

Central content source computer aided teaching (CCSCAT)

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Abstract

The art of teaching is an age-long activity that started with the introduction of education. Teaching itself is both formal and informal and over time, it has been manually carried out, until the advent of computers which introduced the use of images and videos to teach prospective learners. This system of teaching involves the use of large screen display unit in each classroom, preferably a wide Screen Television set. The display unit is placed directly in front of the class, while the conventional whiteboard is to the left side of the class, for short write ups. All the contents for the courses/subjects are built using either Microsoft PowerPoint or any other presentation software, alongside a long text presentation software. There are two major modules of this software – tertiary education module (e-Lectures) and lower education module (CCSCAT) for primary and secondary schools. The tertiary education module is a very effective tool for online teaching for distant learning programs. Using e-Lectures offline, the lecturer enters the class with either an Air Mouse or Wireless Mouse and a Wireless Keyboard. His/her laptop is connected to the wide screen display unit. For writing purposes, which is just illustrations, he may use a digital pen, for online courses, the lecturer shares his screen while using remote desktop software like Zoom, Team Viewer, Anywhere Meeting, etc. As for CCSCAT, there is a central server that houses all the contents for the subjects. The classrooms are connected to this server either online or offline. Meanwhile, the system is predominantly meant to work offline because of the current internet challenges being faced in some countries.

Keywords: Teaching, computerized, computer, offline, online

1.Introduction

Educational today has gone digital and as one of the dimensions of civilization, it can only get better. Digitization of the education sector is no longer an object of debate, especially with the advent of Covid 19 that has forced almost all human interactions to take place online. Learning activities that make use of electronic devices like LAN, WAN, or Internet to give lectures, to interact, or to guide and monitor the students, have been described as e-Learning (Koran, 2002). Over the last decade, there has been an increased awareness of the need to integration and fully implement Information and Communications Technology in our educational system. The Federal Government, on her part, has come up with several programmes. A common trend in the Nigerian educational system is that programs are initiated with little or no implementation at the end (Okoroma, 2006). In several other instances, however, implementation policies are yet to be matched with a corresponding result in the

system, resulting to a mis reflection of the original plan. The aftermath effect is that, not much is actually seen and appreciated about the impact and the huge advantages of ICT in today's education (Israel, 2014). If the rate at which programmes are initiated by the government in the education sector are matched with action, the country would have gone farther than this in technological know-how because this sector is the engine room for technological growth by way of research. Effective and efficient teaching of engineering courses is, therefore, imperative.

Hence, this study tried to seek ways of teaching courses to bring out the best engineers that could compete with their counterparts globally. No student who has been able to pass five subjects at credit level in West African School Certificate Examinations, or other similar examinations can be said to be a dullard. This is so because if the student is not a dullard and the method of teaching is the best, then the student is supposed to come

out bright as well. The computer literacy level of lecturers is on the average (Otonla A.O., 2013), being predominantly used for basic activities and not deep into pedagogical involvements in the university system.

Multimedia, which is one of the major focus of the contents built in this software, helps all learners more effectively and meaningfully through the “dual coding” of information in which the learner processes text and images simultaneously (Mayer, 2001). There has been a lot of online teaching globally for all tiers of the education system in recent years. Meanwhile, third world countries have not been able to harness the potentials of online learning due to poor or non-existing internet connectivity (Oye1 et al 2011). Internet access has been the major challenge to online learning in developing countries. If the content to be taught has a way of residing in the school environment, without going to fetch same from the internet (especially in remote areas and villages), learners in such communities can also have an improved and better learning experience.

This study is aimed at computerizing pedagogy and making it accessible to all, irrespective of

geographical location. The objectives are to develop a system that can turn learning content into digital form, ease comprehension by way of multimedia learning, develop a software that will help achieve and deliver the content with minimal infrastructure.

Thus, this work will to a very great extent, enhance learning by way of infusing multimedia into courses/lessons taught. All courses/lessons will have videos embedded in them as much as possible. One of the versions of the e-Lectures/CCSCAT is Auto-Teaching where the lecturer/teacher records the lecture/lesson. In this case, it will drastically reduce the amount of energy expended by the lecturer/teacher for the course/subject and the system can be deployed in remote villages. On the long run, the system will improve the standard of teaching in the schools that will deploy it.

2. Materials and method

2.1 Hardware

Wide screen television

This is the visual display unit (42 inches wide or more) to be used. The choice of the tv is predicated on its picture clarity, durability, and low power consumption and the psychological advantaged (on the part the children) of the urge to watch the television.



Fig. 1. Wide screen television

Computer server

For e-Lectures, no server is required as the contents are right there on the lecturer’s laptop. For piracy and other security issues, the content of the courses is not made public. As for CCSCAT, the system is going to involve a computer network with

high configuration server. The server will be used to server the content. A hard disk size of between 500GB to 1TB will be needed and a RAM size of 32GB. The RAM size is that much in order to serve large File sizes, especially video Files on the network. This server may be in the head teacher’s office.



Fig. 2 Computer server

Thin client computer

Thin Client computers are going to be used for individual workstations which are actually the classrooms. This will help reduce setup cost and, maintenance cost for the system. It should also have a good amount of RAM, say 4GB and a good graphics adapter.

which are video Files, Cat 6e cable with a gigabyte switch is recommended.

Laptop computer

This is to be used by the lecturer. It houses all the contents, and it should be of good configuration, preferably Core i5 (min) 8GB RAM HDMI port, Web Cam.

Wired network

A wired network is required. This will serve the interconnectivity framework for accessing the contents from any classroom. Due to the nature and size of Files involved,

Air mouse and wireless keyboard/mouse

These are the input devices. They are wireless in order to allow the lecturer/teacher to move about and also operate the lectures/lessons from any position in the class.

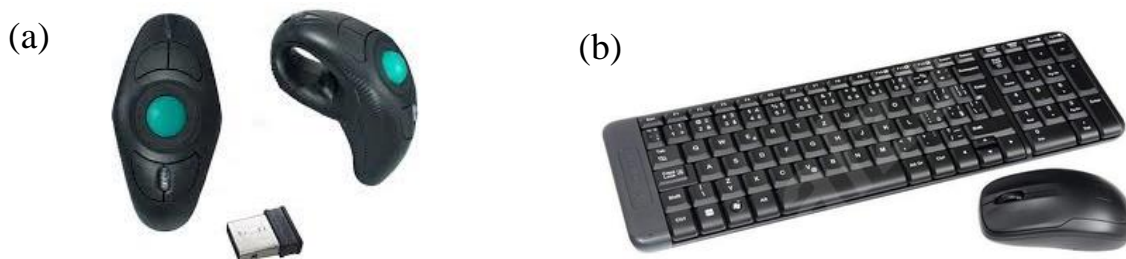


Figure 3: (a) Air mouse (b) Wireless keyboard and mouse

Digital pen tablet

This is the writing tool for CCSCAT that replaces the whiteboard marker. In a lecture theatre, the lecturer may not be able to write

on the board, due to its height. A digital pen is therefore needed to write on the board. An example of a digital pen is Huion H420 Graphics Pen Tablet (Fig. 2) It has a dimension of 4 inches long and 2.2 inches wide which makes it portable.



Figure 4: Huion H420 graphics pen tablet

Software

Two software packages were developed. The first is e-Lectures Version 1.0. The lecturer enters the class and selects the course, the course level, and the topic to be taught. The PowerPoint File is loaded, with links to the associated videos and pdf Files. The second software is CCSCAT Version 1.0 which is meant for primary and secondary schools.

the mouse and keyboard. The mouse pointer is made visible enough by a software package called PenAttention, so that it becomes visible. There are various commands on the keyboard during video play to repeat a section of the video, jump to a given position on the video and also, increase/reduce the video speed. Double-clicking on the video gives full screen.

3.Results and discussion

The system is such that when the lecturer/teacher enters the class, he/she selects the course/subject to be taught, selects the topic, and starts teaching with

E-Lectures version 1.0

Below are screenshots for e-Lectures Ver. 1.0 showing ELA 301 & ELA 302 taken by 300 level students in Production Engineering Department:

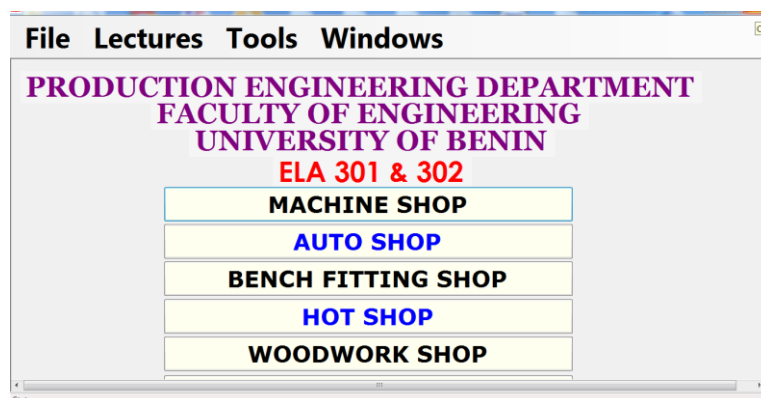


Fig. 5 Screenshot for e-Lectures Ver. 1.0 (Home screen)

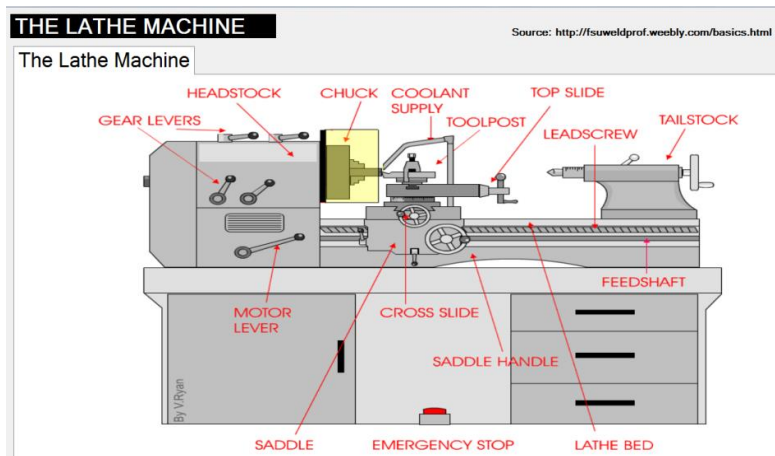


Fig. 6 Screenshot for E-Lectures Ver. 1.0 (Machine shop practice)

CCSCAT Version 1.0

The screenshots below are for the computer aided teaching for primary schools:

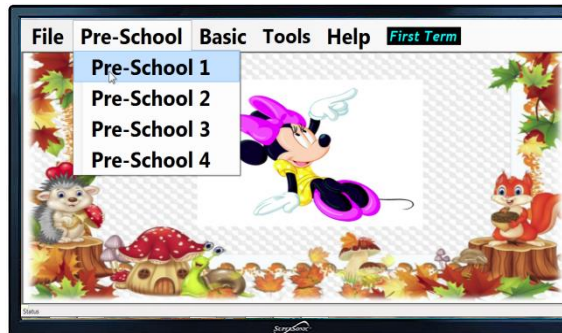


Fig. 7 Screenshot for CCSCAT Ver. 1.0 (Home screen)

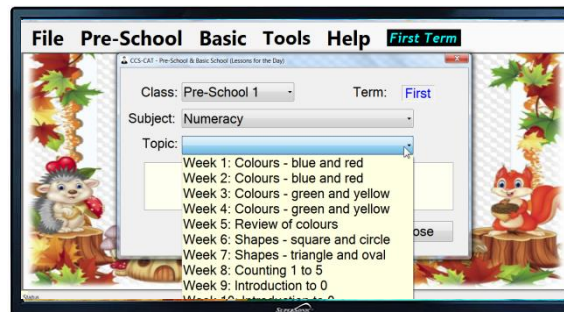


Fig. 8 Screenshot for CCSCAT Ver. 1.0 (Select Topic)

3.1 Discussion of results

The major limitation of this work is the availability of electrical power. Once there is light, the infrastructure needed for deployment can be easily acquired, depending on available funds. The system can be deployed even in just one classroom. Some of the variables that impact on the use of e-Lectures/CCSCAT are:

- 1) The computer literacy level of the lecturer/teacher
- 2) Some topics may not be present in what the school is currently using, and one would need to build such content and add to the site.
- 3) The different curricula being used by many schools (Nigerian, British and Blended curricula) calls for the need to continue building content for different schools. Some schools would not also want their content to be used by any other school.
- 4) Filling up of the Thin Client's hard disk. This can be eliminated by using a good hard drive size for the Thin Client.

Conclusion

This paper has described how to deploy a computer aided teaching system that takes advantage of the ease and inherent improvement by the computer in handling human day to day tasks in all spheres of life. The ability of the main PowerPoint File to be linked to all other File types is what makes the program seamless. Moreover, e-Lectures and CCSCAT can be deployed both offline and online, which makes it deployable anywhere in the world, be it in a remote village or in the heart of the city. In a stable internet connected environment, it is the best tool for distant/online teaching. It has the ability to show slides with animations, images and

play videos and at the same time listen to the lecturer/teacher's microphone. It is a live class.

References

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APPENDIX I

SOURCE CODE FOR e-LECTURES VER. 1.0 USING MICROSOFT VISUAL

STUDIO 2015 (VB.Net) – Windows Application

A few Forms have their source code shown below, for space consideration:

```
Public Class frmSections
    Public Shared movieFileName As String

    Private Sub Home_Load(sender As Object, e As EventArgs) Handles MyBase.Load
        Me.MdiParent = IntelligentTutor
    End Sub

    Private Sub btnExit_Click(sender As Object, e As EventArgs) Handles btnExit.Click, btnExit.Click
        End
    End Sub

    Private Sub Button1_Click(sender As Object, e As EventArgs) Handles Button1.Click
        Dim ChildForm As New frmMachineSection
        ChildForm.Show()
    End Sub

    Private Sub Button2_Click(sender As Object, e As EventArgs) Handles Button2.Click
        Dim ChildForm As New frmSheetMetal
        ChildForm.Show()
    End Sub

    Private Sub Button4_Click_1(sender As Object, e As EventArgs) Handles btnExit.Click
        End
    End Sub

    Private Sub Button4_Click_2(sender As Object, e As EventArgs) Handles Button4.Click
```

```
        Dim ChildForm As New frmAutoShop
        ChildForm.Show()
    End Sub

    Private Sub Button3_Click(sender As Object, e As EventArgs) Handles Button3.Click
        Dim ChildForm As New frmWoodWork
        ChildForm.Show()
    End Sub

    Private Sub Button5_Click(sender As Object, e As EventArgs) Handles Button5.Click
        Dim ChildForm As New frmBenchFitting
        ChildForm.Show()
    End Sub

    Private Sub Button7_Click(sender As Object, e As EventArgs) Handles Button7.Click
        Dim ChildForm As New frmFoundryShop
        ChildForm.Show()
    End Sub

    Private Sub Button6_Click(sender As Object, e As EventArgs) Handles Button6.Click
        Dim ChildForm As New frmHotShop
        ChildForm.Show()
    End Sub

    Private Sub Button2_MouseEnter(sender As Object, e As EventArgs) Handles Button2.MouseEnter
        Button2.BackColor = Color.Black
        Button2.ForeColor = Color.Ivory
    End Sub

    Private Sub Button2_MouseLeave(sender As Object, e As EventArgs) Handles Button2.MouseLeave
        Button2.BackColor = Color.Ivory
```

```
        Button2.ForeColor = Color.Blue
    End Sub

    Private Sub Button1_MouseEnter(sender
As Object, e As EventArgs) Handles
Button1.MouseEnter
        Button1.BackColor = Color.Black
        Button1.ForeColor = Color.Ivory
    End Sub
    Private Sub Button1_MouseLeave(sender
As Object, e As EventArgs) Handles
Button1.MouseLeave
        Button1.BackColor = Color.Ivory
        Button1.ForeColor = Color.Black
    End Sub

    Private Sub Button3_MouseEnter(sender
As Object, e As EventArgs) Handles
Button3.MouseEnter
        Button3.BackColor = Color.Black
        Button3.ForeColor = Color.Ivory
    End Sub
    Private Sub Button3_MouseLeave(sender
As Object, e As EventArgs) Handles
Button3.MouseLeave
        Button3.BackColor = Color.Ivory
        Button3.ForeColor = Color.Black
    End Sub

    Private Sub Button4_MouseEnter(sender
As Object, e As EventArgs) Handles
Button4.MouseEnter
        Button4.BackColor = Color.Black
        Button4.ForeColor = Color.Ivory
    End Sub
    Private Sub Button4_MouseLeave(sender
As Object, e As EventArgs) Handles
Button4.MouseLeave
        Button4.BackColor = Color.Ivory
        Button4.ForeColor = Color.Blue
    End Sub

    Private Sub Button5_MouseEnter(sender
As Object, e As EventArgs) Handles
Button5.MouseEnter
        Button5.BackColor = Color.Black
        Button5.ForeColor = Color.Ivory
    End Sub
    Private Sub Button5_MouseLeave(sender
As Object, e As EventArgs) Handles
Button5.MouseLeave
        Button5.BackColor = Color.Ivory
        Button5.ForeColor = Color.Black
    End Sub

    Private Sub Button6_MouseEnter(sender
As Object, e As EventArgs) Handles
Button6.MouseEnter
        Button6.BackColor = Color.Black
        Button6.ForeColor = Color.Ivory
    End Sub
    Private Sub Button6_MouseLeave(sender
As Object, e As EventArgs) Handles
Button6.MouseLeave
        Button6.BackColor = Color.Ivory
        Button6.ForeColor = Color.Blue
    End Sub

    Private Sub Button7_MouseEnter(sender
As Object, e As EventArgs) Handles
Button7.MouseEnter
        Button7.BackColor = Color.Black
        Button7.ForeColor = Color.Ivory
    End Sub
    Private Sub Button7_MouseLeave(sender
As Object, e As EventArgs) Handles
Button7.MouseLeave
        Button7.BackColor = Color.Ivory
        Button7.ForeColor = Color.Black
    End Sub

    Private Sub btnExit_MouseEnter(sender
As Object, e As EventArgs) Handles
btnExit.MouseEnter
        btnExit.BackColor = Color.Black
        btnExit.ForeColor = Color.Ivory
    End Sub

    Private Sub btnExit_MouseLeave(sender
As Object, e As EventArgs) Handles
btnExit.MouseLeave
        btnExit.BackColor = Color.Tomato
```



```
        btnExit.ForeColor = Color.Cyan
    End Sub
End Class
```

```
Source=Mainserver;Initial
Catalog=eClassroom;User
Id=sa;Password=a_5j__0"
        cn.ConnectionString =
"Provider=Microsoft.ACE.OLEDB.12.0;
Data Source
=DatabaseFiles\myLogic.accdb;"
```

APPENDIX II

SOURCE CODE FOR CCSCAT VER. 1.0
USING MICROSOFT VISUAL STUDIO
2015 (VB.Net) – Windows Application

**A few Forms have their source code
shown below, for space consideration:**

FORM FOR ADDING TOPIC TO THE SOFTWARE

```
Public Class frmAddTopics
    ' Private adapter As New
    SqlDataAdapter("SELECT * FROM
Categories", "Microsoft.Jet.OLEDB.4.0;
Data Source =
|DataDirectory|\eClassroomDatabase.accdb;
User ID=Admin;Password=")
    ' Private builder As New
    SqlCommandBuilder(adapter)
    ' Private table As New DataTable
```

```
    Private Sub
frmAddLessons_Load(ByVal sender As
System.Object, ByVal e As
System.EventArgs) Handles MyBase.Load
        On Error Resume Next
        Dim cn As New
OleDb.OleDbConnection
        Dim cmd, cmd2 As
OleDb.OleDbCommand
        Dim odr, odr2 As
OleDb.OleDbDataReader
        Dim strSQL, strSQL2 As String

        ' cn.ConnectionString =
"Provider=SQLOLEDB;Data
```

```
'Fill Subjects combo box
strSQL = "SELECT Distinct Subject
FROM Subjects ORDER by Subject"
```

```
        cmd = New
OleDb.OleDbCommand(strSQL, cn)

        cn.Open()

        odr =
cmd.ExecuteReader(CommandBehavior.Clo
seConnection)
```

```
        cmbSubject.Items.Clear()
```

```
        Do While odr.Read
```

```
        cmbSubject.Items.Add(odr.GetValue(0).ToS
tring())
```

```
        Loop
```

```
'Fill Class combo box
strSQL = "SELECT ClassName FROM
Classes ORDER by ClassName"
```

```
        cmd = New
OleDb.OleDbCommand(strSQL, cn)
```

```
        cn.Open()
```

```
        odr =
cmd.ExecuteReader(CommandBehavior.Clo
seConnection)
```

```
        cmbClass.Items.Clear()
```

```
Do While odr.Read

cmbClass.Items.Add(odr.GetValue(0).ToString())
Loop

End Sub

Private Sub btnAddTopic_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles btnAddTopic.Click

If cmbSubject.Text = "" Then
MsgBox("Please select the Subject",
MsgBoxStyle.Information, "eClassroom")
cmbSubject.Focus()
Exit Sub
End If

If txtTopic.Text = "" Then
MsgBox("Please enter the Topic",
MsgBoxStyle.Critical, "eClassroom")
txtTopic.Focus()
Exit Sub
End If

On Error GoTo 20

Dim con As New
OleDb.OleDbConnection

Dim cmd As New
OleDb.OleDbCommand
Dim sql As String
con.ConnectionString =
"Provider=Microsoft.ACE.OLEDB.12.0;
Data Source
=DatabaseFiles\myLogic.accdb;"
'con.ConnectionString =
"Provider=SQLOLEDB;Data
Source=Mainserver;Initial
Catalog=eClassroom;User
Id=sa;Password=a_5j_0"
```

```
con.Open()
Dim myTopic As String
myTopic = txtTopic.Text

sql = "INSERT INTO Topics(Subject,
Topic, Class, Term, Included, DeleteFlag,
UpdateFlag) VALUES('" &
cmbSubject.SelectedItem.ToString & "','" &
RTrim(LTrim(myTopic.Replace("''", '')))
& "','" & cmbClass.SelectedItem.ToString &
',''" & GetSetting("eClassroom", "Tools",
"CurrentTerm") & "','Yes', 1,1)"
cmd = New
OleDb.OleDbCommand(sql, con)
cmd.ExecuteNonQuery()
MsgBox("Record saved.",
MsgBoxStyle.Information)
txtTopic.Text = ""
txtTopic.Focus()

20:
If Err.Number = "5" Then
MsgBox("This Topic already exists."
& vbCrLf & "Duplicate Topics are Not
allowed", MsgBoxStyle.Critical,
"eClassroom")

ElseIf Not Err.Number = 0 Then
MsgBox(Err.Description,
MsgBoxStyle.Critical, "eClassroom")
End If

End Sub

Private Sub btnClose_Click(ByVal sender
As System.Object, ByVal e As
System.EventArgs)
IntelligentTutor.Show()
Me.Close()
End Sub

Private Sub btnUpdate_Click(ByVal sender
As System.Object, ByVal e As
System.EventArgs)
'Save the changes back to the database.
' adapter.Update(table)
```

End Sub

```
Private Sub Button2_Click(ByVal sender
As System.Object, ByVal e As
System.EventArgs) Handles Button2.Click
    If MsgBox("Do you want To close this
Form", MsgBoxStyle.YesNoCancel +
MsgBoxStyle.Question +
MsgBoxStyle.DefaultButton2,
"eClassroom") = MsgBoxResult.Yes Then
        Me.Close()
    End If
End Sub
```

```
Private Sub Button1_Click(ByVal sender
As System.Object, ByVal e As
System.EventArgs) Handles Button1.Click
    Dim ff As New frmUpdateTopics
    ff.Show()
    Me.Close()
End Sub
```

```
Private Sub
cmbSubject_SelectedIndexChanged(sender
As Object, e As EventArgs) Handles
cmbSubject.SelectedIndexChanged
```

```
End Sub
End Class
```