

Activity Theory as a lens to understand how Facebook develops knowledge application skills

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ABSTRACT

Uganda's higher education system has generally been criticized for concentrating on theory leading to a mismatch between training received and practical skills required by employers. Studies have documented the inability of graduates from some programmes at Makerere University in applying knowledge in the work environment. This could partly be attributed the use of traditional teaching methods, which do not adequately develop higher order cognitive skills and knowledge application in real life situations. Therefore, the study explored how technological approaches can be adopted to produce better graduates with ability to apply knowledge in real life situations. The study aimed to explore 1) how Facebook affords students to transfer knowledge acquired in the lecture room to the workroom and 2) the usefulness of Activity Theory (AT) as a lens to analyze how students interact with Facebook to develop knowledge application skills. Current methods of knowledge application were reviewed to identify gaps, strengths and effectiveness of Facebook learning activities guided by AT which is a useful social learning theory for studying transfer and knowledge application in new contexts among activity systems. Second year Bachelor of Information Technology students interacted with Facebook as a mediating tool to post videos installing an operating system on the page and interact with peers and their lecturer. Analysis of students' interaction with Facebook activities, practices and implications, and the potential of AT for research, development and dissemination is presented. Findings show the usefulness of AT in clarifying how interactions in Facebook and contradictions occur. Finally, limitations of using AT in understanding how Facebook develops knowledge application skills and recommendations for future research are highlighted.

1. INTRODUCTION

The higher education subsector in Uganda has registered continued growth in terms of enrolment and number of institutions. According to the National Council for Higher Education (NCHE) Report (2013), enrolment has been increasing since 2000 with the emergency of a vibrant private higher education sector. For instance, between 2006 and 2011 total enrolment was from 137,190 to 198,066; representing a growth of 44.4%. There were 187 higher education institutions (HEIs) in 2011 up from 148 in 2006, representing a growth rate of 26% in that period. Of these, the private sector owned 73% and the public owned only 27% HEIs. However, Makerere University enrolls majority of students in Uganda, for instance, in the academic year 2013/14, the University enrolled

42% of the students in public universities, and 21% of the students in all universities in Uganda (Makerere University, Directorate of Quality Assurance 2016). This implies that Makerere University contributes significantly to human capital development in Uganda. As observed by Saint (1992) and Ekong (1998), the higher education system in Africa is credited for producing professionals to lead and manage the institutions of government to a substantial extent and therefore depending less on human resource from other countries. This suggests a close relationship between training and work.

Despite the significant growth of the higher education subsector in Uganda, the relationship between training and work is still problematic in some disciplines. In an empirical study by Mugabushaka et al., (2007) a high use of knowledge and skills was reported by graduates from Tanzania, Kenya and Nigeria (more than 70%), while only 49 per cent reported this in Uganda. Graduates from health and education related fields reported a higher level of use of knowledge and skills than graduates from the other fields. In another study tracing the graduates of Makerere University Medical School, majority of the pharmacists (44.4%) utilized less than 20% of their learned knowledge and skills (Ndungutse, 2005) compared to their counterparts in other medical fields. In a study commissioned by the Uganda National Council for Higher (2006), the lowest rated degree programs whose curricula were rated to be unrelated to the world of work were Social Science and Arts at 50% and 42.1%, respectively, and yet these contribute the majority of the graduates from Makerere University. In the same study, both employers and students felt that institutions of higher learning did not prepare them very well for the world of work in a number of skills including computer skills (36%); entrepreneurship skills (28%); field practical skills (21%); problem solving ability; communication skills; general organizational skills; interpersonal skills; initiative; speed and accuracy in executing tasks. Besides, practical work experience was inadequate, training was considered theoretical and unrelated to the work place. It is reported that 59.9% of the respondents suggested a change in curricular to emphasize practical/ fieldwork (43.6%), to make curricula more market-oriented (15.5%), and make acquisition of computer skills compulsory for all tertiary graduates.

Although Mugabushaka et al. (2007), relate higher education and work to income and employment conditions, the above findings problematize the curriculum, the way it is delivered and assessed and the practical exposure students have before graduation. The mismatch between training and work is partly attributed to the instructional methods used. Traditional teaching methods are criticized for failure to develop Students Higher Order Thinking Skills (HOCS) including knowledge application. Hardman (2005c) emphasizes need to change from traditional methods to active learning and practice for successful academic engagement and development of creativity. Vygotsky's model of learning encourages mediation where a student is assisted by a More Knowledgeable Other (MKO) to get to the Zone of Proximal Development (ZPD) for learning and development (Hardman & Amory, 2014). The MKO helps learners understand what they need to know. As noted by Hodgkinson-Williams and Deacon (2013), learners require different levels and support to perform at their potential ZPD. Therefore, technology as a mediation tool supports learners to get to the ZPD by putting knowledge into practice and solving problems. Dabbagh (2005) notes that cognitive difference should be generated for learners to have multiple perspectives in real life situations and construct new meaning in the context of knowledge and experience.

According to Ellis (2011) employers need knowledgeable workers, who can interpret social situations and respond flexibly to new ideas and solutions. According to Hodgkinson-Williams and Deacon (2013) learners need to develop skills and gain practice with technology to be productive at work. They emphasize that technology educators' need to apply skills to their own practice to cultivate skills. Today's workplace requires individuals that collaborate and create within constraints of time and place and real-time technology to create a strong learning community with problem-solving skills (Beldarrain, 2006). For learners to be prepared for the complex and rapid

changing workforce they need a variety of skills including analysis, critical thinking, decision making, and problem solving. Learning needs and desired outcomes have changed requiring educators to adjust their delivery by using technology-mediated pedagogical methods which afford new approaches to match digital learning interests, preferences, characteristics, styles, motivation and promote learner-centeredness and autonomy. It is assumed that such paradigm shift enables learners apply knowledge in practical settings and therefore be productive workers. Technology can extend human capabilities to solve problems and assist in knowledge acquisition, to empower educators to stimulate learning more effectively (Mlitwa, nd). Specifically, e-learning technologies have been documented as enabling learners' active engagement in knowledge construction, supporting problem solving skills, allowing time for understanding and decreasing time to master skills, facilitating deeper understanding, improving performance, and enabling knowledge construction and development of autonomous learners (Hardman,2005b). Such positive outcomes underscore the importance of using technology in teaching and learning, and therefore require a shift in educators' pedagogical knowledge and practice.

2. PROBLEM STATEMENT

Despite the close relationship between training and work documented in the literature (Saint, 1992; Ekong, 1998), Uganda's higher education system has generally been criticized for concentrating on theory leading to a mismatch between training received and practical skills required by employers (Mugabushaka et al., 2007; National Council for Higher Education, 2006; Namubiru, 2006). Studies have noted the inadequacy of graduates to transfer the knowledge acquired in the lecture room into the work room (Bagarukayo et al., 2012; Mbarika et al., 2010; Ndungutse, 2005). These studies show a mismatch between theory and practice, which could be attributed to lack of emphasis on practical skills development during university training. This inhibits students' ability adequately respond to real world issues and yield greater productivity and return on investment.

3. PURPOSE OF THE STUDY

To explore how Facebook develops knowledge application skills among undergraduate students through the lenses of activity theory.

4. STUDY OBJECTIVES

Specifically, the researchers explored: -

- a) how Facebook develops students' knowledge application skills.
- b) the usefulness of Activity Theory as a lens in understanding how students interact with Facebook to develop knowledge application skills.

5. LITERATURE REVIEW

a) Knowledge Application Methods and Frameworks

Learning is acquiring new information, knowledge and sharing best practices (Tenkasi & Hay, 2004) and is characterized by processes in search of knowledge for purposes of praxis (Sadeck, 2013). It involves questioning, experimenting, exploring, and refining to generate new knowledge and understanding. Learning is a social process and cannot happen without community and cultural influence. For effective learning to take place, time should be invested in putting knowledge into

practice using hands-on opportunities and understanding outcomes. Applying newly learned skills at the workplace enhances knowledge retention (Tenkasi & Hay, 2004) and testing of such skills.

Knowledge transfer is the process of applying tacit knowledge, new ideas, research and other evidence in action and focuses on individuals performing tasks (Ward et al., 2009). Knowledge transfer components include problem identification and communication, knowledge development and selection, analysis of context, knowledge transfer activities and knowledge utilization. Knowledge features information, awareness, and ability to use information in new contexts. According to Kang and Gyorke, (2008) knowledge and activity are very practical and situated. Students should understand concepts before transfer happens. Failure to translate knowledge into action leads to inequalities, and is costly, time consuming, and increases the gap between what is known and done, which leads to ineffectiveness. Knowledge application methods include collaboration which emphasizes collaborative knowledge construction, negotiation of alternatives and reliance on students and educators for learning (Dabbagh, 2005). Therefore, collaboration is important because of the social negotiation, and leads to knowledge application in new contexts. Personal interaction is the most effective means of knowledge transfer. Applying knowledge is using information, concepts and ideas in a new situation. Learners cannot apply knowledge unless they understand and cannot understand a concept unless they remember it (Churches, 2001). Therefore, before students create artifacts, they should remember, understand, apply, analyze and evaluate what they are doing. The gap between knowledge generated and applied in practice needs to be addressed.

As cited in Johnson (2005), knowledge translation is exchange, synthesis, and application of knowledge within a complex system of interactions and includes steps between knowledge creation and its application, and generation of new context-specific knowledge by applying findings in different settings. Therefore, knowledge application is a component of knowledge translation and is best learnt through activity. In order for students to put knowledge into practice or action, they need to learn through activities. Putting new knowledge into practice is a complex process and depends on the students' knowledge, ability and interest. Therefore, knowledge translation and transfer need to become integral components in practice and important strategies in providing evidence-based practice.

Action is associated with knowledge transfer interventions, therefore actual use of knowledge is important for this process. Students need to acquire practical skills in learning activities to put knowledge into practice to develop hands on skills. The methods for knowledge application identified include targeted dissemination, involving users in the research process, developing networks, and use of knowledge brokers. Other methods include Problem Based Learning (PBL) and Multimedia instructional materials. Problem Based Learning is a learning method where problems act as circumstance and driving force for learning which encourages acquiring knowledge to solve a problem, and eventually determines skills attained (Mbarika et al., 2010). The approach involves teaching students to apply knowledge acquired to solve authentic and practical situations, increase student motivation, deepen understanding of subject area, encourage collaborative learning, and develop HOCS. Mbarika et al., (2010) use multimedia case studies to solve real life problems and improve students' HOCS including knowledge application at work. It is therefore critical to design instructional materials with constructs and items corresponding to content- and context- driven factors.

b) The Case of Facebook (FB)

Social media provides a learner-centered technologically and socially rich environment (Murumba et al., 2015). Social networking is a key element of collaborating, which is a 21st century skill integral to the learning process and has an increasing influence on learning because it forms links between people and helps to develop networks. Sadeck, (2013) recommends researchers to consider

technologies and tools that facilitate learning through social interaction, and systems to enable and manage eLearning, progress to constructivist, activity and collaboration. Therefore, using FB aims at promotion of collaborative, constructivist, multimedia, learner-centered learning environment. Facebook is an online application that students are familiar with and best to connect and engage students outside class (Monopolis, 2014). It is used for constructing, sharing learning experiences, research, academic events, artefacts and accessing information (Hussain et al., 2012). It affords collaborative learning, communication, interactivity, better engagement, motivation, instructional materials, increased involvement, enhanced professionalism, building relationships and knowledge sharing which lead to deep learning and application of real world skills and therefore knowledge application skills. Facebook can help gain skills at higher levels of cognition like analysis, applying, because it provides interactive feedback that enhances analysis of multiple perspectives.

However, its use for active learning and putting knowledge into practice has not been fully explored in the education sector, especially in Uganda, where it is largely perceived as social media. Students are already engaged and motivated using it as social media. However, educators have not tapped into this space for formal learning purposes. Among the competences highlighted in the draft Uganda Higher Education Qualifications Framework (NCHE, 2016) for graduates at bachelor's degree level or it is equivalent include the ability to demonstrate knowledge and comprehension on fundamentals of a field of study, use the knowledge acquired professionally and apply the acquired knowledge and skills in identifying and analyzing issues and providing evidenced-based solutions. Such competences are best acquired when students carry out learning activities that enhance practical skills and apply knowledge in practice. This study explores how FB could be used to close this gap.

i) Assessing Facebook Affordances

Bower's affordance analysis framework was used to identify FB affordances (Bower, 2008) which include *Media affordances* like posting questions, status and Text (read-ability, write-ability), view-ability, audio (listen-ability, speak-ability), video (watch-ability, produce-ability). *Spatial Affordances* include ability to resize elements within an interface (resize-ability, move-ability). *Temporal Affordances* include access-ability, record-ability, and playback-ability, synchronous vs asynchronous (synchronicity). *Navigation Affordances* where learners can navigate pages (browse-ability), link to other sections (link-ability), search-ability and sort and sequence (data-manipulation-ability). *Emphasis affordances* allows for combining articulating media uploaded (highlight-ability and focus-ability). *Synthesis affordances* allows for multimedia content (combine-ability) and functions of tools and content of resources integrated (integrate-ability). *Access control affordances* include setting parameters to access to group page with approval from group administrator (permission-ability). Facebook supports collaborations (share-ability). *Technical affordances* include Facebook being efficient, fast and adapts to bandwidth of connection and is used with other platforms. Facebook affords *Usability* because it is intuitive, can execute various functions, is efficient to use and allows user greater flexibility in personalizing experiences. Facebook affords *Aesthetics* because its design is appealing and its interface appearance is familiar, relates to user satisfaction and holds user attention. This makes students engage in environment and can be customized to reflect group values, identity and theme. Some functionalities are handset-dependent and cater for individualized experiences. Facebook affords *reliability* being more than 10 years old, is robust and has stood the test of time and therefore it performs as intended. Anderson (2008) states that for learning to be effective there has to be interaction between students, teachers and content. Therefore, there is need for teacher –content, teacher-student, student-student and student –content interactions, which FB affords. This technology was selected because it is one of the most popular platforms and students are already familiar using it as a social medium.

ii) Using Facebook to Develop Knowledge Application (KA) Skills

The current study was carried out on second year BIT students undertaking the operating systems (OS) course unit at Makerere University. Students were required to record a video of themselves installing an OS and post it on the class FB group. Students researched about installing an OS after an introductory lecture and posted the video of themselves installing it practically on FB. They reported that FB was a convenient platform for discussions, allowed peer interactions, changed their view about the course, was well integrated into the assignment, was more effective, gave them an overall positive experience, made them feel more connected, enhanced their understanding, enabled interaction, enhanced experience of participation, allowed finding and sharing of resources, provided collaborative opportunities, encouraged learner centered activities, allowed flexibility in learning. These findings corroborate with Bosch's (2009). Therefore, the overall effect of FB on the students' learning process and experience was positive, and it is likely that the intended and unintended but positive learning outcomes were achieved. As noted, collaborative learning strategies are useful for constructing and sharing knowledge (Strijbos & Fischer in Barhoumi, 2015). Therefore, FB being collaborative encourages constructing, applying and sharing knowledge and skills.

6. ACTIVITY THEORY AS THEORETICAL FRAMEWORK

The AT framework guides analysis and interpretation of factors that influence students' development of knowledge application skills. The theory examines learning as a social practice and activity (Engeström, 2000) and can be applied in practice. It describes the learning context and pedagogic strategies (Hodgkinson and Deacon, 2013) and puts emphasis on the nature of learning and doing, tool use and community, content and context. Activity Theory suggests a relationship between theory and practice emerging in a historical and cultural context (Vermeulen *et al.*, 2016) and addresses the gap between theory and practice by putting material, activity before language and theory. Vygotsky observes that humans need mediating artifacts to move from lower to Higher Cognitive Functions (HCF). Activities are necessary for cognitive development and cognitive abilities develop as a result of internalization of actions with objects and other people and then externalization. The theory considers learning as both individual and societal, transforming each other (Vermeulen *et al.*, 2016; Kaptelinin, 2013). In Vygotsky's of conceptualization of pedagogical practices, socio-historic conditions for production of new knowledge and new practices are needed (Hardman, 2005b). Therefore, knowledge application requires a socially rich environment.

a) Activity Theory and Knowledge Application

Learning is transformation of activity systems and their components over time. It is an integral part of activity which is part of social practice. In AT consciousness is located in everyday activities and is transformed through practice (praxis) (Arnseth, 2008) and is formed in a collective activity after interaction between subject and environment. Participation has to take place to master practice which is the primary role in shaping and constituting knowledge and knowing. Knowing is conceived as a way of acting within a community of practice (Arnseth, 2008). Proponents of AT advance argue practice should be conceived, and theorizing learning and thinking are integral parts of practice. Practice is developed and changed through social relationships (Lave, 1998). The proponents suggest that people engage with learning with a specific goal for the learning activity (Sadeck, 2013). Learning progresses using tools in collaboration with community and happens through activity. Scaffolding is an instructional method constructed to symbolize potential to build upon existing levels of knowledge and skills (Sadeck, 2013). Learning is first internalized as individual knowledge that can potentially develop over time. Development of HCFs happens first as inter-psychological where the individual learns from others first and then intra-psychological development occurs within the individual. Therefore, when using e-learning, learning as an action takes place by learners using technology to gain knowledge in a social setting. Interaction of

learners with material and collaboration between learners, tools and teachers has to take place for effective learning. In e-learning, goal directed common activities include cooperation, discussions, doing, reflecting and collaboration. Therefore, collaboration and interaction are important for effective learning since they lead to intellectual development.

Activity theory is concerned with doing as action to transform some object (Engeström, 2000). Since knowledge application is best learnt through learning activities, AT becomes essential. Therefore, AT is in form of a distributed social expertise, which is knowledge in practice situated in the context in which it occurs. Activity theory supports the study of transfer among activity systems by understanding how knowledge transitions from one context to another (Dirk, 2013), since it helps to illuminate the nature of learning, particularly how people learn in one activity system and transfer that knowledge to a different activity system. Students and lecturers have different expectations and much practice is needed to apply concepts and knowledge. Dirk notes that knowledge is not a set of skills that can simply be removed from one activity system and applied to another. For example, when a student has to apply a concept they have used before in a new activity, they need to transfer previous knowledge and understand how to take this new situation into account as they work in a different context. Therefore, an employee applies new skills in new contexts differently, implying that students may not have applied these skills currently but may do so in future.

Therefore, Dirk (2013) recommends that transfer is reformulated as a process of transition between activity systems and link between individual with the social structure. In Dirk (2013) employing prior knowledge and practice identically enables active use and requires addressing new tasks and creating new knowledge and practices to meet a challenge that requires new ways of thinking about how to apply the concept. Studying transfer of knowledge involves more than whether a person who knows how to apply a concept in one situation can apply it in another. Therefore, employers can transfer knowledge from an activity system totally unrelated to another. Knowledge transfer involves looking at how knowledge is shaped, and continues to be shaped, by individuals and the activity systems.

Activity theorists emphasize that practice should be conceived as transformation of activity systems.

b) Use of AT Lens to Assess Interactions with Facebook (FB) To Develop Knowledge Application (KA) Skills

Activity theory helps users understand the role FB plays in developing KA skills and to determine if learners were transformed by analyzing FB collaborative activities. In this study, FB helped the researchers to analyse student interaction on FB as a basis to infer learning and development of KA skills. The theory reduces the theory-praxis gap and demonstrates how mental shifts for learning and development are activated by use of tools (Rambe, 2009). Therefore, AT guided us to examine how learners' frames got transformed (learning) and how development was activated. Students constructed knowledge and shared it on FB and this collaboration led to the development of ZPD- KA skills; leading to the acquisition of HCF since knowledge from class was applied.

In the study's activity system, subjects were 48 2nd year BIT operating systems students with varying learning experiences and attitudes about using Facebook to learn. A students' questionnaire adapted from previous research to determine the 'perceptions and attitudes about use of Facebook for the assignment' basing on a likert scale ranging from Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree, was filled by 48 students after uploading video. The results of the number of individual responses per question (where S= strongly disagree; D= disagree; N= neither agree nor disagree; A= agree; SA= strongly agree; FB= facebook). The total number of responses on whether students think that Facebook was a convenient platform for

classroom discussions, allowed them to interact with classmates, should be used as a learning tool, changed their view of course, was well integrated into assignment, more effective and preferred than MUELE, had an overall positive experience, felt more connected, enhanced understanding of OS, enabled lecturer student interaction, enhanced experience of participation, allowed finding and sharing of resources, provided collaborative opportunities, encouraged learner centered activities and allowed flexibility in learning was 513 representing agree and strongly agree responses. The total number of neutral responses were 123 and negative responses (disagree and strongly disagree) were 89, which is far less than positive responses. Therefore, the overall effect of Facebook on students learning process and experience was positive because it enabled putting knowledge into practice, sharing, collaboration, interaction, flexibility and learner –centered activities among others. Majority of the students had a positive attitude and were motivated to use FB.

The object was posting a video installing an OS on Facebook to achieve knowledge application skills as the outcome. Students are mediated by interactions with Facebook, culture, context, language, rules and their community. FB mediates KA skills by increasing proximity through increased communication, learner centered and active learning, student directed learning process, reflection, experiential learning, critical thinking skills and timely feedback as a result of collaboration therefore enabling learning and development of ZPD. Students participated in an activity which transformed their knowledge application skills. The community comprised of students and a lecturer who through scaffolding supported students gain skills, in addition to external members such as the administrator, parents and employers, and the University. Division of labor included distribution of tasks between the lecturer who facilitated, the students who carried out various learning activities, and the administrators who ensured that the Facebook tool works. Rules includes University policies, deadlines, curriculum, lecturer regulations, use of real names and being members of the FB group. Only posts related to assignment were made, commenting on peer posts earned a student an extra mark, and assignment deadlines were to be followed. Barhoumi (2015) reports decrease in participation when teacher is not present, therefore the lecturer had to be part of group as facilitator.

Practice contains contradictions and tensions that motivate change and further development (Murphy & Manzanares, 2008). Contradictions were highlighted by analyzing knowledge transfer among activity systems and addressed to determine why skills were not attained. Some students found it challenging to hand in assignments online because of network and bandwidth issues, while others did not have FB accounts, laptops or smart phones. This made learning with technology unfriendly, therefore these tensions should be addressed in future. Technology has rules that may cause tensions with curriculum such as lecturers refusing technology due to beliefs and attitudes and delay in covering the curriculum as opposed to using technology. Technology changes roles of students to be more participatory and active while lecturers become facilitators.

The elements forming the lecture activity system are illustrated in figure 1. The lecture activity system shows the influence of Facebook of learner, lecturer and content interactions during classroom activities. The student roles on FB included posting questions, posting videos, knowledge generation, resource persons, information disseminators and providers. With FB students take charge of the learning process therefore student-led learning occurs. Students' past experiences and motivation of using FB positively affect scaffolding. Students in the study were initially shocked at the use of Facebook for academic purposes since they perceived it as a tool for social activities. However, they later embraced it and enjoyed the experience since they were already motivated to use it. Therefore, FB complements learning and supports resource creation and sharing. Students' socio-cultural and historical factors included attitudes, values and motivation, and ability to communicate. In the current study, FB afforded questioning opportunities for large classes and eliminated shyness, timidity and low self- esteem. It met students' information needs, sharing of resources, enhanced peer engagement, and provided equal opportunities and

for access to resources. Facebook bridged social distance between the lecturer and students and afforded asynchronous communication, freedom of expression, interaction and collaboration which led to knowledge generation. In this case, Facebook enhanced user engagement with learning and the students became active participants in knowledge construction. Therefore, FB influences academic processes and change.

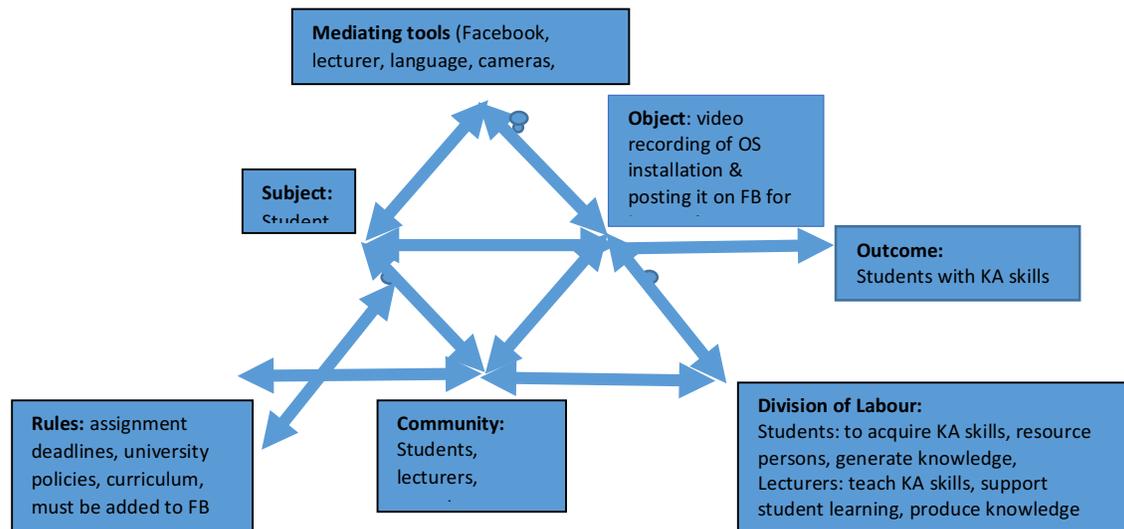


Figure 1: Elements of the lecture activity system (adapted from Engestrom, 2000)

c) Limitations of Activity Theory

Dirk (2013) notes that knowledge is bound up and carried by a subject and does not move from one activity system to another, which makes studying transfer challenging. AT focuses on the activity system and not on the individual. However, when designing activities, we need to note that individual preferences and learning styles matter.

According to Mlitwa (nd) AT is biased on technology-neutrality perspectives, which makes researchers question its adequacy to contextualize learning through technology because there is more to social technological interactions contributing to cognition than technology being a means to an end. Activity theory disregards Facebook as a Social Technical Network (STN), therefore there is need to employ Actor Network Theory (ANT) to fill this gap. Facebook should be conceptualized and treated as a STN to enable engagements between humans, structures, and Facebook and the learning processes

Transferring knowledge from an Activity System totally unrelated to another makes it hard to recognize transfer. According to Rambe (2009) AT is limited with regard to operationalizing relational power. The theory makes it more difficult to analyse how participants make sense of their surroundings. Hardman (2005a) notes that one of the challenges facing AT is the opaque use of the term object and the need to capture it to understand AS being investigated. The theory is also not well developed to study class interactions. Hardman (2005c) observes that Vygotsky's theory points at learning as distributed and does not develop an analytical framework capable of situating learning within a wider context, accounting for collective and dynamic nature of activities.

7. RESEARCH LIMITATIONS, CONCLUSION AND RECOMMENDATIONS

The researchers note a paucity of research on use of AT particularly in Uganda to gain knowledge application skills and a shortage of knowledge transfer methods in literature.

The study explored how technological approaches could be adopted to produce better graduates with ability to apply knowledge in real life situations. We explored how Facebook affords students to transfer knowledge acquired in the lecture room to the workroom and the usefulness of AT as a lens to analyze how students interact with Facebook to develop knowledge application skills. We presented methods of knowledge application to identify gaps, strengths and effectiveness of Facebook learning activities guided by AT. Students interacted with Facebook and posted videos and interacted with peers and their lecturer. Analysis of students' interaction with Facebook activities, practices and implications, and the potential of AT for research, development and dissemination was presented. We identified the usefulness of AT in clarifying how interactions in Facebook and contradictions occur and highlighted limitations of using AT in understanding how Facebook develops knowledge application skills.

Ward et al. (2009) note that knowledge spread is a social activity which involves community activities. Therefore, AT is an appropriate framework for studying knowledge application since Vygotsky posits that learning is a social process and knowledge application involves the community. Hardman, (2005b) adds that the strength of AT is that it enables understanding of learning as a complex result of tool-mediated interactions. However, the gap between what students bring to academic tasks and what tasks demand needs to be filled using technology mediation. Since learning is transformational, AT can be used to understand this process within a system and illustrate how different systems interact with and transform each other over time. There is a need to examine critically the consequences of AT in terms of analytical practice. Learning activities should focus on authentic tasks, synchronous discussions, inbuilt assessment strategies, collaborations and interactions. The researchers agree with constructivists that technology is autonomous and value-laden, and that technology as a mediation has an impact on students' learning. The researchers agree with Mlitwa (nd) who recommends the Actor Network Theory as an alternative value-laden perspective of technology which gives more credit to social and contextual embedded aspects of technology.

In future, the researchers intend to use activity theory to determine how education technology educators can develop courses to cultivate students' knowledge application skills, and how students change technology (tools) and are transformed by it. The socio-technical activity system should be extended into STN without symmetry implications (Mlitwa, nd.) and consider AT and ANT in e-learning in higher education.

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