the students with a surface learning approach were less likely to engage in BLE learning activities. Therefore, the results are discussed based on both contributions and implications offered to the growing body of research in the field of blended learning.

Chapter 3 (study 2), investigates the relationship between students' conceptions of constructivist learning and their engagement in a CBLE. Students' conceptions of constructivist learning were measured by variables related to self-directed learning, active participation and shareable experiences while their engagement was subject to learning activities teacher use to influence constructivist teaching and learning including assessments, group work, interactions

and learning community. The findings disclosed that students had positive conceptions of constructivist learning and that they were engaged in a CBLE through multiple learning activities. The results further indicated a significant relationship between students' conceptions of constructivist learning and their engagement in a CBLE. The chapter revealed the importance of understanding students' conceptions before engaging them in diverse learning activities since their active engagement within a CBLE depends on their actual constructivist conceptions.

Chapter 4 (study 3), examines the relationship between student motivational factors to learn and their constructivist-based engagement strategies in CBLE courses. In this chapter, exploratory factor analysis (EFA) was used to identify presumed motivational factors and constructivist-based engagement strategies among students in CBLE courses. Further, multiple regressions analyses were used to identify the relationship between variables while confirmatory factor analysis (CFA) was used to validate the instrument, checking interrelationship among the observed motivational factors and constructivist-based engagement strategies. The findings revealed four factors structure related to motivational factors and three factors related to engagement strategies. The results showed that students were subject to several motivational factors although external factor dominates their motives to learn while support strategy was more preferred among constructivist-based engagement strategies in CBLE courses. The results regarding gender differences indicated that motivational factors had nothing to do with students' gender groups while slight gender differences were found between female and male students, with female students scoring high level of constructivist-based engagement in CBLE courses. Overall results showed that a significant relationship exists between students' motivational factors and their constructivist-based engagement strategies. Therefore, CBLE courses instructors are supposed to use appropriate instructional strategies to encourage students' intrinsic motivation since extrinsic motivation prolong the use of surface learning rather than deep learning.

Furthermore, chapter 5 (study 4), examines the relationship between teachers' beliefs (cf. teaching methods, course management) and constructivist teaching practices (cf. supportive teaching, explicit engagement and interactions) in BLE courses. The findings revealed that both teaching methods and course management are essential teachers' beliefs in BLE courses. As for teachers' constructivist teaching practices, the findings divulged that supportive teaching was more preferred compared to explicit engagement and interactions. The results also revealed

that teachers' beliefs were the same across categories of gender, educational levels, academic ranks and teaching experiences. The overall results indicated a positive relationship between teachers' beliefs and their constructivist teaching practices in BLE courses, in such a way that teachers' beliefs significantly predicted explicit engagement (50.5%), supportive teaching (37.6%) and interactions (17.3%) of the total explained variance. Indeed, for successful knowledge construction in BLEs courses, there is a need to align teachers' beliefs and their constructivist teaching practices.

Chapter 6 (study 5), discusses teachers' perceived roles and their constructivist engagement practices in CBLEs. A mixed-methods research design was used to collect data from 261 university teachers in ten higher education institutions. The findings provided a good rapport among identified three university teachers' roles, indicating that in CBLEs university teachers hold not only multiple roles but also various constructivist engaging practices including collaboration, facilitation and motivation. Also, gender differences were examined regarding teachers' perceived roles, and the results divulged no differences in gender categories. The findings unveiled the relationship between teachers' perceived roles and their constructivist engagement practices in CBLEs. The findings support the prediction that teachers' perceived roles should be in line with their constructivist engagement practices in CBLEs.

In chapter 7, an abridgement of the dissertation is offered alongside with the presented findings based on five studies (cf. chapter 2 to 6). The chapter addresses the main research objective, corresponding specific research objectives and research questions evolved from a critical analysis of the theoretical background and research philosophy guiding the dissertation. The main findings presented (in chapter 2 to 6) are discussed based on 5 specific objectives with comparable 17 specific research questions. On the one hand, general discussions provided crucial suggestions for both theoretical contributions and practical implications to university teachers, students, instructional designers, curriculum developers and most important HEIs embarking on implementing CBLEs. On the other hand, limitations are discussed in tandem with directions for future research perspectives. In the final analysis, the dissertation concludes that studied student and teacher variables about the implementation of CBLEs offer useful theoretical and practical insights regarding the appropriate use of the 21st-century learning skills in HEIs teaching and learning.

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Nederlandstalige samenvatting

Op constructivisme gebaseerde "blendedlearning" omgevingen in het hoger onderwijs: student- en docentvariabelen in de Tanzaniaanse context

In het hoger onderwijs is "constructivistische epistemologie" (constructivistische theorie van kennis) een gevestigd onderzoeksgebied met verschillende wetenschappelijke onderzoeksgemeenschappen en aanverwante wetenschappelijke studies. Constructivisten richten zich op de individuele betrokkenheid bij het proces van kennisconstructie op basis van het reeds gekende of wat waargenomen wordt. Ondanks uitgebreide wetenschappelijke literatuur en snelgroeiende studies, waarin constructivistische pedagogie en gerelateerde digitale instructietechnologieën zijn geïntegreerd, is er een toename van studenten en docenten die betrokken zijn bij en worden blootgesteld aan een van de volgende: digitale instructietechnologieën, gemengde leeromgevingen of constructivistische pedagogiek. In dit proefschrift wordt daarom beargumenteerd dat er meerdere hiaten bestaan in en tussen constructivistische pedagogie, digitale instructietechnologieën en gemengde leeromgevingen van lokale tot mondiale contexten. Hoewel, wanneer deze onderwijs- en leerpraktijken worden gecombineerd om authentiek leren in de eenentwintigste eeuw te beïnvloeden, dan wordt een 'constructivistisch gebaseerde gemengde leeromgeving' – "CBLE (s)" bewaard als een belangrijke educatieve omgeving. Voor efficiënt gebruik van CBLE (s), moeten studenten en leraren inderdaad op verschillende manieren deskundig zijn en vaardigheid demonstreren. Als eerste, basale computer-operationele vaardigheden. Ten tweede, basisvaardigheden voor informatie-communicatietechnologieën (ICTs). Ten derde, praktisch gebruik van internet. Ten vierde, software-evaluatievaardigheden.En ten slotte pedagogische vaardigheden (Meiers, Knight & White, 2009) voor zowel binnen als buiten de klasomgeving.

Dit proefschrift heeft tot doel om invloedrijke variabelen van studenten en docenten te onthullen met betrekking tot hun leeractiviteiten, strategieën en praktijken bij engagement in CBLE's in de context van Tanzaniaansehogeronderwijsinstellingen (HOI's). Het proefschrift draagt bij tot een beter begrip van deze invloedrijke variabelen in CBLEs. In dit werkstuk verzamelt elk hoofdstuk relevante gegevens en presenteert en bediscussieert het bevindingen op basis van studenten en docenten die aan blendedlearning deden. De algemene onderzoeksvraag luidde: "Wat zijn de variabelen van student en docent die van invloed zijn op hun engagement voor

onderwijs en leeractiviteiten, strategieën en praktijken in CBLE's in de context van Tanzaniaanse instellingen voor hoger onderwijs?" Vijf onderzoeken gebaseerd op vijf specifieke doelstellingen met 17 geformuleerde onderzoeksvragen (zie hoofdstuk 1 - Tabel 2) werden uitgevoerd. Eveneens wordt het kader van het proefschrift geschetst in combinatie met het onderzoeksprobleem dat in hoofdstuk 1 wordt gepresenteerd. De theoretische grondslagen van het werkstuk maken gebruik van de constructivistische theorie van kennis (Bruner, 1960) en de theorie van betrokkenheid bij leren (Kearsley & Shneiderman, 1998). Deze theorieën hebben betrekking op de vijf onderzoeken die hierin zijn beschreven en helpen ons onderzoeksproject te plaatsen in zowel globale als lokale contexten. De theorieën helpen ook bij het uitleggen, ontwikkelen en valideren van veronderstellingen met betrekking tot de student- en leraarsvariabelen in CBLEs in hogeronderwijsinstellingen. Het andere deel van hoofdstuk 1 geeft de structurele organisatie van het proefschrift en de uitvoering van de vijf studies.

In dit proefschrift onderzoekt hoofdstuk 2 (studie 1) de opvattingen van studenten over het typeleeraanpak (oppervlakte, strategisch en diepte) en hun betrokkenheid bij blendedlearning environments (BLEs) en leeractiviteiten (i.e. groepswerk, beoordelingen, interacties en leergemeenschap). Uit een enquête onder 446 studenten op twee universiteiten bleek dat studenten uitgesprokenopvattingen hadden over leerbenaderingen. De bevindingen onthullen dat de strategische leerbenadering de aanpak van diep en oppervlakte leren domineerde. We ontdekten ook dat studenten een hoge mate van betrokkenheid bij groepswerkactiviteiten hebben ten opzichte van leergemeenschappen, assessments en interactieve activiteiten. De resultaten gaven aan dat de opvattingen van studenten over de aanpak van diep leren de interacties, het leren van gemeenschaps- en groepswerkactiviteiten en niet de evaluatieactiviteiten in BLEs significant konden voorspellen. De opvattingen van de studenten over de strategische leerbenadering kunnen interacties, leergemeenschappen en evaluaties van leeractiviteiten voorspellen en geen groepswerkactiviteit. Het resultaat toonde echter aan dat de opvattingen over oppervlakte-leren de betrokkenheid van studenten bij BLE-leeractiviteiten niet konden voorspellen, wat suggereert dat de studenten met een aanpak van oppervlakte-leren minder snel betrokken zouden zijn bij BLEs leeractiviteiten. Daarom worden de resultaten besproken op basis van zowel de bijdragen aan als de implicaties op de groeiende hoeveelheid onderzoeken op het gebied van blendedlearning.

Hoofdstuk 3 (onderzoek 2) onderzoekt de relatie tussen de opvattingen van leerlingen over constructivistisch leren en hun betrokkenheid bij een CBLE. De opvattingen van studenten over constructivistisch leren werden gemeten aan de hand van variabelen gerelateerd aan zelfgestuurd leren, actieve participatie en deelbare ervaringen.Hun betrokkenheid was onderhevig aan de verschillende leeractiviteiten die docenten gebruikten om constructivistisch onderwijzen en leren te beïnvloeden, inclusief beoordelingen, groepswerk, interacties en leergemeenschap. De bevindingen onthulden dat studenten positieve opvattingen hadden over constructivistisch leren en dat ze betrokken waren bij een CBLE door middel van meerdere leeractiviteiten. De resultaten wezen verder op een significante relatie tussen de opvattingen van leerlingen over constructivistisch leren en hun betrokkenheid bij een CBLE. Het hoofdstuk onthulde hoe belangrijk het is om de opvattingen van studenten te begrijpen vooraleerze betrokken worden bij verschillende leeractiviteiten, aangezien hun actieve constructivisme afhankelijk is van hun feitelijke constructivistische opvattingen.

Hoofdstuk 4 (onderzoek 3) gaat in op de relatie tussen de motivatie-factoren van studenten om te leren en hun op constructivisme gebaseerde engagementstrategieën in CBLE-cursussen. In dit hoofdstuk werd een verkennende factoranalyse (EFA) gebruikt om veronderstelde motivatie-factoren, alsook op constructivisme gebaseerde strategieën voor betrokkenheid bij studenten in de cursussen van CBLE, te identificeren. Verder werden multipele regressieanalyses gebruikt om de relatie tussen de variabelen te voorspellen, terwijl er een confirmatieve factoranalyse (CFA) werd gebruikt om het instrument te valideren, nl. de onderlinge relatie tussen de waargenomen motivatie-factoren en op constructivisme gebaseerde engagementstrategieën te controleren. De bevindingen onthulden vier factoren die verband houden met motivatie-factoren en drie factoren die verband houden met engagementstrategieën. De resultaten toonden aan dat studenten onderhevig waren aan verschillende motiverende factoren, hoewel externe factoren hun aanpakdomineerden. Verder genoot de ondersteuningsstrategie meer de voorkeur onder de op constructivisme gebaseerde engagementstrategieën in CBLE-cursussen. De resultaten met betrekking tot genderverschillen wezen uit dat motivatie-factoren geen verband tonen met de gendergroepen van studenten. Dit terwijl er wel kleineverschillen werden gevonden tussen vrouwelijke en mannelijke studenten, waarbij vrouwelijke studenten een hogere mate van constructivistische betrokkenheid bij CBLEs scoorden. Algemene resultaten lieten zien dat er een significante relatie bestaat tussen de motivatie-factoren van studenten en hun op constructivisme gebaseerde strategieën. Daarom

wordt van instructeurs van CBLE cursussen verondersteld geschikte instructiestrategieën te gebruiken om de intrinsieke motivatie van studenten aan te moedigen, aangezien extrinsieke motivatie het oppervlakteleren stimuleertin plaats van diepgaand leren.

Verder onderzoekt hoofdstuk 5 (studie 4) de relatie tussen de overtuigingen van leerkrachten (zie lesmethoden, cursusbeheer) en constructivistische onderwijspraktijken (i.e. ondersteunend onderricht, expliciete betrokkenheid en interacties) in BLEs-cursussen. De bevindingen onthulden dat zowel de lesmethoden als het cursusmanagement essentieel zijn voor leraren in BLEs-cursussen. Wat de constructivistische onderwijspraktijken van leraren betreft, onthulden de bevindingen dat de ondersteunende leer meer de voorkeur had vergeleken met expliciete betrokkenheid en interacties. De resultaten toonden ook aan dat de overtuigingen van leerkrachten hetzelfde waren voor alle geslachtscategorieën, opleidingsniveaus, academische rangen en onderwijservaringen. De algehele resultaten wezen op een positieve relatie tussen leerkrachtenovertuigingen en hun constructivistische onderwijspraktijken in BLEs-cursussen, op een zodanige manier dat de overtuigingen van leraren significant expliciete betrokkenheid voorspelden (50.5%), ondersteunend onderwijs (37.6%) en interacties (17.3%) van de totaal verklaarde variantie. Voor succesvolle kennisconstructie in BLEs-cursussen, is het nodig om de overtuigingen van leraren en hun constructivistische onderwijspraktijken op één lijn te brengen.

Hoofdstuk 6 (onderzoek 5) bespreekt de gepercipieerde rollen van leraren en hun constructivistische engagementspraktijken bij CBLEs. Een “gemengde methoden” onderzoeksontwerp werd gebruikt om gegevens te verzamelen van 261 universitaire docenten in tien instellingen voor hoger onderwijs. De bevindingen leverden een goede samenhang op tussen de drie geïdentificeerde rollen van universitaire docenten, wat aangeeft dat universiteitsdocenten in CBLEs niet alleen meerdere rollen vervullen, maar ook verschillende constructivistische boeiende praktijken beoefenen, waaronder samenwerking, facilitering en motivatie. Ook werden sekseverschillen onderzocht met betrekking tot de waargenomen rollen van leraren, en de resultaten onthulden geen verschillen in geslachtscategorieën. De bevindingen toonden de relatie tussen de waargenomen rollen van docenten en hun constructivistische engagementspraktijken bij CBLEs aan. De bevindingen ondersteunen de voorspellingen dat de gepercipieerderollen van leerkrachten in overeenstemming moeten zijn met hun constructivistische engagementspraktijken bij CBLEs.

In hoofdstuk 7 wordt een verkorte versie van het proefschrift aangeboden, samen met de gepresenteerde bevindingen op basis van vijf studies (zie hoofdstuk 2 tot 6). Het hoofdstuk behandelt de belangrijkste onderzoeksdoelstelling,de bijbehorende specifieke onderzoeksdoelstellingen en de onderzoeksvragen die zijn voortgekomen uit een kritische analyse van de theoretische achtergrond en onderzoeksfilosofie die het proefschrift begeleidde. De belangrijkste bevindingen (in hoofdstuk 2 tot 6) worden besproken op basis van 5 specifieke doelstellingen met 17 vergelijkbare specifieke onderzoeksvragen. Aan de ene kant leverden algemene discussies cruciale suggesties op voor zowel theoretische bijdragen als praktische implicaties voor universitaire docenten, studenten, educatieve ontwerpers, curriculumontwikkelaars en de belangrijkste hogeronderwijsinstellingen die beginnen met het implementeren van CBLEs. Aan de andere kant worden beperkingen besproken in samenhang met aanwijzingen voor toekomstige onderzoeksperspectieven. In de uiteindelijke analyse concludeert het proefschrift dat de bestudeerde variabelen van studenten en docenten over de implementatie van CBLEs bruikbare theoretische en praktische inzichten bieden met betrekking tot het juiste gebruik van de 21ste-eeuwse leervaardigheden in het lesgeven en leren aan hogeronderwijsinstellingen.

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