THE IMPACT OF CAL STRATEGIES ON CAD


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Abstract. This paper reports on a twofold study, which examines the impact of CAL on CAD and architectural education, and evaluates the overall effectiveness and efficiency of CAD teaching and strategies in the curriculum of architecture. The study also examined the need for a framework within which the creation of a module for applying CAL in CAD to support the curriculum of architecture can be structured and assessed. The main concern of the study was to explore the range and balance of computer assisted activities in the design studio, and the interpretation of the various roles of the CAD tutor and his/her involvement in delivering these activities. In delivering these activities two criteria, namely: teaching methods and CAD integration (which are interchangeable and yet play different roles), can have a distinct effect on the implementation of CAL in the design studio.

The case study evaluated and investigated the CAL in the AEC course as part of the 3rd year design studio at Mackintosh School of Architecture, to determine to what extent the AEC learning events were effective in advocating new strategies in CAD. The methods of this investigation consisted of classroom observations and administering questionnaires. Variables such as the group and gender differences/participation, the tutor’s confidence, level of administration and strategies to help with technical problems and motivations, also the task-related activities, tangibility of the learning materials, and the minutes of lesson have been examined. The global rating of the CAL events in CAD lessons, the CAL organisation and sequence, the level of students’ confidence, the rate of students’ interest, the mode of classroom, the level of learner performance and the relationship between CAL and the overall curriculum have also been empirically examined and their interdependent relationships explored. The findings of this study may help in establishing future directions in adopting some form of effective CAL strategies in CAD. The study also serves as an evaluation tool for computing teaching in the design studio. Furthermore, the checklist (see Appendix) used in this case study may also be used in evaluating the different courses in CAD in the curriculum of architectural schools.

1. Introduction

In the 1960s, USA psychologists perceived computers as the new vehicle to convey the concept of computer assisted instructions (CAI) and as a better adaptive/flexible tool and environment to the individual learners than the two other programmed instructions: 'format-teaching machine' and the book-programmed texts' (Apter and Westby 1973). Next to the 'tutorial' effects that the computer offers, it also provides 'drill and practice' concepts (UGC 1970). Research conducted by many institutions in the UK (CBURC, CEG, SCEG, NCC, IUCC) furnished a great diversity of information yet demonstrated clearly that CAL, CML or CAI areas were absent in architecture (SSRCUS 1973).

2.1. CONCEPTUAL ASPECTS

Research by Apter & Westby (1973), Filden & Lockwood Lewis (1973), Oppenheimer (1971) Gilligan (1975), Miles (1975), Smith (1975), Hartley (1975), Lewis (1975) and Broderick & Lovatt (1974) reveals that CAL, CAI, CML domains are highly significant in education; nonetheless, architectural education has been reluctant to account for and apply these terms. Hooper (1975) argued that the notion of the terms CAL, CAI, CML should be understood from a common stand, and not dedicated to any special area or field.

Figure 1 describes interrelations of computer aided architectural design (CAAD) tuition domains, divided into three areas: the, acronym/CAAD domains, the conceptual references in architectural curriculum and the architectural education domains.

![Diagram of CAD domains relevant to the curriculum of architecture.](image)

As a result, this study discerns the three key CAD domains, namely CAL, CAI and CML in relation to group-based and individual-based tuition as follows:

1. **Computer-aided learning (CAL):** The term refers specifically to computers as a learning resource or medium. Thus, proposing that CAL is the
use of a computer system to augment or supplement a conventional instructional system.

2. **Computer-aided Instruction (CAI) and Computer-aided Teaching (CAT):** The two terms are very similar in their meaning and usage; they both have a common goal and objective when applied. These terms mainly refer to the 'drill and practice' and 'tutorial' varieties. Some authors such as Hooper considered CAI as one type of CAL.

3. **Computer-management learning (CML):** The term refers to computer management of learners, which involves the aspects of teachers, instructional materials, media and administrative duties in the computer assisted learning events in CAD. The nature of these three key domains (factors) is manifested and explored throughout their interdependent relationship with the five domains: cognitive, skills, attitude, creativity and performance (QaQish 1997).

4. **Group-based and Individual-based learning in CAL:** The nature of the communication in group- based computer learning and by individual study is such that each involves a distinct process. During the computer-aided learning events differences in what is learnt due to variations in how the communication and learning occurs are likely to be found. When discussing the issue of co-operative, competitive and individualist goal structures, in terms of the group or the individual, Johnson (1988) argues that computer technology furnishes education with several challenges:

   a) The challenge to prevent isolation and alienation of students when promoting the effective instructional employment of computers.

   b) Computer assisted learning institutes less interaction with teachers and classmates, thus advocating the assumption that CAI is primarily individualistic.

   c) Computer assisted instruction may have an effect on educational practice, since interpersonal interaction is a key influencing factor on instructional effectiveness and classroom climate. As a result, the possible use of computer assisted co-operative or competitive instruction is ignored.

2.2. **IDEOLOGICAL ASPECTS**

The aims of any CAD software are to facilitate different types of direct learning which traditionally may not be easily found as often as required in the design studio setting. Computers in CAD could be used with the aim of developing skills such as problem-solving and effective CAD manipulation. Naturally conventional methods are used in the design studio as opposed to CAD methods in the computer lab. In the design studio, students are expected to be confident in using the conventional methods to help them produce their projects in an appropriate presentation manner. In this study, the concept of using a computer in a competent manner that allows the students to produce their
projects without the help of the tutor is referred to as the level of students' confidence. This variable was believed to have an interrelationship with other important ones, namely: knowledge, skills, creativity, performance and affective (QaQish 1997).

3. The Study Description and Objectives

The case study closely explored four areas of research:

1. Principally, the study has evaluated the effectiveness, appropriateness, nature and functionality of CAL in CAD in the AEC course. To achieve a broader perception and knowledge of the role of computer aided learning (CAL) and computer management learning (CML) in computer aided design (CAD) and in architectural education (AE), the study investigated where and how CAL is used in CAD education and to what extent CML in the architectural curriculum is being sought out.

2. The question of Gender and CAL events, was manifested by the AEC course showing different males & females responses. Much research suggested that females benefit significantly less than males from the teaching of computers. For example the achievement level of males was significantly higher than that of females in three national assessments of science, in 1969, 1973, and 1977 (Johnson 1988). The question of whether or not educators should evaluate and examine Gender differences, and how important gender response is to CAL in CAD was addressed.

3. The response of each group of the AEC course in relation to the mode of the CAL activities rendered was examined. The variable mode of CAL events was categorised into five activities, namely: Competition =1, Experimenting =2, Testing =3, Imitating teacher = 4, Drifting away =5.

4. The response of the AEC groups to the five variables namely, the global rating, the rate of the students' interest in CAL, the minutes of CAL, the CAL organisation and sequence, the students' confidence and interest and the percentage of task related activities in the CAL event, the mode of the CAL events, the global rating of the CAL activities in CAD, the level of administrations and the level of tutor's confidence were all examined and interrelated.

4. Methods of Data Collection and Analysis

This study represents the empirical analysis of the information collected from the observations carried out in 20 sessions of the AEC course as part of the 3rd year design studio at MSA and delivered to 5 groups each consists of approximately 12 students. The observations were carried out using a checklist
prepared and developed by the author based on the ITMA group approach to
classroom observation (Phillips 1988). Their approach involved a teacher, a
microcomputer and a group of pupils working together effectively. The
developed CAD checklist gave a directed approach towards CAL in CAD.

4.1. CAD LESSON CHECKLIST

The checklist was divided into six sections as follows (see Appendix for details):
3. The Overall Activities of the CAL Events in Reference to the Learner and the
   Teacher.
4. Communication Skills
5. The Lecture Brief and Highlights of the Main Points
6. The Overall Effectiveness of the CAL Event. The tutor’s abilities,
   organisation, management and competence during the CAL events were
   explored. The students overall satisfaction with the computing teaching and
   the tutors and attitude towards CAL were also examined.

5. Evaluating the Results From the Computer-Aided Learning Event
   (Profile & Distribution) in CAD Course.

Tutors often make generalisations about students, relative to behaviour, how
they think and learn. Although in certain circumstances these general
statements are constructive and productive, they ignore the differences between
groups of students. The issue surrounding diversity among groups of students is
addressed and explored in this study, e.g., cross-sectional differences that exist
among groups and between male and female (Dweck, Davidson, Nelson &
Enna 1978).

5.1. THE RELATIONSHIP BETWEEN THE STUDENTS’ ATTENDANCE/
PARTICIPATION (DV) & GENDER (IV).

Figure 2 shows that there were significant changes in behaviour between males
and females’ attendance in the AEC course. It maintains that the frequencies of
the females’ attendance were much higher in earlier AEC sessions than males,
whereas males’ attendance reached its peak towards the end of the CAL events.
Females showed a tendency to attend the AEC sessions in a ‘fluctuating rhythm’, e.g. a reduction of attendance frequencies fell towards the end of the course. Evidence of rather strong differences of gender attitudes related to CAD learning events was found, this agreed with an earlier study by the author (QaQish & Hanna 1996) which also revealed evidence of different behavioural trends in terms of CAD attendance/participation and training hours between male and female students.

5.2. THE MEAN RESULTS OF CAL VARIABLES OF THE CAD COURSE RELATIVE TO GROUPS OF STUDENTS.

Figure 3 shows the mean of CAL IVs and DVs, namely: the tutor confidence, administration and organisation, the students’ interests and confidence, the CAL task related activities, the global rating and the minutes of CAL events; see appendix for the measuring scale used in the analysis for each variable (Chart 1), and the relationship between and within groups of students (Charts 2).

Most variables ranked approximately around an average of 3.0, which suggests good overall students response in the CAL activities (Figure 3, Chart 1). The high mean of the tutor confidence suggests strong evidence of tutor competency in handling and delivering the CAL materials. The evidence confirms that the tutor’s competence in handling and delivering the CAL materials could contribute significantly to improving students’ skills and attitude, and most of all contributes to students’ overall satisfaction with CAL, e.g. a number of students in the AEC course were able to effectively use and
translate the materials and the instructions they assimilated from the tutorial. This suggests that the effective use of CAD largely depends on the tutor’s competence and the effective and efficient learning strategies he/she incorporates during the CAL events. In Figure 3 (Chart 2) the $DV$ students’ interests has the highest means in four groups, whereas the $DV$ students’ confidence scored the lowest means in the five groups. This indicates that both students’ interests and confidence have similar significance among groups of CAD course. The minutes (proceedings) were scaled from $1=$ substantial obstruction to $5=$ great help. The minutes of the class scored a mean of 3.5 in almost all groups which indicates a persistent effective mode of activity rendered during the CAL events. The high mean score of 3.5 indicates that the CAL minutes were significantly affected by the effective progress and the sequence of the CAL events.

5.3. THE RELATIONSHIP BETWEEN STUDENTS’ CONFIDENCE AND THE TUTOR’S CONFIDENCE

The rate of both students’ and tutor’s confidence was examined using a scale of $1=$ poor, $2=$ fair, $3=$ good, $4=$ very good, $5=$ excellent. Figure 4 (Chart 1) indicates that under an excellent tutor’s confidence the rate of students’ confidence registered a high count of good confidence rate, whereas it registered a low count of fair rate under confident tutor level. This suggests that the tutor’s confidence which represents the level of competence, and abilities in CAD (Skills, knowledge and attitude) is directly related to the students’ confidence. Figure 4 (Chart 2) validates this suggestion by showing evidence of a positive linear correlation between the two variables. Thus, the more confident a tutor is in delivering and explaining CAD applications the more confident students would be in using and handling the CAD package.

![Chart 1: Count/Rate level of Students' Confidence](image1)

![Chart 2: Rate level of Tutor's Confidence](image2)

*Figure 4. The Relationship Between the Students’ Confidence and the Tutor’s Confidence*

5.3.1. Discussion

In the design studio a one to one tutorial is conducted almost throughout; this concept of teaching basis was initiated in the Ancient Greeks. Aristotle
believed in the relation between knowledge and experience (Russell 1960). Similarly, these ideas are experienced and practised again in the methods of instructional teaching in computing (CAI), where students gain knowledge from experience (drill and practice) and observing the tutor during the CAL activities. The relationship between assimilation and dissemination of knowledge by the students and the teachers is then an important notion that must be addressed and interrelated in both CAD and design studio. Schon (1987) argued that this notion is mainly an act of coaching. According to Schon the traditional education of the design studio represents four activities, namely: reflection-in-action, problem-setting, ad hoc theory building and on the spot experimenting. However, coaching should be considered as one form of the act of teaching. If computer aided instruction is to be successful in CAD, then, effective methods of disseminating knowledge similar to those explored in the design studio setting, have to be presented simultaneously along with the design studio.

5.4. THE RELATIONSHIP BETWEEN THE MODE OF CAL EVENTS ($Df$) & THE GROUPS OF CAD COURSE.

Evaluating the CAL event mode amongst the five groups of students in the AEC course revealed differences in the modes of CAL within the groups' attitudes. Five modes were thought to be significant when teaching CAD, namely: competition, experimenting, testing, imitating teacher and drifting away.

![Figure 5: The Relationship of the Mode of CAL events and AEC Students' Groups.](image)

Figure 5 shows that only experimenting and testing modes were registered amongst the five groups of students. The evidence demonstrates that different responses to computing teaching amongst groups of students initiate different modes of CAL. Although the five groups appeared to have performed the two activities of experimenting and testing, yet insignificant differences between the groups were recorded, e.g. group 2 showed an inclination towards an experimenting mode, whereas other groups showed a tendency towards both experimenting and testing.
5.5. THE RELATIONSHIP BETWEEN THE MODE OF CAL EVENTS (DI) & THE STUDENTS’ CONFIDENCE AND INTERESTS OF CAD COURSE.

As the degree of confidence improves amongst groups of students, the level of competence in CAD handling increases relative to modes of CAL. So, the mode of the CAL in CAD next to the variable students' interests and confidence was tested further and found to be significant under students’ interests. When the mode of the class is geared towards experimenting the students' interests reached a frequency of 3.9 as opposed to 2.9 for confidence (Figure 6). This indicates that there was a significant positive relationship between the variable mode of the class under experimenting and testing and the students' interests, whereas the relationship was negative with student's confidence.

![Graph showing the relationship between Mode of CAL Events, Mode of Classroom, and Student Confidence and Interests.]

**Figure 6.** The Relationship between the Mode of CAL and the Students’ Confidence and Interests Relative to Experimenting and Testing.

The independent analysis carried out on both variables demonstrates the observed response percentages between the mode of CAL and the students' interests and confidence (Figure 7). A scale of 1= poor to 5= excellent was assigned to measure the students' confidence and interests. The findings show that the students' interests counted for higher percentages under excellent, very good and good ratings, with both experimenting and testing. Evidently, this area requires further investigation in the behavioural psychology of both the students’ confidence and interests relative to the mode of CAL events.

The question of CAD integration into the design studio becomes rather
inapplicable as other areas of architectural education emerged and also proved important relative to CAD, such as lighting and structure. The integration of CAD as a learning resource must be examined in a wider context of research. The design studio along with other areas in the curriculum such as technology and history all are perceived as learning tools from which students assimilate the knowledge of architecture and regressively induce its practicable side (practice)(see Figure 1).

5.6. THE RELATIONSHIP BETWEEN THE TUTOR’S LEVEL OF CONFIDENCE, ADMINISTRATION AND ORGANISATION (IVS) & THE STUDENTS’ CONFIDENCE AND INTERESTS (DV’S) OF CAD COURSE.

There was evidence to suggest an association between the tutor’s level of confidence, administration and organisation of the CAL events and the students’ interests and confidence. The word Confidence relative to the student or the tutor applies to an overall level of competence, skills, knowledge and attitude during the CAL events. The null hypothesis states that there was no association between the tutor’s IV’s and the students’ DV’s. This implies that the tutor’s IV’s did not affect the level of the students’ interest or confidence. The test shows that there was an association between the tutor’s confidence and the student’s confidence (Table 1, No. 3), the value of $X^2$ was found to be significant at the 0.005 level ($X^2=15.78901$, $df=4$, $CV=7.779$). The results of the correlation tests carried out on the same two variables (Table 2, No.3), found a significant positive association (Pearson’s $r=0.7557$, $N=18$, $p=0.378$). It was concluded that the more confident a tutor is, the more confident a student is likely to become in skills, knowledge and attitude. Similar results were found between the tutor’s confidence and the student’s interests (Table 1, No. 6).

**TABLE 1. Tests of Goodness of fit for the CAL and the Students’ IV’s and VS’s**

<table>
<thead>
<tr>
<th>No</th>
<th>IV</th>
<th>VS</th>
<th>DV</th>
<th>N</th>
<th>$X^2$</th>
<th>df</th>
<th>$P$</th>
<th>CV</th>
<th>$r$</th>
<th>AP</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rate of CAL Organisation &amp; level of Students’ Confidence</td>
<td>20</td>
<td>6.707</td>
<td>2</td>
<td>0.34</td>
<td>2</td>
<td>0.03</td>
<td>12.67</td>
<td>0.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rate Level of Administration level of Students’ Confidence</td>
<td>20</td>
<td>5.128</td>
<td>4</td>
<td>.274</td>
<td>7.779</td>
<td>0.203</td>
<td>3886</td>
<td>0.378</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Level of Tutor’s Confidence by level of Students’ Confidence</td>
<td>20</td>
<td>15.789</td>
<td>4</td>
<td>0.003</td>
<td>7.779</td>
<td>0.755</td>
<td>0033</td>
<td>0.378</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rate of CAL Organisation &amp; level of Students’ Interest</td>
<td>20</td>
<td>0.996</td>
<td>6</td>
<td>0.952</td>
<td>2.706</td>
<td>0.043</td>
<td>8566</td>
<td>0.378</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Rate Level of Administration level of Students’ Interest</td>
<td>20</td>
<td>12.310</td>
<td>4</td>
<td>0.015</td>
<td>4.605</td>
<td>-1.494</td>
<td>5293</td>
<td>0.378</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Level of Tutor’s Confidence by level of Students’ Interest</td>
<td>20</td>
<td>15.868</td>
<td>4</td>
<td>0.003</td>
<td>7.779</td>
<td>0.757</td>
<td>0002</td>
<td>0.378</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There was no association between the tutor’s administration and organisation of the CAL events and the students’ confidence and interest in the CAL events. The $X^2$ value, was found to be insignificant at the 0.05 level ($X^2=5.12821$, $df=4$, $CV= 7.779$). Thus, the tutor’s administration had no influence on the students’ confidence (Table 1, No. 4 & 5), the level of association between the two revealed a low coefficient value, i.e. weak association. There was an association between the tutor’s organisation and the students’
confidence (Table 1, No. 1). When testing for significance of this association, a positive but weak correlation \( p < 0.5 \) was found (Pearson's \( r = 0.3531, N=18, p=.1267, CV = 0.378 \)). The issues of tutor's competence and organisation were very important and contributed significantly to the improvement and effectiveness of the CAL in CAD. Tutors may consider these three areas, and attempt to evaluate their administrative organisational methods during the CAL in CAD. In addition, they should administer questionnaires to students in order to find out more about their performance in the CAL event. Students may also be tested for their level of confidence and interest, either by producing continuous or proportioned CAD exercises relative to the design projects.

5.7. THE RELATIONSHIP BETWEEN THE TUTOR'S LEVEL OF CONFIDENCE, ADMINISTRATION AND ORGANISATION(IVS) & THE GLOBAL RATING OF CAL IN CAD COURSE.

The DV global rating of the CAL event was very important since it represented the overall impression of the CAL activities undertaken and the interaction between the tutor and the students during the AEC course. The tested values of this interaction were indicated by the scale of the CAL rate of activities rendered during the AEC course relative to the three tutors' IVs: CAL organisation, CAL administration and confidence, in which 1= CAL as substantial obstruction and 5= CAL as great help.

![Figure 7: The Impact of the Tutor's Independent Variables on the Global Rating of CAL.](image)

A scale of 1 to 5 was given for the global rating, where 1= poor and 5 = excellent. The only ratings recorded were the good and very good. The tutor's confidence (the quality of tutor's abilities, competency in CAL/CAD) was much higher than the organisation and administration, whereas the CAL organisation accounted for the lowest score in the measurement scale (Figure 7). The association between the tutor's IVs and the global rating of CAL determines the rate of effectiveness of CAL in AEC. The scale used ranged from excellent for effective CAL events and activities including the overall success of students' performance (the highest score), to poor (the lowest score) for ineffective CAL events. A positive association was found between the tutor's IVs and the global rating of CAL (Pearson's \( r= 0.43685, N=18, \)
The more confident a tutor is the more the effective CAL global rating is likely to become. This was manifested in the high students' skills, knowledge and attitude. There was a low correlation between the tutor's administration and organisation of the CAL events and the global rating of the CAL events (Pearson's $r$ = .16667, $df$=18, CV = 0.378). Thus, it was necessary to improve the administrative level in order to increase the global rating of the CAL events. There was evidence to suggest an influence of tutor's administration on the global rating of the CAL events ($X^2$ = 7.6666, $df$ = 2, CV = 4.605, $p$ = 0.05). The issues of the tutor competence, administration and organisation have contributed significantly to the global improvement and effectiveness of CAL in CAD. Thus tutors should again give special considerations to these three areas when considering the global rating of CAL and occasionally evaluate their doctrine; they should administer questionnaires in order to find out more about their students' performance during and after the CAL events. The teacher involvement in many activities, such as managing discussion, encouraging strategic thinking, and regulating level guidance were evident, still the computer and the package have also proved to be important. The more interactive and user friendly an application is, the more response and interaction a teacher would get from students. The relationship between the tutor, student and computer can only be effective if worked coherently and successively during CAL in CAD.

6. Conclusion

1. There was strong evidence to suggest that the Gender behaviour differs between male and female students towards computing teaching. Males and females differed in their CAD courses' attendance, performance, attitude, and the overall perception of CAD teaching. Several reasons must have prompted the female population to decline towards the end of the CAD teaching, e.g. lack of a female role model. Tutors must address this issue in future CAD courses to learn more about Gender behaviour.

2. The tutor's competence, management and organisation were found to be greatly significant and had a strong impact on the students' performance, attitude and skills during the CAL in CAD.

3. The mode of CAL in CAD has a tendency to veer towards experimenting and testing. There was evidence to suggest that as the mode of CAL was geared towards experimenting, students' interest had risen significantly higher than their confidence. This indicted that the students' confidence is also being affected by other variables, and naturally may take a longer time to achieve; further research is needed in this area. Moreover, the students' confidence was found to be extremely affected by the tutor's competence. There was no evidence to suggest any behavioural trends amongst groups related to the
4. The groups in CAD course have shown tendency to adopt different behaviour towards CAD teaching. A standardised method of teaching CAD, more concentration on written than verbal format of course delivery and well prepared lectures may elevate group differences. The ad hoc methods of teaching may prove to be unsuccessful in multi-grouped CAD course. A tutor should not employ un instructed methods of teaching strategies. This is bound to generate different levels of performance, skills and attitude amongst students.

References

CBURC is an abbreviation of Computer Board for Universities and Research Council.
CEG is an abbreviation of Computer Education Group.
IUCC is an abbreviation used for Inter-University Committee on Computing.
NCC is an abbreviation of National Computing Centre Limited.
SSRCU: 1973, Social Science Research Council Survey Unit. The Use of Computers in University Social Science Departments. London: SSRC.

**APPENDIX. CAL in CAD Lesson Evaluation Checklist Copy**

Q. No. Date:

<table>
<thead>
<tr>
<th>Q. No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Time CAD Lesson Starts Time Finishes</td>
</tr>
<tr>
<td>2.</td>
<td>School Name Class of</td>
</tr>
<tr>
<td>3.</td>
<td>Course Name</td>
</tr>
<tr>
<td>4.</td>
<td>Lesson Name-Topic</td>
</tr>
<tr>
<td>5.</td>
<td>Teacher's Name</td>
</tr>
<tr>
<td>6.</td>
<td>Teacher's Qualifications</td>
</tr>
<tr>
<td>7.</td>
<td>Software used/ Application Packages: Source and availability and cost</td>
</tr>
<tr>
<td>8.</td>
<td>Type of Hardware used: No. of HW:</td>
</tr>
<tr>
<td>9.</td>
<td>Availability of HW for each learner:</td>
</tr>
<tr>
<td>10.</td>
<td>Attendance: Sex Male: Full Time Student</td>
</tr>
<tr>
<td>11.</td>
<td>Attendance: Status            Part Time Student</td>
</tr>
<tr>
<td>12.</td>
<td>Note of students' time arrival: Explain reason if known? Why?</td>
</tr>
<tr>
<td>13.</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Computer Technicians availability YES</td>
</tr>
<tr>
<td></td>
<td>idea 4. Homework</td>
</tr>
<tr>
<td>17.</td>
<td>Students' Seating during Delivering materials on computer: Notes &amp; Observer</td>
</tr>
<tr>
<td></td>
<td>Comments</td>
</tr>
<tr>
<td>18.</td>
<td>Students' Seating during Delivering materials on Blackboard:</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Progress and sequences of CALE: Notes &amp; Observer Comments</td>
</tr>
</tbody>
</table>
18. Rate of CAL Events/Activities Rendered (Distribution)

<table>
<thead>
<tr>
<th>CAL Events/Activities</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Mode of Classroom: Competition =1, Experimenting =2, Testing =3, Initiating Teacher =4, Drifting Away =5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2) Minutes of lesson: Use top scale</td>
<td></td>
<td></td>
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<tr>
<td>3) Rate the students' interest in the class event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(1= Bored, 5= Strong interest)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4) Rate level of Administration:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1= Open, 5= Structured</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5) Rate level of tutor confidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1= Poor, 5= Excellent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6) Percentage of task-related activity amongst students</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1= CAL High Task, 5= CAL Low Task Related</td>
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<td>7) Observer global rating of the CAL activities in the CAD Lesson.</td>
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<tr>
<td>1= Poor, 5= Excellent</td>
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<td>8) Rate of CAL organisation and sequence: Use top scale</td>
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<td>9) Rate level of students' confidence in the end of class:</td>
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<tr>
<td>Use previous scale in item 5</td>
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</tbody>
</table>

19. Time Allocations to Classroom overall CAL Activities Relative to the Learners.

<table>
<thead>
<tr>
<th>CALE Time</th>
<th>Activities</th>
<th>Engaging</th>
<th>Sketching</th>
<th>Drawing</th>
<th>Practising</th>
<th>Exercising</th>
<th>Observing</th>
<th>Notes</th>
<th>Coffee</th>
<th>Break</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Hour</td>
<td>15:00</td>
<td></td>
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</tbody>
</table>

20. Time Allocations to Classroom overall CAL Activities Relative to the Tutor.

<table>
<thead>
<tr>
<th>CALE Time</th>
<th>Activities</th>
<th>Teacher Explaining</th>
<th>Teacher Answering</th>
<th>Asserting an Idea</th>
<th>Teacher Delivering</th>
<th>Teacher Adjusting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Hour</td>
<td>15:00 Minutes</td>
<td></td>
<td></td>
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<td></td>
<td>30:00</td>
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</tbody>
</table>

Time table extends along the time rendered in CAL events.

21. Communication Skills - Notes by the observer

1. Establishing the main criterion for the CAL Activities
   Observer Notes
   a) Determining how the CAL is promoting and contributing to the learner; How tangible the CAL materials.
   b) How does the CAL events activities link in with the overall course or program learning aims and objectives
   c) What sort of tasks ( projects, case studies, assignment and outputs will the CAL lead to?

2. Ensuring that the tuition of Cal in CAD has established the learning objectives
   a) Level of learner performance?
   b) Under what conditions?
   c) Define the standard?

3. Has the tutor done all the necessary administration checking that the learner will be able to help upon: Such as
   a) Equipment arrangements: computers, printers, plotters
   b) Room and Location use
   c) Furniture
   d) Lighting
   e) Arranging Material

4. What strategies and resource does the tutor have to help groups of learners with technical problems and motivations needs.

22. The Lecture Brief and Highlights of the Main Points: Notes
23. The Overall Effectiveness of the CALE: The observer opinion. Note