The Impact of a Blended Learning Course on Khartoum University Students` Achievement and Motivation to Learn Scientific English

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Abstract

The aim of this study is to assess the impact of a proposed blended learning strategy for teaching Scientific English among Khartoum University, therapeutic & health nutrition students' achievement and motivation to learn scientific English. The sample consisted of (137) college students who are studying in faculty of education, home science department. The experimental group was composed of 48 students who enrolled in the English for Science, University required courses during the first semester of the academic year 2012/2013. The control group composed of the previous home science first year students who were enrolled in the same course in the first semester of the academic years 2010/2011(33 students) and 2005/2006 (56 students) respectively. The experimental group taught the course contents by using the proposed blended learning strategy, while the two control groups (2011/2012 & 2005/2006 academic year groups) taught the course contents through the conventional (traditional face–to-face) approach of teaching. Learners' motivation toward course learning materials was measured using the Instructional Materials Motivation Survey (IMMS) instrument, which consisted of four motivation categories based on Keller's model: Attention, Relevance, Confidence, and Satisfaction. Data analysis revealed that there was a significant effect of the proposed blended learning strategy on subjects` achievement in the English for Science; University required course as well as their motivation to learn Scientific English. Moreover, results indicated that experimental groups' candidates reported a high degree of satisfaction with blended learning experience in Scientific English. Based on the study results some recommendations and suggestions for further research were driven.

Keywords: Scientific English, English for Science, University Required Course, e-learning, blended learning, motivation for learning, and satisfaction with learning

1. Introduction

This study aims to explore the impact of utilizing a proposed blended learning strategy based on Moodle Learning Management System LMS for teaching scientific English at Khartoum University on home science students' achievement and motivation towards learning and studying Scientific English. Khartoum University is a multi-campus, educational, public university located in Khartoum, the capital of Sudan. It is the largest and oldest university in the country. The roots of the University of Khartoum (U of K) go back to 1898 when Lord Kitchener of Khartoum proposed founding a college in memory of General Gordon (Khartoum university web site; 2013) [1]. It was founded as Gordon Memorial College in 1902 and established in 1956 when Sudan gained independence. Since that, the University of Khartoum has been recognized as a top university and a high-ranked academic institution in Sudan and Africa (Akec, 2009) [2].

The face to face activities of the study took place at the main branch of the educational campus located in Omdurman, the second city in Sudan and administrated by the English Language Department affiliated to the Administration of University Requirements (AUR). Khartoum University AUR was founded in 1998 and developed naturally to teach scientific subjects that everybody thought are important.

The administration is responsible for teaching the university requirements subjects for first and second year students (375 hours) including Arabic Language, English Language, Islamic Culture, Computer Science and Sudanese studies (AUR, 2013) [3].

Any university student is required to study a total of 90 hours of English in the first and second year. English for Science, University requirement is taught to all science students at the faculty of education i.e., (Faculty of education students who study mathematics, physics, biology, chemistry and home science department). The activities of the present study are limited to home sciences students by adapting a blended learning strategy, in which 60% of the course time was used for face-to-face classes, and the other 40% was allocated for the online learning by the use of Moodle LMS and selected internet resources in the English language. Blended Learning used in this study is a mix of traditional instructor-led training; synchronous online conferencing or training, asynchronous, self-paced study, and structured on-the-job training from an experienced worker or mentor (see Singh, 2003) [4]. The face-to- face component of the study took place in Khartoum University's educational campus at the Faculty of Education with the hope of enhancing English language educational outcomes by improving science students' achievement and motivation towards learning and studying Scientific English.

2. Review of the Related Literature

In the period following Sudan independence in 1956, English played a role as the medium of instruction in most schools in the southern states until the Urbanization of Higher education; it was supplanted by Arabic in the mid-1990. During this period, many groups of secondary education learners and university graduates were disadvantaged in relation to the acquisition of the English language, notably those were immersed in an Arab culture and studying in the governmental education. By comparison, those who fled to Anglophone countries in the region are returning with varying degrees of English language competence (Tom & John, 2011) [5].

A persistent problem for teachers in English as a Second Language (ESL) situations concerns students who speak their shared common language instead of English in the classroom. In his topic "Eyes on English"; Billak (2011) [6] explored considering the inherent difficulty of the speaking skill, this is understandable. Learners often prefer to interact socially in their native language, allowing them to more effectively express a full range of ideas. In this article, the author discusses Eyes on English, a school wide campaign; she developed to promote the use of English. This article presents the rationale for implementing Eyes on English and describes how it can help teachers increase English usage through an activity that is practical, fun, and easy to implement.

Scientific English is a term used to distinguish the teaching of English for scientific, technical, etc. purposes to people whose first language is not English from other terms. On the other hand literary English language is a register that is used in literary work. For much of its history there has been a distinction in English language and colloquial language (Matti, 1992) [7]. English has been used as a literary language in countries part of the British Empire, for instance India up to the present day, Malaysia in the early twentieth century (David, 2003, p. 104)[8].
Motivation plays a significant role in the process of learning a language. Language educators cannot effectively teach a language if they do not understand the relationship between motivation and its effect on language acquisition and their students learning outcomes. The core of motivation is what might be called passion, which relates to a person's intrinsic goal and desires. Successful learners know their preferences, their strengths and weaknesses, and effectively utilize strengths and compensate for weaknesses. Successful language learning is linked to the learner's passion, and instructors should find ways to connect to this passion (Karaoglu, 2008) [9].
Learners need quality instruction, input, interaction, and opportunities for meaningful output, not only to make progress, but also to maintain motivation for language learning. A good teacher, then, must tap into the sources of intrinsic motivation and find ways to connect them with external motivational factors that can be brought to a classroom setting. This is especially significant when English is not seen as important to the students' immediate needs, other than to pass exams. Because learners have different purposes for studying a language, it is important for instructors to identify students' purposes and needs and to develop proper motivational strategies. Students should understand why they need to make an effort, how long they must sustain an activity, how hard they should pursue it, and how motivated they feel toward their pursuits.

Gardner (2006) [10] mentioned that: the term motivation is a very complex phenomenon with many facets. From the behaviourist perspective, motivation is "quite simply the anticipation of reward" (Brown, 2000) [11].

However, the cognitivists view the term motivation as being more related to the learner's decisions as Keller, (1983) [12], quoted by Brown (2000, p. 160) [11] stated, "the choices people make as to what experiences or goals they will approach or avoid, and the degree of effort they exert in that respect". However, in the constructivists' definition of motivation, they place "further emphasis on social contexts as well as the individual's decisions" (Brown, p. 160, 2000) [11]. Despite the differences, in all the definitions of motivation given by the three schools of thought the concept of "needs" is emphasized, that is, "the fulfilment of needs is rewarding, requires choices, and in many cases must be interpreted in a social context" (Brown, 2000, p. 161)[11].

The importance of motivation in enhancing second or foreign language learning is undeniable. Lifrieri (2005, p. 4) [13], pointed out that "when asked about the factors which influence individual levels of success in any activity – such as language learning –, most people would certainly mention motivation among them". Brown (2000, p. 160) [11] stated that "it is easy in second language learning to claim that a learner will be successful with the proper motivation". With similar views, Gardner (2006, p. 241) [10] posits that "students with higher levels of motivation will do better than students with lower levels". He further adds that "if one is motivated, he/she has reasons (motives) for engaging in the relevant activities, expends effort, persists in the activities, attends to the tasks, shows desire to achieve the goal, enjoys the activities, etc." (Gardner, p. 243, 2006)[10].

There is a plenty of research that has been carried out internationally to investigate learners‟ motivation and motivation towards the English language. In Malaysia, for example, Vijchulata and Lee (1985) [14] reported on a study that investigated the students' motivation for learning English in Universiti Putra Malaysia (UPM). Based on Gardner and Lamberts research (1972) [15], the researchers developed a questionnaire to elicit the data required. The questionnaire was administered on approximately a thousand students from all the different faculties in UPM. The findings revealed that UPM students were both interactively and instrumentally oriented towards learning the English language.

Another study by Sarjit (1993) [16] attempted to explore the language needs of consultants at a company. The name of the organization was not mentioned as the consultants did not allow the researcher to expose their identities. Learners‟ motivation was of concern in the study. The research sample consisted of 26 consultants, 4 directors and one instructor. In her study, Sarjit (1993) [16] employed different techniques to gather information, such as questionnaire, interviews and field observation. For the subjects‟ motivation, the study found that instrumental motivation was the main reason for learning the language followed by personal motivation in Japan, learners' motivation and motivation towards the English language were also of concern for many researchers.
One of the most relevant studies was that of Benson (1991) [17] who surveyed over 300 freshmen to assess their motivation towards learning English. The results demonstrated the importance of integrative and personal goals as factors in motivation among Japanese college students as he stated, "integrative and personal reasons for learning English were preferred over instrumental ones" (Benson, p. 34, 1991)[17]. In Papua New Guinea (PNG), a related study was undertaken by Buschenhofen (1998) [18]. He sought to assess the motivation towards English among year 12 and final-year university students. To collect the data, he administered a questionnaire on approximately 50 % of year 12 and first-year university students in PNG. Both groups were contrasted in terms of their tolerance towards the use of English in a variety of contexts. The results indicated (1) a generally positive attitude by both groups towards English and (2) some significant attitudinal differences in relation to specific English language contexts. Buschenhofen attributed such differences to the changing social, educational, and linguistic conditions which characterize the transition from year 12 to university education.

In (2004) Arani [19] investigated in Iran the language learning needs of medical students at Kashan University of Medical Sciences. One of the primary objectives of the study was to identify the students' motivation towards learning English as a school subject prior entering the university. The research sample consisted of 45 medical students 22 who enrolled in the first and second year of study. To collect the data, different types of questionnaires were administered to the sample at the beginning, in the middle and at the end of the English for Medical Purposes (EMP) courses. The results showed that most of the subjects had positive motivation towards both learning English and the English language teacher.

A more recent study has been carried out by Karahan (2007) [20] in the Turkish EFL context. The motive of his study arose from the complaints raised by learners, teachers, administrators, and parents about why most of Turkish EFL students cannot attain the desired level of proficiency in English. Therefore, he conducted a study to find out the relation between language motivation and language learning which is a missing point of discussions on the problems of teaching English in Turkey.

More specifically, Karahan tried to identify the interlaced relationship among language motivation, the starting age of language learning, and the place where the individual started to learn the language within the Turkey EFL context. The only method of inquiry used was a questionnaire adapted from previous studies on language motivation. The sample included 190 (94 females and 96 males) eighth grade students of a private primary school in Adana, Turkey, where English was intensively taught. The findings indicated that although the students were exposed to English in a school environment more frequently than other students at public schools, they had only mildly positive motivation; especially female students had higher rates. In addition, the subjects recognized the importance of the English language, but interestingly did not reveal high level orientation towards learning the language. On the other hand, the results revealed that the subjects had the mildly positive motivation towards the English based culture, but they were not imin of Turkish people speaking English among themselves.

With regard to Arab EFL learners, some studies have been undertaken to investigate learners` motivation and motivation towards the English language. For instance, Qashoa (2006) [21] conducted a study among secondary school students in Dubai. The study aimed to (1) examine the students' instrumental and integrative motivation for learning English and (2) recognize the factors affecting learners' motivation. The findings indicated that difficulties with the subject (English) aspects such as vocabulary, structures and spelling were found to be the most de-motivating factors for the students.

In the Yemeni Arabic EFL context, Al-Quyadi (2000) [22] carried out a comprehensive study to investigate the psycho-sociological variables in the learning of English in the faculties of Sana`a in Yemen. One of the main objectives of his study was to study the nature of the psychological variables of learning English by Yemeni EFL learners in terms of motivation and motivation as measured by English majors in the Department of English, Faculties of Education at Sana`a University. The findings indicated that the students had positive motivation towards the English language and the use of English in the Yemeni social and educational contexts.

Walker-Dalhouse and Dalhouse (2009) [23] investigated reading achievement and academic challenges of Sudanese children. They interviewed Sudanese parents, and their children, and English as Second Language (ESL) teachers. Parents' and children's interviews were transcribed and four themes were generated from the data: Cultural Differences /Practices; Parent roles and expectations; home school relationships/interactions; Teacher expectations and practices. The results reflect the willingness of Sudanese parents to work with teachers; the need for teachers to form strong parent-teacher relationships; and for teacher practices that support students' literacy within the classroom context. Teacher interviews were used to provide a better understanding of Sudanese home school relationships and educational issues.

In his exploration of the politics of literacy in late colonial Sudan, (Seri-Hersch, 2011) [24] drawing upon hitherto untapped archival sources in English and Arabic, it focuses on two key questions: What were the purposes and uses of literacy in the eyes of colonial authorities? What means were used to spread literacy skills among the Sudanese people? Positioning these issues in the context of British imperial policy in Africa, it is argued that mixed teams of British and Sudanese educationists came to view literacy as a central tool to foster social progress and political modernity. The analysis puts special emphasis on literacy campaigns and follow-up literature as an experimental means used to promote and perpetuate Arabic literacy in Northern Sudan. Examining both "nationwide" and provincially based magazines, it highlights their multifaceted role as pedagogic materials, vehicles of political, cultural and ideological representations, social networks, as well as public platforms of expression for young Sudanese literates.

In their ethnographic study; Perry and Moses (2011) [25] explored the ways in which media, particularly television, connected with English language and literacy practices among Sudanese refugees in Michigan. Three families with young children participated in this study. Data collection included participant observation, interviews, and collection of artifacts over 18 months, with a focus on television events as the units of analysis. Data analysis focused on television practices connected with literacy practices for adults and children. Results indicated that television offered important cultural connections with participants' beliefs, values, and attitudes regarding their Sudanese heritage, the new U.S. context, and religious practices. Both adults and children believed television was an important resource for learning and recognized potential problems with too much viewing. Most significantly, the analysis suggested important connections between television practices and the development of both English language abilities for all family members and the development of real-world literacy practices.

Hatoss and Eacersall (2012)[26] investigated the linguistic and educational socialization of Sudanese refugee-background youth in Australia.

Their study focused on exploring Sudanese-background secondary school students' career aspirations, motivations and obstacles. The research used a mixed-method approach, including a survey conducted with students studying in six regional Australian high schools and three focus group discussions held in two schools. The research findings provide profound insights into motivation and agency in their career choices. The research also explored the tensions between high levels of educational aspirations and the linguistic, psychological, racial and social barriers that Sudanese-background learners face in their socialization process in Australia. Some of the barriers include racism, interrupted schooling, and low levels of English literacy. Their voices about their career choices, on the other hand, are testimony of their resilience and their motivation to help others in Australia and in Sudan.

Hellekjaer (2012) [27] from Norway quantitatively examined the academic English reading proficiency of 578 Norwegian university students. Self-assessment items were used to measure reading proficiency in Norwegian and English and validated using an International English Language Testing System Academic Reading Module. The study found that about 30% of the respondents had serious difficulties reading English, while an additional 44% found it more difficult than reading in their first language. The main problems encountered were unfamiliar vocabulary and slow reading, while extracurricular readers and respondents who were able to guess word meanings from context had higher reading scores. Poor language proficiency was a problem for many, to the extent that they fell below the linguistic threshold level. The study showed that, contrary to expectations, Norwegian EFL instruction in upper-secondary schools fail to develop the academic English reading proficiency needed for higher education.

Chang, (2011) [28] stated that: to be successful in navigating the waters of American higher education, international students need to demonstrate proficiency in English language and an understanding of the educational expectations of American academia". Unlike Americans who apply to a US university, international students must demonstrate that they understand enough English to take a class at a university without much difficulty. Many universities require a language proficiency examination such as the Test of English as a Foreign Language (TOEFL [TM]). Although preparing for such a test can be done in the student's home country, many international students choose to prepare by attending an English as a Second Language (ESL) program in the United States prior to gaining admittance into an American undergraduate or graduate program. By doing this, international students have the chance to improve their level of English while experiencing American life. The American English and Culture Program (AECP) is an intensive ESL program based at the Tempe campus of Arizona State University (ASU). AECP is a non-degree, non-credit program that prepares international students to meet the language requirement for acceptance into ASU or other American universities. It provides the opportunity for international students to become fully prepared for academic study at the university level, while building on their experiences of American as well as global community, communication, connection, and cooperation.

Lindholm-Leary and Hernandez (2011) [28] examined the language proficiency and achievement outcomes of Latino students enrolled in a dual language program who varied by language proficiency (Native English speakers, Current English Language Learners--ELLs, Fluent English Proficient/Previous ELLs). Most previous research has not disaggregated Latino students, especially ELLs. The purpose of this research is to examine the achievement and language proficiency of 732 Grade 4 to Grade 8 Latino students enrolled in a dual language program who differed by language proficiency. Results show that these Latino student groups achieve at higher levels than their peers in English mainstream. Findings also indicated that the three groups vary in parent education, language proficiency in Spanish, and achievement as measured in Spanish and English. Further, Fluent English Proficient/Previous ELLs are the most Spanish proficient and bilingual, achieve at higher levels in English and Spanish, and close the achievement gap with native English speakers in English mainstream programs.

Previous research showed that African Universities suffer the same problem. For example; Chen and Goh (2011) [29], investigated the difficulties that teachers encounter in teaching oral English in higher education in the English as a foreign language (EFL) context. Open-ended question surveys and semi-structured interviews were used to elicit data. There were 331 EFL teachers from 44 universities in 22 cities across China that responded to the survey questions. Thirty teachers were interviewed. The findings showed that apart from external constraints such as large class sizes and lack of teaching resources, EFL teachers are frustrated by their low self-efficacy with regard to oral English proficiency and inadequate pedagogical knowledge.

Most teachers expressed eagerness to receive training in how to design and implement effective tasks to motivate students' engagement in oral English activities. The implications of these concerns for teacher education are highlighted in the call for training programs that strengthen teachers' knowledge base for effective oral English instruction in the EFL context.

Bal (2012)[30] presented an account of his first hand experiences between 2006 and 2010, relating to his involvement in the establishment of the English Language and Literature department at the International University of Sarajevo in Bosnia and Herzegovina, and of the difficulties and challenges of the venture in the post-war country, whose higher education system needed urgent reforms. The focus of his study is on the cultural diversity found in an English language (a unifying global language) educational setting established in a country which, despite the present estrangement, once hosted a common culture for the Bosnian and Turkish students of the department. Clustered mainly around this issue, the paper further elaborates on the transcultural dynamics of English education aimed at a variety of students that came from different educational backgrounds.

Much of the student diversity in U.S. schools reflects increasing numbers of English language learners (ELL). ELL represents a very heterogeneous group in terms of their native language proficiency, educational experiences, access to quality early childhood programs, and immigration experiences. An unfortunate commonality they often share is poor academic achievement, particularly in the area of reading. Higher rates of grade retention and school dropout are consistently linked to poor academic performance. Bowman-Perrott, Herrera, and Murry (2010) [31] discussed literacy development, reading difficulties related to special education identification, and reading interventions for ELL. Practical strategies for reading instruction are also provided.

In his article entitled "The English is not the same", Strauss (2012) [32] described his interaction as English for academic purposes (EAP) practitioner with a supervisor and her two postgraduate international students, both of whom were second language speakers of English (L2). Because of linguistic and relationship issues the supervisory experience for the parties was challenging and frustrating. He suggested that while the linguistic difficulties impact negatively on the supervisory relationship, this is exacerbated by the differing assumptions and expectations of the stakeholders. And argued, however, that what is regarded as "acceptable" English at some institutions has not been sufficiently interrogated and the belief that English as a native language (ENL) is the only acceptable variety of English needs further investigation. Such an investigation needs to take place in a forum where the less powerful voices of the EAP practitioners and the students will not be marginalized.

Lindholm-Leary (2012) [33] investigated research that highlights the success of dual language education for student participants, both native English speakers and English language learners, from a variety of demographic backgrounds at both the elementary and secondary levels. However, there are a number of challenges that can impede the quality of implementation in dual language programs. His study identified and discussed some of these important challenges facing dual language programs, including issues related to program design, accountability, curriculum and instruction related to bi-literacy, and bilingual language development. In addition, implications for practice are presented to address some of these challenges.

English-taught Programs (ETPs) have increased exponentially in European universities over the last 10 years, leading to growing numbers of bilingual graduates. Costa, (2013) [34] reported on the most recent survey of ETPs in Italian higher education. A questionnaire completed in 2010 by 50% of Italian universities addressed both organizational factors (including the number of ETPs, reasons for adoption and difficulties in implementation) and pedagogical factors (including recruitment and teachers' competencies). The findings paint a heterogeneous picture, with ETPs expanding, but still not the universe. Issues are analyzed according to university type (public/private) and location, since the divisions between the wealthy, industrialized North, the Centre and the less developed South are largely reflected in the profile and status of universities in each geographical zone. All institutions show a clear-cut focus on content over language.

2.1 Blended Learning as a Proposed Panacea for ELT Development

Blended learning is the combination of multiple methods of teaching. It is sometimes referred to as integrated learning, hybrid learning, multi-method learning, or mixed teaching (Franks, 2002) [35]. Some educators have attempted to differentiate some of these terms by using percentages (see Smith and Kurthen 2007) [36]. Table (2-1) shows taxonomy of terms related to blended learning.

Table 1: Taxonomy of Terms Related to Blended Learning (Smith and Kurthen 2007, in Gruba and Hinkelman 2012: 4) [37].

Term	Definition
Web-enhance	Subjects that make use of a minimal amount of online materials, such as posting a syllabus and course announcements.
Blended	Subjects that utilize some significant online activities in otherwise face-to-face learning, but less than 45 per cent.
Hybrid	Subjects in which online activities replace 45–80 per cent of face-to-face class meetings.
Fully online	Subjects in which 80 percent or more of learning materials are conducted online.

Singh (2003) [38] described blended learning as being 'a learning program where more than one delivery mode is being used with the objective of optimizing the learning outcome and cost of program delivery. They do not expand on what the delivery modes are in their definition, yet a more explicit definition from Valiathan (2002) [39] suggests they may include "face-to-face classrooms; live e-learning, and self-paced learning". Reid-Young (n.d.) [40] also provides us with a set of delivery modes which differ slightly from Valiathan's (2002) [39] and 'may range from classroom sessions to mentoring arrangements or the support of a subject matter expert in the same office or area.

The concept of blended learning is not a new one; it has been driven by a series of technical innovations in learning for many centuries. What does give the term blended learning a new impetus are the exciting and powerful web-based technologies that have greatly affected the market over the last few years (Epic Group, 2003) [41]. Interest in blended learning has surged within the past few years. The online learning department of the Rochester Institute of Technology (RIT, 2005)[42] identified five reasons why the interest in blended learning increases so rapidly in recent years as follow: [1] learner- centred models of instruction are moving to centre stage,[2] the continuous debate over classroom versus distance education has subsided, [3] more and more universities are becoming accustomed to using a courseware management system, [4] students now days are knowledgeable about and comfortable with online communication , [5] all of us are "time starved" and desire greater flexibility in scheduling our work. Blended learning mixes various methods, which include face-to-face classrooms, live E-learning, and self paced learning.

Perlas (2010)[43] reported on an explanatory mixed method study, which aimed to examine the effect of the blended learning format on underrepresented, community college student motivation. Results from the quantitative phase of the study showed no significant differences at the p less than 0.05 levels between the blended learning and traditional learning samples among all four categories of student motivation: Attention ($p = 0.622$), relevance ($p = 0.702$), confidence ($p = 0.695$) and satisfaction ($p = 0.617$). Results from the qualitative phase of the study demonstrated that the blended learning format had positively affected underrepresented student motivation in terms of providing students with both internal and external motivating factors.

Na-Songkhla (2011) [44] presents a model of learning in a workplace, in which an online course provides flexibility for staff to learn at their convenient hours. A motivation was brought into an account of the success of learning in a workplace program, based upon a Behaviorist learning approach--an online mentor and accumulated learning activity score was applied; whereas a social constructivist concept was also blended into the online learning environment. The results showed that all staff successfully completed the online learning program. Their opinions on the monitoring system were at a very high level of satisfaction, and fewer active staff obtained rewards from their collected scores during the online social network activities. Correlation was found between frequency of staff's participation in social learning activities and achievement with higher learning scores at the end of the program.

Pellerin and Montes (2012) [45] investigated the effectiveness of the implementation of blended teaching (BT) by combining the Spanish online resource "Aula Virtual de Espanol" (AVE) with the face-to-face (F2F) delivery approach in second language Spanish programs in two high schools in Alberta, Canada. The findings demonstrate the effectiveness of combining the online resource AVE to the F2F teaching approach to promote BT in the Spanish language classroom. The use of the BT approach in the language classroom had a positive impact on the students' motivation and their participation levels in class, as well as their use of the target language in the classroom.

According to Bonk and Graham (2004) [46] all of the blended learning examples may occur at one of four different levels: activity level, course level, program level, and institutional level. Across all four levels, the nature of the blends is either determined by the learner or the designer/instructor. Blending at the institutional and program levels is often left to the discretion of the learner, while designers/instructors are more likely to take a role in prescribing the blend at the course and activity levels.

With reference to Sharma (2007) [47] suggested 'for blended learning to be effective the two component parts should be integrated with the technology complementing and not replacing the efforts of the teacher'. In the same article Sharma (2007) [47] provided us with five practical examples of how to follow the guidelines at the lesson level; [1] a teacher prepares his students for giving a presentation firstly by discussing the topic, then by allowing them to practice fixed phrases using a CD-ROM, then watching a video on presentations, before finally they prepare and deliver their own, [2] using a class wiki (a website on which the pages can be edited by the users, e.g. Wikipedia), [3] creating a podcast (a computer audio file), [4] downloading Moodle software (a platform) to support a virtual learning environment (VLE), and [5] setting up a blog (an online diary).

According to (Graham, 2005) [48] there are six major issues course designer should consider prior to designing a blended learning course [1] the role of live interaction – how necessary is the face-to-face component of the course? Certainly in ELT it would seem fair to say students place a great deal of emphasis on this element of the course and that it is vital, [2] the role of learner choice and self-regulation – how much guidance should the students be given when it comes to choosing the type of blended learning course they participate in, in particular in relation to university courses?, [3] Models for support and training – how to support and train the instructors and students in a blended learning environment plus provide technological support, [4] finding balance between innovation and production – and how to do so in a cost effective way, [5] cultural adaptation – should the materials be adapted to suit local audiences?, and [5] dealing with the digital divide – can affordable blended learning models be developed to accommodate those at the bottom of the socioeconomic spectrum?

To achieve a 'principled approach' to blended learning Sharma and Barrett (2007: 13 –14) [49] suggest the following four guiding principles: [1] firstly, they advise you to 'separate the role of the teacher and the role of technology' as the roles are not interchangeable, but they are complementary, [2] secondly, 'teach in a principled way' using means that best suit the learners' needs, i.e. pedagogically driven, [3] thirdly, 'use technology to complement and enhance F2F teaching' meaning that the two modes should complement each other, and which seems to suggest that face-to-face is exclusively the lead mode, [4] lastly, 'It's not so much the program, more what you do with it' (Jones, 1986)[50].

In the present study; the proposed blended learning strategy was composed of 60% face-to-face interaction and 40% online learning. The face-to-face component was limited to mini lectures, power point presentation, class discussions and short quizzes. While the online component of the blended strategy components are online course material, reading and listening activities, exercises, group discussion took place in the computer lab and online tests.

Up-to-date, blended learning at the University of Khartoum is limited to some faculties' personal effort. Though, University of Khartoum possesses a very strong e-learning infrastructure and the resources needed for blended learning, no institution strategy existed for encouraging blended learning. Faculties' efforts in blended learning limited to preparation of power point presentations, displaying internet material during the class or recommending some websites for enhancing the course resources.

The real e-learning experience at the University of Khartoum was known as U.of. K. Web Classes. These web classes are launched through the university learning management system (Moodle), which established in the early 2000, but few online courses were found. The Khartoum University network is considered the largest among the Sudanese universities as it connects more than 4000 PCs in different geographical locations. It has a Wide Area Network (WAN) connecting the different campuses of the Centre and Medicine in Khartoum, Shambat in Khartoum North, and Education in Omdurman plus other units and hospitals. The university`s WAN has the potential to secure the needed support services for successful blended, online learning and web classes at University of Khartoum, figure 2.1 shows the statistics of the current web classes at Khartoum University.

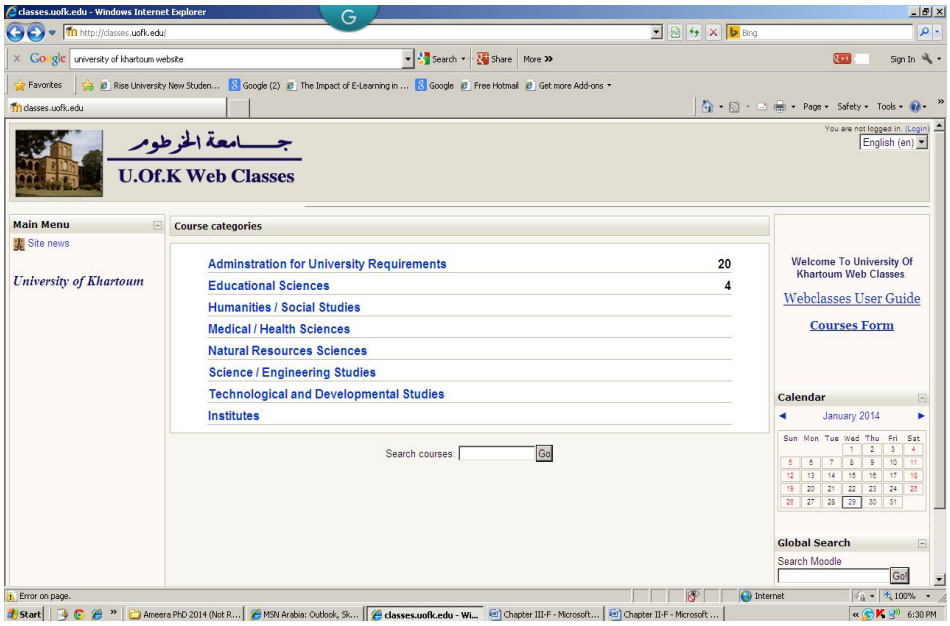

Fig.1: University of Khartoum web Classes Statistics (source: http://classes.uofk.edu/)

The university needs to make a big shift from a classic university in a technical oriented one in which blended learning represents daily practices. There's a need for developing an institution blended and online strategy, training the staff on how to develop e-course and manage web classes.

Harker and Koutsantoni (2005) [51] discussed the effectiveness of a web-based learning program of English for Academic Purposes (EAP) for British students from ethnic minority backgrounds. An original web-based materials for English for Academic Purposes (EAP) were developed and 43 student volunteers participated in two different modes of learning during the 9-week long program: through blended learning and at a distance. The study found that the blended learning mode was much more effective in student retention in this non-credit bearing program, whilst students' achievement levels were similar in both groups. In addition, formative and summative feedback from the students suggests that most students in both groups were satisfied with this web-based EAP program.

Although the benefits of blended learning have been well documented in educational research, relatively few studies have examined blended learning in language teacher education. Bueno (2012) [52] explored the benefits and drawbacks of synchronous voice-based computer-mediated communication (CMC) in a blended course of English for specific purposes. Quantitative and qualitative data from two groups following the same syllabus, except for the oral component, were compared. The results showed that achievements were significantly better in the experimental group and that there was also an increase of other positive factors which may effectively contribute both to second language acquisition (SLA) and to solving many of the problems which make speaking skills the weakest skill in foreign language contexts.

The issues of learners` motivation towards scientific English have not been sufficiently discussed with regard to Sudanese students. In other words, no study has been conducted to explore motivation that students in the Sudanese institutions might have toward learning the Scientific English language. Therefore, this study would help understand these important issues. Based on the current and up-to-date literature discussed in this section, the impact of blended learning in science students' academic achievement, and motivation towards English language learning are important concepts to be considered when investigating the effective design of a blended learning activity. As a result of reviewing literature and previous studies the authors conclude the following:

1. Blended learning is usually defined as the combination of multiple methods of teaching. It is sometimes referred to as integrated learning, hybrid learning, multi-method learning, or mixed learning (Franks, 2002) [35] blended learning is an element that can help create and advance a state of academic achievement, and thus could promote student`s motivation.

2. Most of the reviewed studies were focused on the effects of using computer on language learning, and the effects of e-learning and online units designed to teach L2 on the students' achievement and motivation towards learning English language.
3. It is very important to choose the suitable learning strategy, design a well planned online material and learning resources in Virtual Learning Environment (VLE) to teach second language (L2) skills and help the students to be independent learners, and motivated towards learning English language.
4. The authors noticed that there are very few studies designed in a blended learning approach to help L2 learners to learn general English skills in Sudan, and very few designed scales to measure undergraduate students' motivation towards learning English. This adds to the significance of the current study.
5. The authors will benefit from the relevant studies that designed online learning to enhance L2 vocabulary in designing the online component of the proposed blended learning (based on Moodle LMS and its online communication tools) to enhance the learning outcomes of the home science, health & therapeutic students who participated in this treatment.
6. The present study is different from the previous ones because it measured four dependent variables related to quantitative and qualitative Scientific English learning outcomes i.e. (Achievement in Scientific English, and motivation for learning Scientific English) and intended to provide support for the learners.

2.2 Statement of the Problem

Teaching Scientific English at Sudanese Universities and colleges faces tremendous challenges and problems due to the increase in higher education freshmen enrollers, shortage in learning resources and Sudanese educational systems reform. Within the current reform in the Sudanese new educational system, it is possible that the majority of university enrolees would be (18-21) years old who can afford to devote their full time to living on-campus and taking courses. Moreover, they may not be mature enough to take care of their learning responsibilities and live far away from their families.

To cope with the current national information technology revolutions, Sudanese science and health programs need to address the interest and needs of the growing number of students with innovative mediated structural programs through a variety of learning technologies and blended learning methods. Those blended learning methods can introduce a multitude of technological advantages to traditional programs of education (face-to-face).

Bates (2001) [53] mentioned that: the University of Central Florida in the USA reports that grades are higher when face –to-face classes are combined with on-line (Blended Learning) compared with straight face-to-face teaching or solely distance education courses. Students' ability to learn a second language can be influenced by their motivation to learn, attitudes towards the target language, the target language speakers and their culture, the social value of learning the second language, and also the students' attitudes towards themselves as members of their own culture (Ellis 1994) [54]. In addition, English as a Foreign Language (EFL) teachers should recognize that their students can possess positive and negative attitudes in varying degrees, and that the negative ones can be changed by thoughtful instructional methods, such as using materials and activities that help students achieve an "understanding and appreciation of the foreign culture" (Brown 2000, 181) [11].

The present study is mainly designed to test the effectiveness of a systematically developed Scientific English blended learning strategy for Khartoum University first year students` academic achievement as well as their learning motivation. The study is seeking to answer the following main question:

"What is the impact of blended learning on home science first year students who studying English for Science University required course learning outcomes? "

The study intended mainly to answer the following sub-questions:

1) What is the instructional design for the proposed blended learning Strategy?
2) What is the impact of the proposed blended learning strategy on Khartoum University first year home science students' achievement in English for Science University required course?
3) What is the impact of the proposed blended learning strategy on Khartoum University first year home science students' motivation to learn English for Science?

2.3 Purpose of the Study

1) Developing a blended learning strategy based on Moodle LMS and testing its effectiveness on teaching Scientific English at the University of Khartoum.
2) Assessing the impact of the proposed blended learning strategy on Khartoum University first year science students' academic achievement in The English for Science University required course.
3) Assessing the impact of the proposed blended learning strategy on candidate's motivation towards learning and studying Scientific English.
4) Deriving some recommendation on how to utilize blended learning for teaching Scientific English at the college level.

2.4 Delimitation and Limitation

The activities of the present study took place at University of Khartoum Educational Campus on home science first year students who are taking the English for Science university required courses. The material of the course was developed in a manner to cover topics related to subjects` field of study, which is home science in general, and human therapeutic and health nutrition in specific; and helps in developing their English language skills related to that field. The proposed blended learning strategy was 60% depends on face-to-face class presentations and 40% online/ electronic (e-learning) activities, mostly took place in a college computer lab equipped with the needed facilities and internet services. Learning outcomes limited to, total achievement in the course assessed by the final course achievement exam developed by the first author (the course instructor) and subjects` scores in the instructional material motivation survey (IMMS) adapted from Keller IMMS (2006) [55] and translated into Arabic language and administrated at the end of the course. Generalization of results in similar learning communities with similar educational contexts and subjects' characteristics is possible.

2.5 Definition of Terms

2.5.1Blended Learning

Refers to any combination of traditional teaching methods and other e-learning delivery formats (Osguthrope and Graham, 2003) [56]. Blended learning can also be defined as: the use of an electronic learning tools e.g. VLE to supplement the face-to-face learning (Welker & Berardino, 2005-2006) [57].

In the present study blended learning refers to the situation in which computer CDs, internet resources, the English for Science Course Campus (Moodle LMS) and face-to-face classes are blended together for teaching the Scientific English, University required course for Khartoum University first year science students so as to help them in learning the English vocabulary related to their scientific fields.

2.5.2 Scientific English Language

Oxford English language Dictionary (2014) [58] defines Scientific English as: as English for specific/ special purposes (the teaching of English for scientific, technical, etc. purposes to people whose first language is not English. In the present study Scientific English refers to a group of definitions, known terms and various issues that are included in the curriculum of the English for Science University Required Courses at the college level.

2.5.3Motivation for Learning

In this study motivation is described as goal-directed; the learners' immediate goal is to learn the language. Gardner (1985) [10] proposed that in order to understand why learners were motivated, it is necessary to understand the learners' ultimate goal or purpose for learning the language. Gardner refers to this as the learner's orientation. He identified two distinct orientations for learning a language: integrative and instrumental.

3 Methodology & Procedures

The objective of this research is to study and explore the impact of utilizing blended learning for teaching scientific English at Khartoum University on science students' academic achievement and motivation for learning scientific English. In order to achieve the study goals, the study designed the needed learning and teaching materials and planned the most suitable blended learning strategies. The following paragraphs will present a detailed description on the research procedures and methods.

3.1 The Research Methodology

The study adapted an experimental method to achieve its purpose. The adapted experimental research method utilized a quasi-design includes post-test control group design technique. More specifically, this research design was a quasi-experimental one for the difficulty of subjects` random assigning into experimental and control group. Table 3-1 shows the study design.

Table 1: The Study Design

Test	Group	Exp. Group	Con. Group 1	Cont. Group 2
Sudanese High school Certificate Score		Pre treatment	Pre treatment	Pre treatment
Achievement in Scientific English				
		Post treatment	Post treatment	Post treatment
Motivation to Learn English				
		Post treatment	Post treatment	Post treatment

The various designs for the variables were as follows:

1. The subjects` achievement hypothesis was tested by a randomized post-test control group design. This included the final exam.
2. Subjects` motivation towards learning and studying Scientific English hypothesis was tested by John Keller (2006) [55] Instructional Materials Motivation Survey (IMMS) instrument.

3.2 Population and Sample

The target population composed of first year science students' in Khartoum University who are eligible for studying the English for Science University required Course registered in the second semester of the academic years 2005/2006, 2011/2012 and 2012/2013.

The participants of the study were 137 female college students. Their ages varied from 17 to 21 years old and the reported mean value was 18.69 (S.D. = 1.6013). Concerning their Sudanese high school certificate, their scores ranged between 95 and 56, with an average of (74.48), and SD (1.06). Their first semester GPA mean is (m=2. 57, SD=. 481) and ranged between 1.58 and 3.39. Concerning their experience in computer & internet, around 30.8 % (42) classified themselves at week experience level, 59.0% (80) possessed an intermediate level of experience in computer and internet. Table (2) shows the study sample demographic and experiential characteristics.

Table 2: Characteristics of the Sample of the Study

Variable	Frequency	%
Gender		
Male	3	02.18
Female	135	97.82
Age		
Mean		18.69
Std. Deviation		01.60
Maximum		21.00
Minimum		17.00
Score in Secondary English		
Mean		74.49
Std. Deviation		9.06
Maximum		95
Minimum		56
GPA		
Mean		2.57
Std. Deviation		.481
Maximum		3.39
Minimum		1.58
Internet & computer experience		
Week exp.	12	30.8
Intermediate exp.	23	59.0
Advance expense.	4	10.3

3.3 Instrument and Procedures

3.3.1 English for Science Achievement Test

The aim of the test was to assess subjects` achievement in the English for Science university required course. The second author (course instructor) designed the achievement test which revised by the English language department and the University Requirement Unit and reviewers who specialized in teaching Scientific English for college students. The test consisted of questions with choices, covered the important skills that the researcher focused on during the experiment.

Question 1 was a reading passage about vitamins. It came with comprehension questions checking students' understanding of terminologies. It also tested how students answered in fully correct sentences (grammar and spelling).

Question 2 mainly covered grammar area, particularly parts of speech. It came with a table with spaces to be filled by students with suitable parts of speech.

Questions 3,4 & 5 tested transitive and intransitive verbs, English language tests and verbs to be (present and past) which the research think that students have fossilized errors need to be corrected by more practice. Also the exam tested students' ability to differentiate the present simple and continuous.

It is worth mentioning that; listening skills were not tested in the achievement test, because the study has already evaluated the impact of blended learning on participants listening skills during the lab sessions by asking them to answer listening questions after displaying online material.

3.3.2 Motivation towards Learning Scientific English Scale

To assess the impact of the proposed blended learning strategy on Khartoum University home science motivation towards learning Scientific English, the study adapted an instrument proposed and constructed by John Keller's (2006) [55] for measuring students' motivation known as instructional material motivation survey instrument. The Instructional Material Motivation Survey (IMMS) is a 36-item survey with a Likert-type scale. Participants are asked to think about each statement in relation to the course itself, and to indicate how true each statement is. The response scale ranges from 1 (Not true of me) to 5 (Very true of me). Therefore, the minimum score on the 36 item survey is 36, and the maximum is 180 with a midpoint of 108. The minimums, maximums, and midpoints for each subscale vary because they do not all have the same number of items. There are 5 subscales: one for each of the ARCS components (Attention, Relevance, Confidence, Satisfaction) and one for the ARCS total score.

Instructional Material Motivation Survey (IMMS) Scoring

The survey can be scored for each of the four subscales or the total scale score (Table 3). The response scale ranges from 1 to 5. This means that the minimum score on the 36 item survey is 36, and the maximum is 180 with a midpoint of 108. The minimums, maximums, and midpoints for each subscale vary because they do not all have the same number of items.

An alternate scoring method is to find the average score for each subscale and the total scale instead of using sums. For each respondent, divide the total score on a given scale by the number of items in that scale. This converts the totals into a score ranging from 1 to 5 and makes it easier to compare performance on each of the subscales.

There are no norms for the survey. As it is a situation specific measure, there is no expectation of a normal distribution of responses. As data become available from a variety of applications of the scales, descriptive statistical information will be published.

Scores are determined by summing the responses for each subscale and the total scale. Readers should note that the items marked reverse (table 3) is stated in a negative manner. The responses have to be reversed before they can be added into the total response. That is, for these items, 5 = 1, 4 = 2, 3 = 3, 2 = 4, and 1 = 5.

Table 3: IMMS Scoring Guide

Attention	Relevance	Confidence	Satisfaction
2	6	1	5
8	9	3 (reverse)	14
11	10	4	21
12 (reverse)	16	7 (reverse)	27
15 (reverse)	18	13	32
17	23	19 (reverse)	36
20	26 (reverse)	25	
22 (reverse)	30	34 (reverse)	
24	33	35	
28			
29 (reverse)			
31 (reverse)			

Psychometric testing: The survey was administered to a total of 90 undergraduate students in two undergraduate classes for pre-service teachers at Florida State University. The internal consistency estimates, based on Cronbach's alpha, were satisfactory (table 4).

Table 4: IMMSS Reliability Estimates and Computed Cronbach's Alpha for IMMS Test

Scale Reliability	Attention	Relevance	Confidence	Satisfaction	Total scale
Estimate (Cronbach α)	.89	.81	.90	.92	.96
Computed (Cronbach α)	.81	.81	.67	.64	.91

IMMS Validity Test

Validity was established by preparing two sets of instructional materials covering the concept of behavioural objectives. These materials were part of a unit of work on lesson planning and instructional design. Both lessons had the same objectives and technical content. The lesson for the control group was prepared according to standard principles of instructional design, but was not enhanced in any way to make it interesting. The experimental lesson was enhanced with strategies to stimulate curiosity, illustrate the practical relevance of the content, build confidence, and provide satisfying outcomes. Students were randomly assigned to the two lessons which they completed during one class period, including testing. Scores on the experimental lesson were significantly higher than for the control lesson.

The present study adapted the Instructional Materials Motivation Survey (IMMS) for assessing subjects' motivation towards learning Scientific English. The (IMMS) administrated at the end of the course on the experimental group only (those who taught the course material using the proposed blended learning strategy).

4 Developing and Implementing the Proposed Blended Strategy

The electronic component of the course was developed based on Moodle LMS tools used at Khartoum University. Activities of the development were guided by the principle of learning driven from teaching schools (behaviourism, cognitive theory, constructivism and social learning theory guidelines). The development process was guided by ADDIE model. The ADDIE Model instructional design model is possibly the best-known instructional design model; figure (2) below shows the phases of the model.

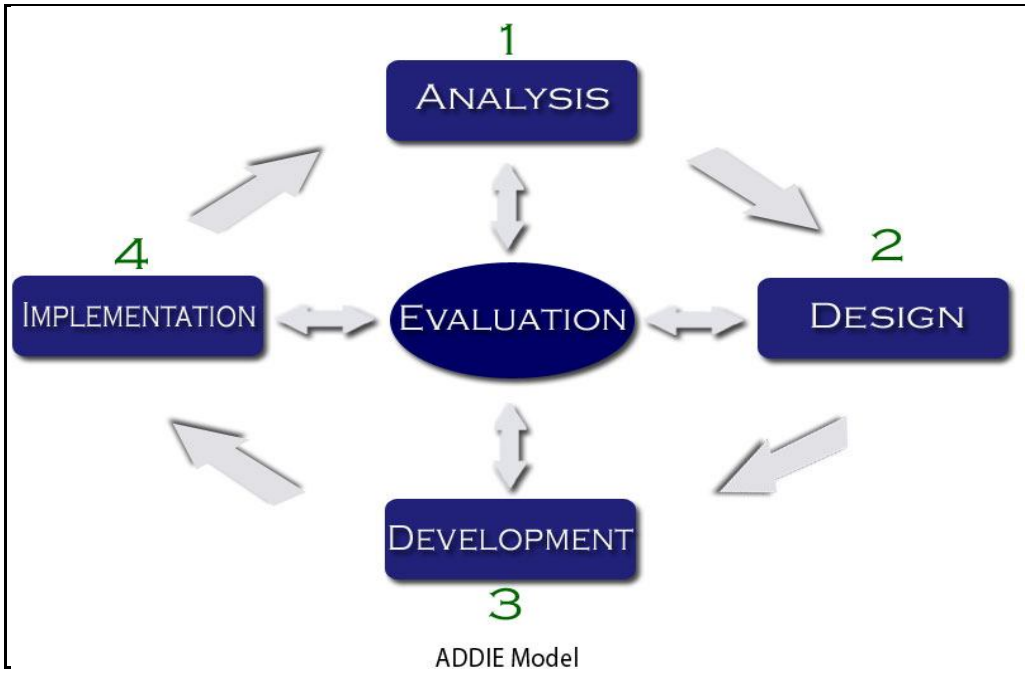

Fig.2: ADDIE Instructional Model Phases

As shown in fig. 2 above; ADDIE is a five phases (Analysis, Design, Development, Implement, and Evaluate) model, and of the ISD family (Instructional System Design). Though many of the people who work in the field think that the ADDIE model has no author, Watson (1981) [59], mentioned that: the model appeared for the first time in 1975. It was created by the Centre for Educational Technology at Florida State University for the U.S. Army and then quickly adopted by all the U.S. Armed Forces. The military, having a large number of instructional designers, greatly influenced much of the corporate and educational world to adapting the ISD or ADDIE model. In the present study the phases of the model utilized are as follows:

4.1 Analysis Phase

In this phase the study dealt with the target group description (home science students at the faculty of education – University of Khartoum who are studying the English for science university required course), were exited course outlines and description were revised, gaps were identified, learning context (class environment), and all factors related to where learning will take place was also accomplished.

In specific, the authors determined the needed components to be able to design the Moodle blended English for Science University required course. They identified the audience of the study. That is, the students who are enrolled in English 102 University required course (home Science first year students at Faculty of Education University of Khartoum). Those students were enrolled in the nominated course during the academic years (2011/2012 and 2012/2013) where the accessible population. They need to have a new way of teaching English for Science University required course, and to be active while learning.

Also in this phase, the delivery options were identified, which were to be, CDs that contain the course beside the online Moodle components and the student workbook (printed format). The product of this phase is the foundation for all subsequent design and development activities of the proposed course environment.

4.2 Design Phase

The activities of this phase are driven by the products of the analysis phase and ends in a model or blueprint of the English for Science course material. During this phase, learning tasks were analyzed, learning objectives for the course were stated, the assessment instruments were developed and the proposed instructional strategy is outlined and the delivery method which is based on blended learning through Moodle LMS environment is also developed and planned. The learning objectives of the course were stated as follows: by the end of this course home science first year student should be able to:

1. Read with understanding scientific texts related to their field of study.
2. Acquire terminology related to their field of specialization.

3. Apply the scientific style in their writing.
4. Analyze texts to their linguistic elements.
5. Use correct grammar when writing.
6. Write scientific and academic essays.
7. Write a correct list of references.
8. Use references appropriately: citation, summary, quotation, and paraphrasing.
9. Take notes from references and lectures.
10. Write their CV correctly.
11. Write job application letters in the correct style.
12. Write and present seminar paper.

Assessment instruments were set in this phase. The students' assessments in this course were intended to be formative and summative assessments. The formative assessment was to be through doing the activities and getting the immediate feedback and through the self-assessment questions at the end of each topic. The summative assessment was to be through the mid and end of the semester. In addition, post motivations scale to be administrated by the end of the course.

4.3 Development Phase

Development is simply diagramming and outlining the necessary activities that will assist the learners in reaching the course's goals. The end result is the completed instructional courseware (workbook in English for Science, its power point presentation-ppt, the activity book (both printed and electronic versions) as well as the Moodle environment component. The processes of this phase are driven by the products of the design phase and ends in a complete course package of instructional material for teaching the English for Science University required course and hosted on Khartoum University Moodle learning Environment.

In this phase, the actual production of the course material took place. The course was designed to meet the students' needs. They need to have an interactive learning course environment to understand the course material in general and to hear the correct pronunciation of some scientific terminologies in particular. Figure 2 shows, English 102 English for Science University Required Course homepage.

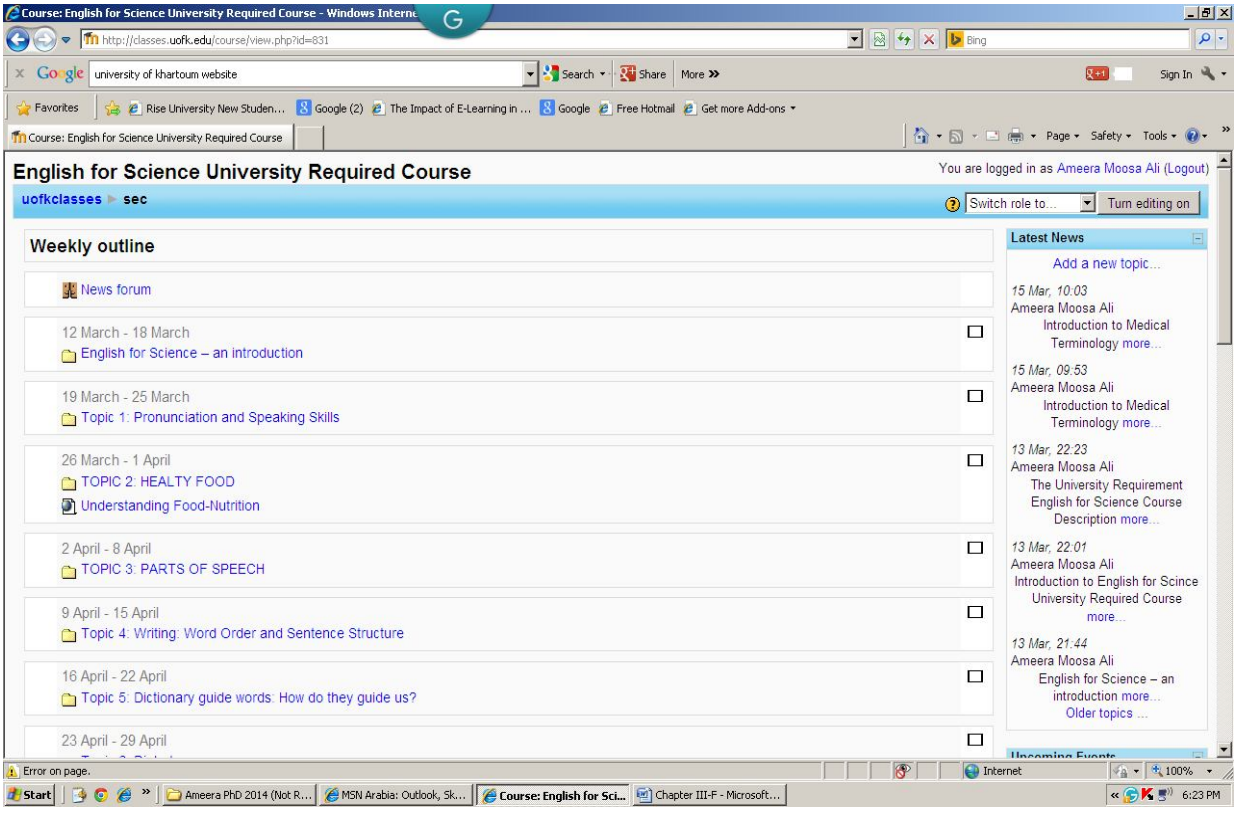

Fig. 3: Eng. 102 English for Science University Required Course homepage

4.4 Implementation Phase

The initial phases of the English for Science implementation methodology which have been discussed are Analyze, Design, and Develop – documents the course objectives and instructional requirements so that all the needed learning resources represented in (software & hardware) are prepared to install the new products and integrate it into the University of Khartoum Moodle LMS to be delivered in a blended learning manner. In this phase the course instructor prepared and trained on how to teach through a Moodle environment, the electronic component of the instructional system was installed, f2f instruction component was implemented at the Educational campus for 2 contact hours a week and starting from 17th of October 2013. The proposed blended learning strategy was also implemented. The course meets at the Geographical Information System (GIS) Computer Lab affiliated to the Geography Department for two hours a week, for practicing online learning activities i.e. (Listening to multimedia material, reading on related topics, navigating through the course material, downloading course material and doing extra exercise).

4.5 Evaluation Phase

The evaluation phase consists of two parts: formative and summative. For the purpose of this study, an academic achievement test and motivation survey was administrated by the end of the course so as to assess the impact of the proposed course material on subjects' quantitative and qualitative learning outcomes. Quantitative learning outcomes in this study were represented in achievement in scientific English, while qualitative Learning outcomes were limited to motivation towards learning and studying Scientific English which was tested by Keller Motivation Scale.

The outcomes of evaluating the impact of the proposed treatment on Khartoum University home science learning outcomes i.e. (Achievement and motivation towards learning and studying Scientific English) will be presented in the results section of the study.

5 Statistical Analyses

The Statistical Package for Social Sciences (SPSS) Version 19 was used for analyzing the collected data.

- ✓ The Cronbach's alpha test was used to analyze item's reliability for the IMMS scale. The aim of alpha test was to make sure that the scale had high discriminations indicators; the test was also used to expose the scales weak items.
- ✓ T- Test was used to test the significance of the difference between the experimental and control groups in academic achievement.
- ✓ For testing the impact of the proposed blended learning on subjects` motivation towards learning & studying English language one sample t-test and the level of confidence was used to test the significance between the attitudes pre and post services.

6 Results

The results of the data analysis, using statistical methods, are presented for each research question. The data analysis is based on the data collected from the research instruments described in the previous sections. The results of the questions and the related hypotheses are presented in the way they appeared in study followed by a discussion of the study's results. Data analysis was performed using SPSS v.19.

6.1 Results Related to Study Question I

What is the instructional design of the proposed blended learning strategy?

The activities of the present study are limited to English for Science taught at Faculty of education for the home science students seeking specialized in human nutrition. The goal of the study was to redesign the course topics and develop learning material that helps home science candidates to master the course objectives stated by the Khartoum University Requirement Unit.

6.1.1 English for Science Course Objectives

The general aim of the Scientific English, University Requirement Course (SEURC) is to upgrade the overall English language proficiency of students entering the home science & biological sciences programs from a low-intermediate to intermediate level.

A major objective of this course is to involve students in communicative interaction in English in order to increase their confidence and ability to deal with the demands placed on their skills in an integrated way in the language class.

6.1.2 English for Science Course Outline

The English for Science skills practice include the following:

1. Structure (Grammar): Review of those structures and functions frequently encountered in scientific discourse, particularly those related to description, definition, comparison and contrast, classification and process.
2. Reading: Improving general reading skills of anticipation, prediction, skimming, scanning, understanding main ideas, vocabulary in context, increasing reading speed and comprehension, particularly of scientific texts; and using a scientific dictionary.
3. Writing: Focus on developing paragraph writing skills; developing fluency and accuracy in writing; introduction to note-taking, paraphrasing and summary writing.
4. Vocabulary: Basic vocabulary and frequently used terms in scientific discourse, specifically those related to human biology and anatomy; nutrition, child education, medical and family terminology.
5. Speaking: Developing oral proficiency and fluency through asking, explaining, summarizing, presenting information orally (through individual, pairs and small group activities); improving pronunciation through drilling, reading and modelling.
6. Additional English for Science Improving Activities:
   - Small group discussions: Students exhibiting substantial deficiencies in any of the above skill areas will be required to undertake further practice in small group discussion setting. Small group discussion focusing on grammar, writing and further fluency practice (speaking) will be conducted several times a week.
   - Out of Class Activities: All students are required to complete an individualized program to improve their general English proficiency through self-access and/or project work as determined and agreed upon with their course instructor.

Table 4: English for Science, University Required Course Outlines and Home Assignment

Weeks	Classroom Activities	Home Assignments
1.	English for Science – an introduction How the module works Assessment Diagnosing your learning needs	Getting familiar with the course material, the teaching/learning strategy, the online component of the course as well as the assignments and evaluation.
2.	Speaking and pronunciation: introductions and greetings	Exercises: listening online activities and practices related to the topics.
3.	Reading comprehension: text about the Healthy Food. Spelling rules.	Online reading texts about Healthy Food.
4.	Parts of speech. Examples and exercises.	Exercises: parts of speech.
5.	Writing (word order and sentence structure; organizing words into sentences, paragraphs and topics).	Printed material on Family Customs in different parts of the world.
6.	How to use the dictionary? Oxford online dictionary	Find meaning online for a list of words.
7.	Reading Comprehension: about Family Cycle.	Prepare a short presentation about your Family.
8.	Vocabulary: Diabetes.	Exercises; reading comprehension exercises and spelling tasks.
9.	Simple Present and Present Continuous. Texts related.	Prepare to speak about your daily activities using the grammar rules.
10.	Capitalization. Proper nouns and common nouns.	Exercises and reading online texts.
11.	Simple Past and Past Continuous. Reading text.	Writing short stories using the rules.
12.	Vocabulary: affixes (suffixes and prefixes). Readings on Body Systems	Vocabulary exercises, quizzes and games.
13.	Present Perfect. Text and exercises. Readings on Snowboarding.	Prepare to give a short presentation about your last vacations.
14.	Reading topic about Anemia.	Exercises related to Anemia.
15.	Exam preparation week.	Preparation for final exams - written and oral.

6.1.3 The Proposed Teaching Strategy

The material of the course taught through a blended learning approach in which face –to-face sessions, printed material (course workbook), interactive computer-based learning resources, internet resources (electronic learning resources) were integrated and mixed. The blending ratio was around 60 % for traditional teaching and 40% for e-learning which delivered via Khartoum University Moodle LMS. To access the Moodle component of the course, go to the following link: http://classes.uofk.edu/, then click on educational sciences link and then the course link.

6.1.4 Course Assessment

Grades will be determined based on quizzes and exams related to the specific language skills practiced in class and presented in other learning resources. In addition, a certain percentage of the total mark will be assigned for speaking and writing assignments. The Scientific English course is a two-credit course. Students will be evaluated as follows:

Table 5: English for Science Assessment Strategy (100 Points)

Item #	Short description	Marks (points)
1.	Quiz 1:	10
2.	Quiz 2:	10
3.	Attendance:	5
4.	Self Study:	5
5.	Midterm exam:	20
6.	Final written exam:	30
7.	Final oral exam:	20
Total		100 Points

6.2 Result Related to Question II

What is the impact of the proposed blended learning strategy on Khartoum University first year home science students' achievement in English for Science University required course?

To test the impact of the proposed blended learning strategy on Khartoum university students` achievement in scientific English, the study tested the first hypothesis stated that [there are statistically significant differences between the experimental and the two control groups in final scientific English exam means due to the use of the proposed blended learning strategy. Subjects' achievement was assessed through the course final exam (post-test) developed by the course instructor. Final scores were recorded and transferred to SPSS for data analysis. The analysis was conducted on the experiential group and the two control groups to estimate if the blended learning has impacts on learners' achievement or not. As the study samples was constituted of three different groups, t-test and One-way ANOVA to compare samples' means was conducted. To know whether the null hypothesis is rejected or not in ANOVA, the output of the test analysis (produced using SPSS version 19) is shown below.
Firstly, the output obtained from One-way ANOVA with descriptive statistics of Learners' achievements and Post-Hocs (Tukey HSD) are summarized.

Table 6: Means and Standard Deviations of the Groups Score Based on the Post-Test (Final Exam)

Group	N. of population	Mean	Std. Deviation
Experimental (2012/2013)	56	64.667	8.566
Control 1 (2011/2012)	33	59.576	13.599
Control 2 (2005/2006)	48	58.696	10.992

Table (6) verifies that the experimental group means exceeded the two control groups means in scientific English. They were as follows: Experimental group average was (64.667), and the first control group average was (59.576) whereas the second control group average was (58.696).

In the Next table, the written summary of the significance of the differences among between groups would be [$F(2, 136) = 4.224$, $p <. 017$]. This means that the computed value of F test reached (4.224) and it was statistically significant at the significance level reached (.017) that is greater than the significance level ($\alpha = 0.05$). Consequently, there is a major difference between the learners' scores in the three groups.

Table 7: Test Results of ONE WAY ANOVA test for Detecting the Significance of Differences among Groups in Final Scientific English Exam

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1009.433	2	504.717	4.224	.017
Within Groups	16012.567	134	119.497		
Total	17022.000	136			

The results stated in the table (7) indicate that the experimental group and the two control groups are not equivalent to the achievement post-test. Subjects' achievements in Scientific English final differed significantly among the three groups. Therefore, in this case, the results will reject the null hypothesis and conclude that there are differences of any sort in learners' scores in scientific English. Although, the ANOVA table didn't show which of the three groups means might be different from others. Therefore, a multiple comparison test was needed to show the difference between the low and high groups. The Averages and standard deviations of the three groups' scores were measured.

Independent Sample T-test was applied to identify the significance between any of the two groups as you will see in the following shown tables.

Table 8: Independent Sample t- Test Results for Detecting the Significance of Differences in Means and Standard Deviations of the Two Control Groups in Final Achievement SE Exam

Group Type	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Control 1 2011/2012	33	59.576	13.599	-.333-	87	.740
Control 2 2005/2006	56	58.696	10.992			

The SPSS output from independent samples t-test gives us the means and standard deviations for both groups. But the actual t-test results will be able the results of Levene's test for equality of variances. The values of the t, df, and Sig. (2-tailed) of Levene's test results decided if the variances are equal across groups or not. The data have produced that (t (87) =-. 333-, p =. 740). The test results indicate that the control groups have no differences in the total final exam averages.

As the research main interest is to detect significant statistical results between the experimental group and the control groups, another output from Independent samples t-test for data analysis will be carried out in the following tables.

Table (9) indicates that the experimental group has an average of (64.667) with a standard deviation (8.566), whereas the first control group came in the second position with an average of (58.696) and standard deviation (10.992).

Table 9: Independent Sample t- Test Results for Detecting the Significance of differences in Means and Standard Deviations of the Experimental and the First Control Group in Final Exam Achievement Test

Group Type	N	Mean	Std. Deviation	t	df	Sig.(2-tailed)
Experimental 2012/2013	48	64.667	8.566	2.068	79	.042
Control 1 2011/2012	33	59.576	13.599			

Levene's test results indicated that the difference in the total variance between the two groups in the Final achievement exam is statistically significant at the significance level (0.05). The test results show that (at (79) = 2.068, p =.042).

Further analysis for the experimental and the second control group was undertaken and shown in the following table. Table (10) indicates that the experimental group has an average of (64.667) with a standard deviation (8.566), whereas the second control group came in the second position with an average of (58.696) and standard deviation (10.992).

Table (10): Independent sample t- Test results for detecting the Significance of differences in Means and Standard Deviations of the experimental and the second control groups in Post Achievement Test

Group Type	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Experimental 2012/2013	48	64.667	8.566	3.051	102	.003
Control 1 2005/2006	56	58.696	10.992			

Levene's test results indicated that the differences in the total variance between the two groups in the post achievement test is statistically significant at the significance level (0.05). The test results shows that (t (102) = 3.051, p = .003).

Distribution of grades in English for Science University Required Course

Further analysis was undertaken in subjects' final grades in English for science University required course. The grading system in Khartoum University categories are (A, B+, B, C+, C, D & F).

This grading system is based on the probability of grading (Thorndike, 1977) [60] that distributed achievement into five groups as follows:

Grade	Range	Percentage probability
A	+ 1.5 to 2.5 or more	7
B	+ .5 to 1.5	24
C	+. 0 to 0.5	38
D	-0.5 to -1.5	24
F	- 1.5 to -2.5	7

Table 11 shows the three groups grades final grades distribution in the English for Science University required course.

Table 11: Subjects Grade Distribution in English 1022 Course

First year2012/2013 grades distribution					
Grade		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A	1	2.1	2.1	2.1
	B+	12	25.0	25.0	27.1
	B	24	50.0	50.0	77.1
	C+	9	18.8	18.8	95.8
	C	1	2.1	2.1	97.9
	D	1	2.1	2.1	100.0
	Total	48	100.0	100.0	
First year2011/2012 grades distribution					
Valid	A	4	12.1	12.1	12.1
	B+	4	12.1	12.1	24.2
	B	8	24.2	24.2	48.5
	C+	13	39.4	39.4	87.9
	C	4	12.1	12.1	100.0
	Total	33	100.0	100.0	
First year2005/2006 grades distribution					
Valid	A	0	0	0.00	0.00
	B+	8	14.3	14.3	14.3
	B	13	23.2	23.2	37.5
	C+	13	23.2	23.2	60.7
	C	18	32.1	32.1	92.9
	D	4	7.1	7.1	100.0
	Total	56	100.0	100.0	

Finger 4 shows subjects` actual and expected destitution of grades in the English 102 course.

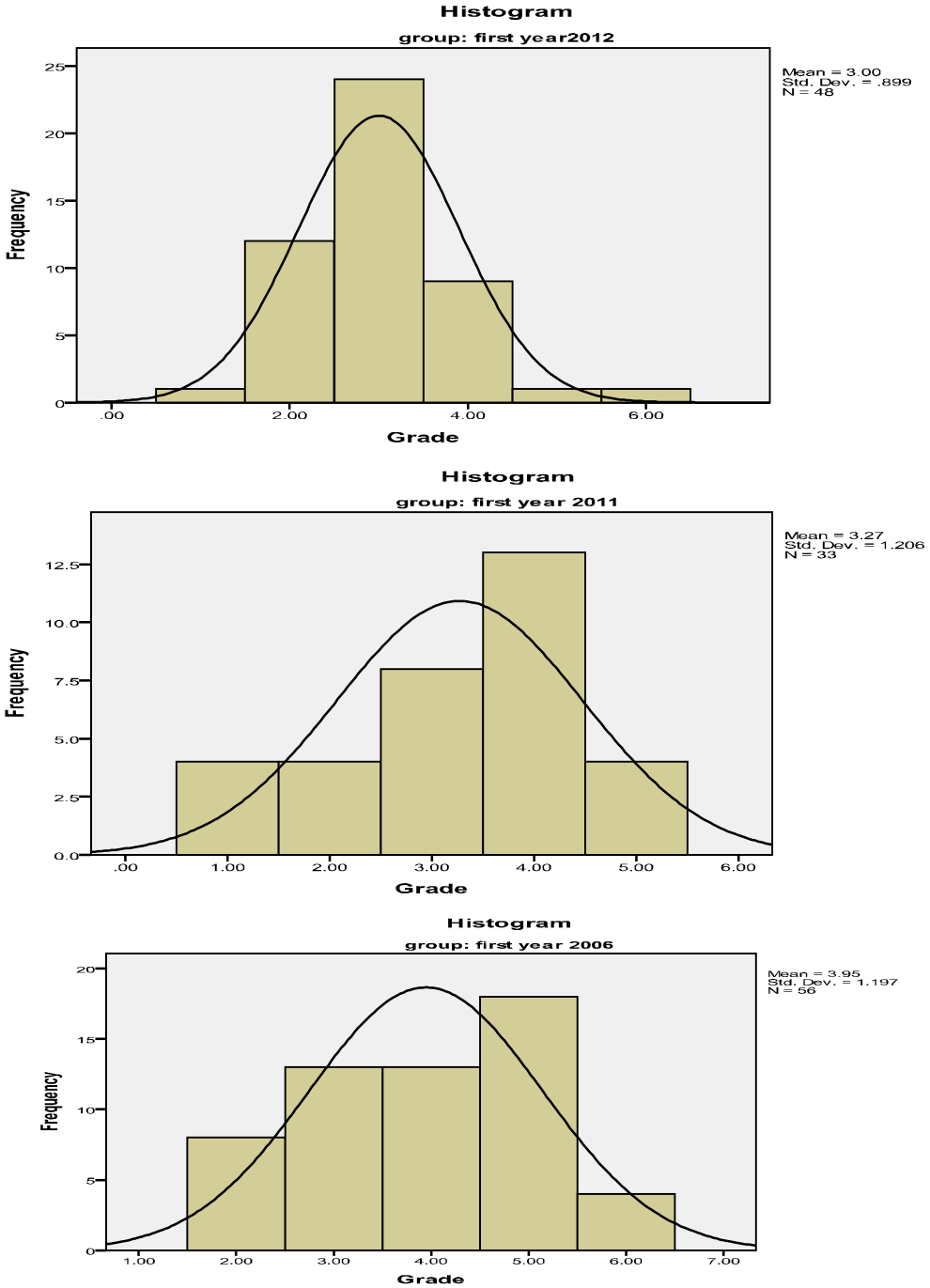

Figure 4: Actual & Expected Grade Distribution for English 1022 Course

6.3 Result Related to Question III

What is the impact of the proposed blended learning strategy on Khartoum University first year Health & therapeutic nutrition students' motivation to learn English for Science?

To answer this question the study tested the following hypothesis: There are statistically significant differences between the experimental group mean of motivation to learn English for Science scale and the average mean of motivation (3) due to the use of the proposed blended learning strategy.

To test the impact of the proposed teaching strategy on subjects' motivation towards learning and studying English for Science, the motivation towards English language scale was administrated on the experimental group at the end of the study program (on the 16th week of the semester 2012/2013) by the use of the proposed material and strategy. The motivation towards English language instrument was answered by 39 of the course participants who were 46 in total. As stated earlier in chapter three; the Instructional Materials Motivation Survey (IMMS) instrument was proposed and constructed by John Keller's (2006) for measuring students' motivation. The motivation yardstick was composed of 36 items distributed among 4 sub-domains that build subjects' motivation towards the English language. Table 12 shows mean scores, standard deviations with regard to motivation towards learning English language for (IMMS) dominions and the scale as the whole.

Table 12: Mean Scores, Standards Deviations & Degree of Judge with Regard to Motivation for Learning English

IMMS dimension	N	# items	Mean	Std. Deviation	Degree of judge
Attention	39	8	3.7350	.45317	Above average
Relevance	39	9	4.1425	.58292	High
Confidence	39	8	3.9886	.50904	Above average
Satisfaction	39	9	4.1154	.54095	High
IMMS	39	36	4.0840	.46396	High

From table 12 we condoled the following:

Subject's motivation towards learning English for Science in all dimensions scored a mean (≥3. 0) and judged as above average to high i.e. (The four dimensions of IMMS mean ranges from above average to high). The relevance of the material scored the highest mean (m= 4.1425, Sd. = .58292), then came the satisfaction component (m= 4.1154, Sd. = .54095), confidence component (m=3. 9886, Sd. = .50904). Relevance component scored the lowest mean (m= 3.7350, Sd. = .45317).

The overall mean score of the subjects' motivation towards learning English for science judgment is high (m=4.0840, Sd. = .46396).

To test the impact of the proposed blended learning strategy for teaching English for science on subjects` motivation toward learning English, the means scored of the subjects on the scale dimensions were computed and compared to the normal (average) degree of an individual motivation towards learning English language which is equivalent to 3 in the Likert-five point scale using one-sample t-test was used. Table 12 shows the results of motivation towards learning English one-sample t-tests results and the confidence interval differences.

Table 13: One-Sample T-Test and the Confidence Interval Differences in the Participants' Motivation towards Learning English

	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Attention	10.129	38	.000	.73504	.5881	.8819
Relevance	12.239	38	.000	1.14245	.9535	1.3314
Confidence	12.128	38	.000	.98860	.8236	1.1536
Satisfaction	12.877	38	.000	1.11538	.9400	1.2907
IMMS	14.592	38	.000	1.08405	.9336	1.2344

Results of one-sample t test is shown in table (13) indicated that: all IMMS components means (Attentions, Relevance, Confidence & Satisfaction) as well as the whole IMMS were found to be larger than the average motivation level (3) and found to be significantly significant (0.05) level. The test results show that: for attention t (38) = 10.129, p =.000); for relevance t (38) = 12.239, p =.000); for the confidence t (38) = 10.129, p =.000), for satisfaction t (38) = 12.128, p =.000) and for the whole IMMS t (38) = 14.592, p =.000).

These results indicate that the subjects` motivation toward learning English for science is positively improved by integrating and using the proposed blended learning strategy based on Moodle LMS for teaching English for science at Khartoum University.

7 Discussion

One of the aims of the present study was to assess the impact of a proposed blended learning strategy on Khartoum University first year science students' achievement in English for Science University Required course. The student's achievement was assessed by the use of the course final exam grades. Experimental group (2012/2013) final exam mean exceeded the means of the two control groups i.e. (First year 20111/2012 & first year, 2005/2006). Data analysis results were strongly supported the study first hypothesis proposed that; there were significant differences between the experimental group and the two control groups in relation to the achievement in English for Science University Required Course at Khartoum University. The proposed blended learning strategy has proved positive impact on subjects' achievement by facilitating their learning, making learning resources available and accessible inside and outside the class time. In addition to varieties in learning resources that accommodated different learning styles, motivate the students and encourage individual learning.
The results in achievement were in agreement with (Harker and Koutsantoni, 2005) [51] study, which found that the blended learning mode was much more effective in student retention in this non-credit English Language Course bearing program. And Bueno (2012) [52] work which proved that blended learning group achievements were significantly better in the experimental group and that there was also an increase of other positive factors which may effectively contribute both to second language acquisition (SLA). Such results were also supported by (DeRosier, et.al. 2013) [61] work which proved that the strongest variable affecting improvement in blended learning was time, and the most significant time effect was seen in the production of presentations and publications.

The results relevant to the second study hypothesis revealed statistical significant differences between the experimental group averages in all components of IMMS motivation scale: Attention, Confidence, Satisfaction, and Relevance between the actual mean of motivation and the proposed motivation average mean (3 out of 5 on Likeret) in favor of the experimental group. Subject's motivation towards learning English for Science in all dimensions scored means (≥3. 0) and judged as above average to high i.e. (The four dimensions of IMMS mean ranges from above average to high). The relevance of the material scored the highest mean (m= 4.1425, Sd. = .58292), then came the satisfaction component (m= 4.1154, Sd. = .54095), confidence component (m=3. 9886, Sd. = .50904). Relevance component scored the lowest mean (m= 3.7350, Sd. = .45317).

The overall mean score of the subjects' motivation towards learning English for science judgment is high (m=4.0840, Sd. = .46396). Consequently, the overall motivation results obtained indicate that the use of different blended learning format presentations based on the use of audio, video and hypertext which were experimented on the experimental group is effective in teaching Scientific English compared with the (face-to-face) traditional method that was applied to the students of the control groups.

This result supported by (Perlas, 2010) [43] study who found that blended learning format had positively affected students` motivation in terms of providing students with both internal and external motivating factors, and (Shivetts, 2011) [62] who explored literature related to e-learning and blended learning environments concluded that; learners' motivation is a major factor for e-learning and blended learning success. The results also alert that student success in this environment is heavily related to course layout and accessibility.

8 Conclusion and Recommendations

The proposed blended learning approach was used based on Khartoum University Moodle Learning Management System. The activities of the present treatment took place in Khartoum University Educational Main Campus located in Omdurman. The electronic component of the course was hosted at Faculty of education Geographical Information System GIS Computer lab. The GIS computer lab is a well established e-learning environment with 50 workstations, multimedia presentation system, and full access to Khartoum University Network Services and Web classes. The application presents the content that contains text, hyperlinks, recommended websites and other multimedia formats in a way that can effectively develop learners' English language Skills. Instructor and technical support can provide instant feedback for educational purposes and better blended learning experience in Scientific English. Thus, the study sets out to investigate the effects of a proposed blended learning strategy in Scientific English on learners' achievement and motivation toward learning and studying Scientific English.

It tested the following two hypotheses;

- There are statistically significant differences between the experimental group and the two control groups in the English for Science University required course test due to the use of the blended learning strategy.
- There are statistically significant differences between the experimental group motivations towards learning English for Science scale and the proposed average level of motivation (m=3) due to the use of the blended learning strategy.

The study utilized a mixed research approach; a descriptive approach based on the survey and content analysis was used in collecting information and documents related to course descriptions in Scientific English, the system design of instrumental systems approach was utilized for developing the course learning material, and its electronic components based of Khartoum University Moodle LMS.

In conclusion, the proposed blended learning strategy used in teaching English for Science University required course (Eng 102) was positively affect Khartoum University health & therapeutics first year students' achievement and motivation towards learning and studying Scientific English at Khartoum University and improved the students' satisfaction with the course online material unit. These results should a higher the value of blended learning in developing students' acquisition of L2 vocabulary in English for Science, since this study had its circumstances and problems that may be behind this result. As it is clear in the literature review, there are some studies that proved the success of blended learning in enhancing vocabulary acquisition.
Based on the study findings and conclusion drawn above, the authors recommend the following:

1. Khartoum University should encourage English for Science instructors to adopt blended learning and make use of the Moodle learning environment along with the traditional method of teaching to facilitate the learning process. Training sessions should be held for staff to provide them with the latest developments in the field of language education, blended learning and e-learning.
2. Scientific English instructors should motivate their learners to use internet technology in general and multimedia format in particular that help them to interact with outside learning material and communicate with their colleagues and teachers as well as be independent learners.
3. For university education purposes, computer and internet services should be available in the college and make accessible for the students.

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