THE RECIPROCAL NATURE OF UNIVERSAL GRAMMAR AND
LANGUAGE LEARNING STRATEGIES IN COMPUTER
ASSISTED LANGUAGE LEARNING

by

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STATEMENT BY AUTHOR

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ABBREVIATIONS

CALL = computer assisted language learning
et al = et alii 'and others'
L1 = first language
L2 = second language
IL = interlanguage
LLS = language learning strategies
qtd = quoted
SILL = Strategy Inventory for Language Learning
SLA = second-language acquisition
UG = Universal Grammar
ABSTRACT

The research presented here begins with an overview of the transformation that has occurred in SLA theory and pedagogy over the past twenty years. The author maintains that the general use of CALL is not in line with current SLA theory and practice, and that the ideal role of CALL should be to encourage the integration of SLA theory and pedagogy. Research is presented on UG and LLS along with three corollaries suggesting that CALL could be directed to enhance a learner's use of LLS, which would result in making UG parameter resetting more efficient. The author then presents the findings of two empirical studies: the first study validates the usefulness of LLS, and the second study confirms that CALL can enhance the use of LLS. Finally, CALL must be applied within the framework of current SLA theory so that it can become an even more useful tool in the learner-centered, proficiency-oriented classroom.
INTRODUCTION

Research on the effectiveness of computer-assisted language learning (CALL) has increased markedly since the early 1980s (Dunkel 1991, 5); however, new focuses as well as methods of research inquiry still need to be developed in order to gauge correctly the power of the computer to affect different aspects of second language acquisition (Dunkel 1991, 23). For example, Dunkel maintains that little is known about the major instructional variables underlying effective utilization of CALL (1991, 24). Thus, the explicit role of CALL in foreign language pedagogy as well as in second language acquisition research has not been thoroughly defined.

While few would contest the advantages of word-processing or grade-book software for scholars and teachers, "debates about appropriate ways for language learners to interact with the computer are a feature of nearly every language teaching conference and journal issue" (Garrett 1991, xii). In spite of this deliberation, computers do appear to be making their way into the language classroom. As quoted by Johnson, "the Office of Technology Assessment (OTA) determined that, nationally, 40% of all Chapter I teachers who taught ESL used computers" (1992, 39). Nevertheless, assessments vary. Some educators contend that in many settings there are no computers, nor are there
likely to be any for some time to come (Johnson 1992, 39). In spite of these conflicting appraisals, there is general agreement that computer technology will play increasingly important roles in second language learning, teaching, and research (Johnson 1992, 39).

Language teachers, applied linguists, and designers of learning and teaching materials are all experiencing the after-shocks of a twenty-year transition in the field of foreign language learning and teaching (Furstenberg Morgenstern 1992, 118). The result of this twenty-year transition in foreign language teaching has been the convergence of two axes:

1) the need for learning communicative functions, i.e., language for use.

2) the treatment of language as a system of grammatical rules and examples. (Furstenberg and Morgenstern 1992, 119)

What has happened over the past twenty years is that the study of grammar alone has been shown to be insufficient as a preparation for communicating in a foreign language; however, this does not mean that explicit knowledge of grammar has become unnecessary for students wishing to become 'good language learners' (Ahmad et al. 1985, 55). Nor does this mean that the cognitive framework for language acquisition, as opposed to a behaviorist approach, must exclude the obvious benefits of practice and repetition. It
simply means that the emphasis in second language acquisition methodology has shifted during the past twenty years.

Increasingly today, teaching methodology takes into consideration both learning strategies, i.e., "the techniques which students use to comprehend, store, and remember new information and skills" (Chamot and Kupper 1989, 13), and communicative approaches, i.e., second language teaching which emphasizes that the goal of language learning is communicative competence, as opposed to grammar-based approaches (Richards et al. 1985, 48). Applied linguists also consider that a learner-centered classroom is crucial, and view the command of a foreign language as "the result of integrated apprehension and production processes that result from extra-linguistic as well as linguistic knowledge" (Swaffar 1989, 103). Thus, the factors involved in successful foreign language learning are many and varied. For example, students learn a great deal about a second language just from classroom exposure; however, multiple exposures in varied contexts give second language learners the best opportunity to expand their knowledge of a foreign language because the learners have the opportunity to use

\[1\text{What a student thinks and how a student acts in order to learn comprise the non-observable and observable aspects of learning strategies. (Chamot and Kupper 1989, 13)}\]
their normal learning abilities such as guessing, inducing, experimenting, checking, and refining hypotheses (Fox 1989, 9). It has often been suggested that the computer is an appropriate tool for providing some of the diverse contexts needed outside the classroom to help second language learners expand their vocabulary and their overall knowledge of a foreign language.

This perspective, and the many new methods based on communicative approaches to foreign language teaching, came about as a result of a transformation in the goal of second language teaching in the United States within a relatively short period of time. Swaffar suggests that as recently as 1970, applied linguists viewed the circumstances of foreign language teaching in a context totally differently from the one described above: "Twenty years ago proficiency was often measured in terms of a predetermined linguistic product. Instructional focus was on vocabulary and grammar use according to a norm" (Swaffar 1989, 301).

Since 1970, a transformation in foreign language instructional theory has lead to a general reassessment of how to become proficient in a foreign language, and has altered the nature of research and consequently its implication for adults in foreign language instruction. This writer labels this twenty-year period the 'deconstruction' phase in foreign language teaching.
This label may sound exaggerated; however, Swaffar argues that:

It is hardly an overstatement to say that we in second language teaching have experienced a shift of great magnitude, a radical rethinking of our subject matter, tasks, and our objectives vis-à-vis the adult language learner. Yet while the rethinking is radical its ramifications are unclear. (Swaffar 1989, 301)

Language teaching has shifted powerfully from a structural approach to a communicative one, where language is no longer seen as a set of linguistic rules but as a dynamic process of interaction (Furstenberg and Morgenstern 1992, 121). As a result of the 'radical rethinking' or 'shift' that has taken place in applied linguistics during the past twenty years, it has not only become increasingly difficult to distinguish between what is legitimate in foreign language teaching and what is not, it has also become difficult to define and determine what a 'good' learning situation is. Thus, foreign language researchers are interested in reestablishing certain boundaries within the field, but only by developing a completely different rationale than what had existed twenty years ago. Within these boundaries, it seems that the goal is to achieve a balance between the perpetual 'accuracy' vs. 'fluency' dilemma; however, this is difficult because in a learner-centered classroom, creativity and small-group work are crucial, and the relationships among the learners themselves
become paramount (Furstenberg and Morgenstern 1992, 119). At times, according to Furstenberg and Morgenstern, error detection and correction become secondary considerations, complicating the eternal 'accuracy' vs. 'fluency' dilemma (1992, 119).

Swaffar's description of the 'radical rethinking' that took place during the past twenty years, is, in a sense, the result of a 'deconstruction' of the theories that dominated foreign language teaching twenty years ago. This phase of upheaval forced researchers to become less dependent on linguistics, and more self-sufficient in their own fields. It became increasingly apparent to certain European and North American researchers that they could no longer rely on other disciplines for theoretical orientations, but would have to research second language acquisition directly and empirically themselves (Larsen-Freeman and Long 1991, 10). This in turn resulted in the shift of focus from the teaching process to the learning process (Larsen-Freeman and Long 1991, 5). The same reorganization is also affecting the most recent materials used in computer assisted language learning:

More recently CALL materials have sprung up, reflecting a shift in the field from a teacher-focused approach to a learner-centered one, and accordingly from a view of the computer as mainly a teaching aid to that of the computer as essentially a learning aid. (Furstenberg and Morgenstern 1992, 121)
Nevertheless, there is still an immense inconsistency within the profession. CALL applications in general have not caught up with the vigorous changes that have occurred in second language teaching practices, and the role of the computer in foreign language teaching is still usually that of 'quizmaster' (Jones and Fortescue 1987, 5). Within this convention, the computer provides the student with question-and-answer programs usually dealing with grammar, vocabulary, reading comprehension and listening comprehension; however, the computer as 'quizmaster' has recently come under attack as a poor attempt to imitate the teacher (Jones and Fortescue 1987, 5). This is probably because computer courseware is not adapting swiftly enough to the changes occurring in second language theory and teaching. Furstenberg confirms this when he states that: "Most computer programs developed to date do not, in any way, take into account these new approaches and seem increasingly out of synchrony with newer theories and pedagogical practices" (Furstenberg and Morgenstern 1992, 121).

The discrepancy between CALL's potential role as learning aid in a learner-centered environment, and the way it is currently used as teaching aid or 'quizmaster', is not unusual. Thomas Kuhn maintains that "in times of major readjustments in dominant thought, traditional patterns
continue to operate concomitantly with the new ones" (qtd. in Swaffar 1989, 301). Consequently, there is a dichotomy that exists within CALL, which makes its role in foreign language teaching ambiguous: on one hand its current role is that of drillmaster, which is out of step with current pedagogical theory and practice, and on the other hand its potential role is as a flexible learning tool that is in line with current pedagogical theory and practice. Accordingly, there is an obvious difference between how CALL is being used today, which is closely linked to the structural approaches of twenty years ago, and how it could be used if it were based on current theoretical and experimental research in second language pedagogy.

The traditional portrayal of CALL is unfortunate, and misleading in several important respects (Jones and Fortescue 1987, 5). The following description outlines the discrepancy between the traditional portrayal of CALL and its potential role:

- The traditional portrayal of CALL implies the substitution of computer for teacher - in other words a wholly self-access use for the machine.

- The traditional portrayal of CALL suggests that a CALL lesson is determined solely by the interaction between learner and computer, and thus neglects vital methodological considerations in which the teacher plays a key role.
- By limiting the computer's role to that of 'quizmaster', the traditional portrayal of CALL ignores other equally valid roles for the machine - roles which are very relevant to today's communicative classroom.

- The traditional portrayal of CALL suggests that there is a single 'computer method', and one that is inextricably linked in many teacher's minds to the days of audiolingualism and pattern practice. The emphasis on formal correctness has caused many to reject the computer's role as 'quizmaster' altogether.

- The traditional portrayal of CALL implies a one-to-one ratio between learner and machine, which is usually neither practical nor particularly desirable.

- Finally, the traditional portrayal of CALL implies that computers can be made omniscient, which they cannot. (Jones and Fortescue 1987, 5)

By contrast, the purpose of this discussion is to examine CALL's potential role in light of current pedagogical theory and practice: The first section clarifies what the computer's role in SLA should be, the second section examines the interrelatedness of computer assisted language learning, Universal Grammar (UG) access, and language learning strategies (LLS), and the third section examines the results of an empirical study in CALL and how the data relate to the theoretical perspectives presented in the first and second sections.

As an overview, this writer intends to demonstrate that the ideal role of CALL in SLA is twofold:
1. First and foremost, CALL must provide learners with a learning situation that is distinctively more practical and more productive than conventional learning situations, i.e., CALL must be applicable to a variety of language learning contexts. If CALL cannot provide the learner with anything more than a digitized workbook, then CALL should play no role in SLA.

2. Providing that the first criterion is met, then the subsequent role of CALL should be to provide theorists, researchers, and educators with frequent, up-to-date information on language learning development and progress. Computers can be used to organize, analyze, and recycle students' input, which can then be used to study the effectiveness of CALL situations, and to provide theorists with never-before-available empirical evidence for the actual process through which a learner goes in using, learning, and acquiring the L2. This would also serve to improve applied linguists' ability to measure performance and perhaps even competence.

Finally, these two criteria must work reciprocally, i.e., CALL programs must be designed to provide data to theorists and researchers, and their findings must be recycled back to educators and CALL programmers. This ongoing process will ensure the compatibility of CALL within the context of current SLA theory and pedagogical practice.
THE COMPUTER'S ROLE IN SLA

Whereas in the past there may have been a deficiency of theories on second language acquisition, today the exact opposite is true. Research literature abounds in approaches, theories, models, laws, and principles (Ellis 1988, 301). Over the past twenty years, research in second language pedagogy has increased dramatically: "The number of studies concerned with second-language learning has increased exponentially, as has the number of journals, anthologies, and textbooks dealing with this topic" (McLaughlin 1987, 1).

McLaughlin's justification for this phenomena involves practicality:

There are more people than ever whose economic aspirations depend on their learning a second language. In European countries there are large numbers of immigrants and 'guest-workers' who have to learn the language of the home country. A similar situation exists in the United States, which has recently witnessed a huge influx of immigrants, legal and illegal. Consequently, there is a growing need for second-language teachers of both children and adults, for pedagogical information, and for research on the process of second language learning. (McLaughlin 1987, 1)

The following theories represent just a few of the perspectives evident in second language acquisition studies: Acculturation/Pidginization Theory, Accommodation Theory, Discourse Theory, The Monitor Model, Interlanguage Theory, The Variable Competence Model, Universal Grammar, Cognitive
Theory, and theories on language learning strategies (McLaughlin 1897, v). According to Ellis, the primary goal of a theory in second language acquisition is "description", which pertains to "the representation of the nature of the linguistic categories which comprise the learner's interlanguage during development" (1988, 302). This definition directs the central goal of theory away from application and practice, as straightforward 'description' is not always relevant to pedagogy. For example, the pedagogical implications of Universal Grammar (UG)\(^1\) are not fully apparent at this point. Lydia White claims that extreme caution is needed concerning the pedagogical ramifications of UG. She argues that the aim of second language acquisition research, including UG-based research, is to reach an understanding of how languages are learned, and even when such an understanding is realized, this does not necessarily offer clear insights into the best way to teach languages (White 1989, 182); however, this is not true of all theories. Of the theories mentioned above, Krashen's Monitor Model has had a remarkable effect on second language

\(^1\)According to Chomsky (1975), Universal Grammar consists of a series of preprogrammed subsystems responsible for meaning, syntax, relationships between various types of words, and their functions. Within each subsystem, the individual through experience makes choices from a linguistic 'menu'. (qtd. in Richard-Amato 1988, 19)
teaching. The main reason for this is the model's appeal to practitioners:

One of the reasons for Krashen's popularity among language teachers is that he has been able to package his ideas in a manner that is accessible to practitioners. Moreover, he has captured the Zeitgeist - the movement in the field away from grammar-based to communicatively oriented language instruction. His ideas on the role of affective factors in language learning and on the importance of acquisitional sequences in second-language development also appeal to practitioners. (McLaughlin 1987, 162)

A set of questions that arises as a result of the Monitor Model's unique success in linking theory and practice include whether theory should relate to practice, whether practice should relate to theory, or whether practice and theory could develop simultaneously. It could be argued that theory and practice complement each other and that neither one exclusively precedes the other. That is, they take turns complementing each other and both advance independently as well as dependently.

There are two traditionally independent, investigatory approaches that relate to this dilemma: Researchers have attempted to formulate theoretical models to explain the complex process of second-language acquisition; and simultaneously, classroom teachers have gained insight into language learning by observing and teaching (Doughty 1982,
2). In other words, these two approaches are not typically merged in a way that is favorable to connecting theory and practice.

According to Doughty, these two approaches have remained separate because educators are apprehensive of theory:

For some time, however, the language teaching field has suffered from a distrust of what theory and research can offer pedagogy because the thinking of theorists is often 'loaned' (though unsolicited) from disciplines such as linguistics and cognitive psychology, whose fundamental precepts do not have second-language learning as a primary concern. (Doughty 1982, 2)

The progress that theorists have made toward developing applicable models of second-language acquisition, as in Krashen's Monitor Model, suggests that researchers are finding better ways of integrating theory and practice; however, in order for this process to become more practical, researchers and educators will need to develop methods that make better use of classroom data. The ideal role of the computer in SLA would be one that fosters this process. For example, it is possible for computers to monitor and record students' performance in foreign language instruction. This monitoring capability offers researchers and educators a unique opportunity for collecting data. Jamieson maintains that "learner differences in CALL use could be traced and identified easily and accurately by keeping track of their
interactive learning strategies" (qtd. in Dunkel 1991, 19). CALL could work efficiently in this fashion because computers can recycle and save answers as students enter them into the computer. Ideally the role of computers in SLA should be to make classroom-oriented research methodology more accessible to SLA theorists. This role should also make research easier for educators who might not otherwise have time but wish to conduct classroom studies in order to tailor their own instruction to specific teaching goals, individuals or groups of students. This would be an effective process for determining the usefulness of CALL for second language learning:

The effectiveness research base needs to be disseminated to language learning theorists, researchers, administrators, and practitioners alike, and research approaches other than the traditional laboratory-like experiments need also to be presented in order to help gauge the usefulness of CALL for second language learning. (Dunkel 1991, xvii)

Of the SLA theories mentioned above, there are specific aspects of Universal Grammar and the theories on language learning strategies that could interact reciprocally within CALL to support and enhance their mutual validity and applicability.

As an example of the interaction of theory and practice via CALL, the responses that learners provide in a CALL situation could be transferred to a data base. This
information could then be evaluated to reinforce Universal Grammar, and the theories on language learning strategies.

**Universal Grammar**: When investigating the principles of UG, researchers sometimes focus on whether or not L2 learners produce or accept sentences which would constitute violations of UG or language typology\(^1\) (White 1989, 83). According to Lightbown, this type of analysis has important implications for foreign language instruction, as well as for assessing the significance of SLA research in classroom teaching:

> Such experiments are of great importance in determining not only what the role of form-focused instruction may be in language learning, but also in assessing the present state of the potential for application of language acquisition research in classroom teaching. (1991, 211)

However, in investigating UG, it is necessary to control the sentence type being investigated to ensure that structures relevant to a parameter\(^2\) are tested for (White 1989, 83):

> "Instead of looking at how learners treat UG violations, the

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\(^1\)The study of language universals and the study of language typology are complementary to each other: the study of universals focuses on what is common to all languages and the study of typology focuses on the variation that exists between languages. (McLaughlin 1987, 95)

\(^2\)According to Universal Grammar theory, the principles of Universal Grammar involve a set of properties with certain parameters. These parameters remain 'open' until they are set. The grammar of a language is the set of values it assigns to various parameters. As Chomsky put it, 'Experience is required to set the switches. Once they are set, the system functions'. (McLaughlin 1987, 94)
question of concern is which parameter setting is reflected in the interlanguage" (White 1989, 83).

The problem is that sentence types that are grammatical in the L1 may be ungrammatical in the L2, and vice versa, thus, "tests must be devised which allow one to assess whether or not the L2 learner knows the relevant properties of the L2" (White 1989, 83).

CALL could be easily employed for this type of research because software can be designed to record and track learners' ongoing and spontaneous interaction with the computer. White indicates that this type of data is useful: "Spontaneous production data can be used effectively when investigating parameters" (White 1989, 83). White also argues that devising appropriate methods to tap the L2 learner's competence, while abstracting away from performance phenomena, is crucial for investigating the role of UG in second language acquisition (1989, 36). If a computer tracked a student's performance over a long period of time, it would seem reasonable that this information, when analyzed as a whole, would be more representative of a student's competence than the analysis of isolated data.

Language learning strategies: Theorists studying language learning strategies and L2-learner differences could use CALL information to monitor the strategies used in L2 production. By analyzing the strategies utilized in L2
production, researchers could determine which strategies were the most effective. As stated by Jamieson above, "learner differences in CALL use could be traced and identified easily and accurately by keeping track of their learning strategies (qtd. in Dunkel 1991, 19). This procedure could aid programmers in designing software that encourages students to use language learning strategies. Jamieson maintains that "...the design of the CALL program can encourage the development of language learning skills and result in more learning" (qtd. in Dunkel 1991, 19).

In addition to researchers benefiting from this information, educators would also gain from the information derived from this type of research in two ways:

1. Although the pedagogical applications of UG theory are not fully known, many researchers suggest that there are implications. For example, Rutherford and Sharwood Smith argue that certain UG conditions and constraints could be considered for purposes of pedagogical grammar:

There are, of course, aspects of UG conditions and constraints that vary with relation to specific languages and that also need therefore to be considered for purposes of pedagogical grammar. For example, while 'subjacency'\(^1\) is a condition that holds universally, what constitutes a

\(^1\)This principle states that a constituent, such as a WH-word [who, what, etc.], may only be moved out of one bounding category. What constitutes bounding categories varies across languages. (Larsen-Freeman and Long 1991, 230)
'bounding node'\(^1\) will vary from one language to another, with far-reaching consequences for the shape of those individual grammars. Bounding nodes would therefore have an effect on the construction of pedagogical grammars. (Rutherford and Sharwood Smith 1985, 279)

Rutherford and Sharwood Smith are not arguing that UG is the only force in determining candidates for consciousness-raising\(^2\) in pedagogical grammar; rather, he is saying that it may be the only constant force, whereas other influencing factors, e.g., proficiency level, curricular objectives, affective variables, etc., are not consistent (Rutherford and Sharwood Smith 1985, 280).

In another study, Hills (1984) argues that certain UG research on the clustering of properties associated with parameters might serve as a 'trigger' for more rapid learning:

For pedagogical purposes the learning of one such property (e.g. 'dummy' place holders in English) might serve as a 'trigger' for the rapid learning of the rest of those properties (e.g. the fact that English, a non-PRO-drop language, cannot leave subject position unoccupied. (qtd. in Rutherford and Sharwood Smith 1985, 280)

\(^1\)The bounding nodes in English for example, are to be NP, S, and S-bar; for Italian they are NP and S-bar. (Rutherford and Sharwood Smith 1985, 279)

\(^2\)By 'consciousness-raising' we mean the deliberate attempt to draw the learner's attention specifically to the formal properties of the target language. (Rutherford and Sharwood Smith 1985, 274)
Once again, the problem is that very little research has been done on the pedagogical implications of UG research; however, the proposed role of CALL as suggested above is an attempt to give researchers and educators a chance to investigate these possibilities empirically. Rutherford and Sharwood Smith agree that this type of investigation is important:

It is time for consciousness-raising and the Pedagogical Grammar Hypothesis (PGH)\(^1\) to be subjected to empirical scrutiny. With recent advances in the delineation of UG, 'there is no reason to assume that consciousness-raising by the teacher and conscious learning by the learner cannot be investigated in a systematic way' (Sharwood Smith 1981). (qtd. in Rutherford and Sharwood Smith 1985, 280)

2. In terms of learning strategies, this research data could be shifted immediately back into CALL programming in order to improve the computer program's ability to nourish and encourage language learning, and the utilization of language learning strategies. In other words, by understanding what situations promote successful language learning, and the resourceful handling of language learning

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\(^1\)The Pedagogical Grammar Hypothesis was proposed by Sharwood Smith in 1980: Instructional strategies which draw the attention of the learner to specifically structural regularities of the language, as distinct from the message content, will under certain conditions significantly increase the rate of acquisition over and above the rate expected from learners acquiring that language under natural circumstances where attention to form may be minimal and sporadic. (qtd. in Rutherford and Sharwood Smith 1985, 275)
strategies, CALL programmers could write programs that encourage students to exercise more productive language use and language learning strategies. According to Noblitt and Bland, the complementary nature of this process includes these benefits:

1. The ability to enhance the data base so as to accommodate learner characteristics.

2. The ability to document insights into error analysis.

3. The ability to formulate pedagogical and theoretical questions about the language learning process and CALL.

4. The use of tracking data in conjunction with student consultation offers the teacher a new tool for studying student learning.

5. In addition to suggesting the value of a learning environment that uses the target language as a vehicle for self-expression, it provides a means for working at the strategic rather than purely tactical level to teach students how to learn. (Noblitt and Bland 1991, 129) [underlining shows my emphasis]

The role that the computer plays in second language acquisition must support the demands of researchers and educators. In other words, the computer needs to work as a research base for disseminating information to language learning theorists, researchers, administrators, and practitioners alike (Dunkel 1991, xvii).

The advancement of educational technology in the past five years has been incredibly rapid (Dunkel 1991, xiii). Consequently, the ability to realize the implications for
students, to capitalize on the potential of each new discovery, and to implement the latest capability always lags far behind, and reports of research on the implementations inevitably appear still later (Dunkel 1991, xiii). As Dunkel argues, this general instability tends to discourage careful long-range studies:

On the face of it, there would seem to be little point in undertaking research on the pedagogical uses of a particular technology today if it is still so new that very few teachers or students have access to it, or if it is impossible to guess how soon it will become generally affordable, or if it is rumored that tomorrow's release will make a quantum leap in capacity or flexibility - or in a different direction (1991, xiii).

Therefore, the purpose of researching technology should not be to focus on trying out each new innovation but to think through the significance of technology in relation to language learning (Dunkel 1991, xiii).

The next section provides an example of how ideally the computer could function in SLA research and pedagogy based on the role just outlined.
THE RECIPROCAL NATURE OF UNIVERSAL GRAMMAR AND LANGUAGE LEARNING STRATEGIES IN CALL

The theory of Universal Grammar, if applied based on its contribution to SLA research, could provide insight into teaching methods that improve the efficiency of L2 acquisition. For example, most of the research concerning Universal Grammar suggests that L2 learners have at least partial access to UG. "Much research suggests that the indirect access model is correct: L2 learners use their L1 instantiations of UG as a stepping stone to S.T. (final state of the mind)\(^1\) (Cook 1988, 184). Consequently, if access to UG is at least partial, then there will be certain L2 learning situations that influence UG parameter resetting more efficiently than others. In addition to this, L2

\(^1\)Cook differentiates between L1 learning and L2 learning. He states that L1 learning is a process from S.O. (initial state of the mind) to S.S. (steady state of the mind), and that L2 learning is a process from S.I. (initial state in second language learning) to S.T. (final state of the mind). The differences between L1 and L2 learning are then:

L1 learning       S.O..................................S.S.
L2 learning       S.I..................S.T.

Cook explains that most people are substantially less efficient in their L2 than in their L1; many succeed in learning little of the L2, sometimes despite their best efforts. If the adult S.S. is the final state in L2 learning, paradoxically it is reached by hardly anyone. L1 competence is whatever it is; L2 competence is defined as what it is typically not, in short as if it were L1 competence. The steady state that many L2 learners achieve differs from an L1 S.S. and varies from one learner to another. Cook then refers to this as the final state S.T., to distinguish it from S.S. in L1 learning. (Cook 1988, 175)
learner differences could be accounted for in UG-accessibility variations. For example, Cook argues that indirect access to UG is possible for the L2 learner, and that this indirect-access model predicts differences between learners according to the L1 parameter setting (Cook 1988, 184). In order to explain these differences, Clahsen and Muysken suggest that one would have to assume that children possess learning capacities specific to language, particularly the capacity to postulate an abstract underlying order, whereas adults use acquisition strategies which may be derived from principles of information processing and general problem solving strategies (1986, 110).

Thus, L2 learners must implement language learning strategies in order to overcome the difficulties in L2 acquisition that result from having only partial access to UG. Cook notes that, if access to UG were direct, "then all L2 learners would start equal" (1988, 184), which signifies that the level of difficulty in L2 acquisition would be similar if not the same as L1 acquisition.

White argues that although the goal of UG theory is not based in language teaching, parameter resetting does offer potential implications for language teaching:
An area where UG-based research does offer potential implications for language teaching is over the question of what kind of evidence can be used to reset parameters. It is possible that specific grammar teaching and correction in the language classroom can sometimes fill a gap not covered by positive evidence¹ from the L2. (White 1989, 182).

The study performed by this researcher demonstrates that the students in the CALL group, who used the computerized workbook, performed as well as the control group on vocabulary, and that the CALL group performed better on unit tests and received an overall higher final course grade than the students in the control group. In a follow up study using the "Strategy Inventory for Language Learning (SILL): Version for English Speakers Learning a New Language" (Oxford 1990, 283), some of the language learning strategies of students who had used the computerized workbook were significantly better than the students who had not been exposed to the computerized workbook. This difference in achievement on tests and performance on the SILL is not meant to prove that the use of the computerized workbook resulted in UG-parameter resetting, or even that the increased use of language learning strategies results in UG-parameter resetting. The basis of this study does not rest on whether or not parameters were reset (that would be

¹'Positive evidence' is evidence as to what is possible in a language. (White 1989, 13)
impossible to prove at this point in time). The argument here does rest, however, on the contention that because UG access is restricted, L2 learners must compensate in some way for the UG accessibility that has decreased as a result of the L1. L2 learners can compensate for this by improving their use of language learning strategies.

Because of the flexibility of CALL programs, CALL, if based on the application of language learning strategies, comprehensible input\(^1\), and grammatical explanation, would be an excellent medium for helping students compensate for the UG accessibility that has decreased as a result of the L1, i.e., by utilizing the proper learning strategies, students could make better use of comprehensible input and grammatical explanation, thus, making L2 acquisition more efficient.

The following three corollaries summarize the rationale for this argument:

Corollary 1: In terms of UG access in L2 acquisition, current UG theory maintains that 1) L2 learners might start from scratch, which would indicate that learners have direct access to UG and are not influenced by the L1, i.e., learning a second language is potentially exactly the same as acquiring a first; or 2) L2 learners might start from

\(^1\)Comprehensible input is language that is heard or read and understood. (Larsen-Freeman and Long 1991, 242)
their knowledge of their first language, which would indicate that they have indirect access to UG only through the L1; or 3) L2 learners might not treat the L2 as a language at all, i.e., they make no use of UG and learn without reference to it (Cook 1988, 182). The alternatives can be illustrated with this continuum:

![Continuum of Access to UG](image)

<table>
<thead>
<tr>
<th>Alternative accesses to UG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct access to UG</td>
</tr>
</tbody>
</table>

Cook argues, however, that the problem in choosing one of these three alternatives is that they might be true for different learners, or for different aspects of language for the same learner (Cook 1988, 183).

Recent work on acquisition also supports Cook's view: There is an essential similarity between the acquisition of L1 and L2 (which would indicate at least partial access to UG); however, within this view on acquisition it is maintained that although the same 'operating principles' and 'learning strategies' are responsible for both L1 and L2 acquisition, there are a host of cognitive, affective, and social factors that account for the observed differences in
rate, manner, and level of eventual attainment of the L2 (Clahsen and Muysken 1986, 93).

One of the characteristics of UG parameter resetting is its interpretation of L2 acquisition. In the process of L2 acquisition, UG differentiates between 'acquisition' and 'learning'. According to this distinction, 'acquisition' is responsible for resetting some parameters, and 'learning' is responsible for resetting other parameters (White 1989, 30). The definition used here applies to L2 acquisition only (UG theory on L1 acquisition would use completely different definitions). The essential difference is that 'acquisition' occurs unconsciously and spontaneously (which accounts for the unmarked parameters), and 'learning' is conscious knowledge of language rules (which accounts for the marked parameters). McLaughlin's definitions of 'acquisition' and 'learning' will be used for the corollaries of this study:

Acquisition comes about through meaningful interaction in a natural communication setting. Speakers are not concerned with form, but with meaning; nor is there explicit concern with error detection and correction. This contrasts with the language learning situation in which error detection and correction are central, as is typically the case in classroom settings, where formal rules and feedback provide the basis for language instruction. (McLaughlin 1987, 20)
In order to explain the presence of UG in second language acquisition, White offers five alternatives on how one might relate UG to L2 acquisition:

1. UG is available and works exactly as it does in first-language acquisition.

2. UG is totally unavailable in second-language acquisition.

3. Access to UG is mediated via the first language. There are actually two different versions of this hypothesis:
   a. UG is inaccessible but any aspects of it available in the L1 can be used in the second language.
   b. Second-language learners initially assume the first-language value of UG parameters, but are still able to tap UG. Hence, they can reset to second-language parameter settings.

4. UG is available but does not work in identical fashion to first-language acquisition. (White 1989, 48)

White maintains that these five positions can be reduced to two main abstractions: the hypothesis that UG in some way plays a role in second language acquisition (1, 3b, and 4 above), which White calls the UG hypothesis, versus the hypothesis that UG is to all intents and purposes inaccessible (2 and 3a), which White calls the UG-is-dead hypothesis. These two alternatives can be further broken down into these two fundamental concepts: Either UG plays a role in L2 acquisition (which supports the idea that parameters can be reset), or it is basically inaccessible
(which supports the idea that parameters cannot be reset). These two opposing hypotheses stand at opposite ends of a continuum with White's five alternatives existing within these boundaries of the continuum.

White offers arguments for and against each of these alternatives, but concludes that UG access is at least partial. Her reasoning is based on a variety of researchers' findings:

It now appears to be generally agreed that UG is not totally inaccessible, that L2 learners do exhibit language behavior which must have originated in UG. Compare, for example, the assumptions made in the papers by Clahsen and Muysken (1986) and Clahsen and Muysken (1989). In the former paper, UG is argued to be totally unavailable; in the latter paper, it is suggested that fixed principles but not parameters are available. Similarly, Schachter (1988b) assumes no access, whereas Schachter (1988a) assumes UG to be accessible but only via the L1, a position also held by Bley-Vroman (1989). Thus, a consensus appears to be developing that there is partial access to UG in L2 acquisition. (White 1989, 174)

In a separate article, Herschensohn agrees, concluding, that "Acquisition of the second language is accomplished by a process that is similar to, but not the same as, acquisition of the first" (1990, 452). Thus, of the varying theories on L2 access to UG, the limited-access option offered by White appears to be the most tangible alternative.

The fact that L2 learners already have knowledge of a language is relevant, and the evidence to demonstrate this is readily available. To name one study, Rutherford (1983)
offers strong evidence showing that transfer from L1 is present in a learner's interlanguage, which is very persuasive in support of some style of L1 interaction with L2 acquisition. Herschensohn acknowledges that this theory is controversial, but that most researchers in this field agree that adults are able to access in some way their knowledge of Universal Grammar to reset parameters for the second (or subsequent) languages they are learning (Herschensohn 1990, 458).

This would indicate that when the parameters of UG are set in early childhood, the L1 input determines how the parameters are set. For example, comparable to toggles on a computer, if there are 3 switches (ABC), then there are 6 possible combinations in which to arrange the switches (ABC, ACB, BAC, BCA, CAB, CBA). Therefore, if one had 6 languages with which to experiment, and they all had a distinct UG-core with 3 toggle switches, then at least 2 would begin with A (ABC and ACD). This example becomes even more complex if one considers the option of each toggle having three positions (on, off, and neutral). The point here is that these parameters are "physically" set in the order that the L1 dictates. Chomsky (1975) himself uses a similar analogy that also compares these structures to a computer. According to his analogy:
...universal grammar consists of a series of preprogrammed subsystems responsible for meaning, syntax, relationships between various types of words, and their functions. Within each subsystem, the individual through experience makes choices from a linguistic 'menu.' Depending on the language environment in which it finds itself, the brain will select items appropriate to the specific language to which it is exposed. Grammars for the different languages might even be defined by specifying the choices from the menu of humanly possible options. (qtd. in Richard-Amato 1988, 19)

Chomsky's premise that the individual selects appropriate items necessary for learning a language supports the limited-access option offered by White that some sort of parameter resetting is not only possible, but also necessary for learning a second language.

Corollary 2: Consequently, a full use of Chomsky's theory on L2 acquisition would stress 1) L2-learner differences, 2) that the goal of language teaching is the acquisition of knowledge of language structure, 3) that language acquisition involves the interaction between specific features of the UG and the learner's mind, and 4) experience from the linguistic and cultural environment. Chomsky's theory, if applied to foreign language pedagogy, would emphasize the application of language learning strategies in order to account for L2-learner differences, which relates to Cook's hypothesis that different learners have different access to UG, in addition to comprehensible input and grammatical explanation.
According to the definition of comprehensible input, there are differing approaches within language teaching that can contribute to the resetting of UG parameters:

1. Consciousness-raising (focus on form, explicit method, deductive).

2. 'Natural' L2 acquisition (focus on meaning, implicit method, inductive).

3. Language learning strategies (focus on procedure, awareness of task at hand, introspection, self-analysis).

The definition of acquisition and learning, as given by McLaughlin above (page 34), indicates that the resetting of parameters in L2 acquisition could result from either 'acquisition' or 'learning'. In other words, parameter resetting in L2 acquisition is not something that occurs as a result of absolute 'acquisition' or absolute 'learning', but rather as a result of both. However, according to White, marked parameters may actually have to be "learned" (White 1989, 118). Regardless of which side of the acquisition-learning continuum the learning situation falls, the important issue is whether the situation leads to a resetting of parameters. According to Chomsky: "Language acquisition is not so much a problem of acquiring grammatical rules, but rather a process whereby the learner sets the values of the parameters of the principles of Universal Grammar" (qtd. in McLaughlin 1987, 94).
Thus, according to Chomsky's definition of the process of language acquisition, 'learning' versus 'acquisition' is not the issue. Both 'learning' and 'acquisition' could result in the resetting of parameters. Consequently, a 'successful' learning situation is not one that necessarily dominates in the sense of 'learning' or 'acquisition', but is rather a situation where the learner is cognitively aware of the learning process. For example, White explains that 'positive evidence' can account for the 'acquisition' or resetting of certain parameters, but that explicit intervention may also be necessary, i.e., that parameter resetting also consists of a cognitive process. White explains how this affects parameter resetting:

Spanish learners of English may need to be told that English does not allow empty subjects, French learners of English may need to be told that English does not allow adverbs to intervene between verb and object, Japanese learners of English may need to be told that English reflexives always require a local antecedent. (White 1989, 182)

White's analysis of parameter resetting supports an explicit method of grammar instruction, which emphasizes the importance of overtly teaching the rules of grammatical structures of the target language in order to organize, efficiently and accurately, linguistic elements for communicative purposes (Scott 1989, 14). In addition, McLaughlin supports the value of explicit grammar
instruction by distinguishing between 'controlled processing' and 'automatic processing' in learning a foreign language. McLaughlin suggests that:

Language skills are learned and become automatic only after the use of controlled processes, thereby supporting the notion that students develop automatic control of a grammatical structure after passing through a deliberate, conscious stage of learning grammatical rules and their application. (qtd. in Scott 1989, 14)

Corollary 3: CALL is a flexible medium for language learning that can improve L2 acquisition by synthesizing the application of language learning strategies, comprehensible input, and grammatical explanation.

The learning situation analyzed in this study, which involved the use of the Auf Deutsch computerized workbook (Kraft and Futterknecht 1989), integrated the three approaches listed in corollary two. For example, 1) the program focused the students' attention on form, 2) all of the exercises were contextualized, and 3) the program gave feedback to the students and encouraged them to use a variety of language learning strategies. Several examples of responses students could receive from the computerized workbook follow: "Please refer to the chart on page 64." "Not exactly, check your spelling." "Are you sure you want the dative?" "This is a difficult exercise, please review it often." "It would be a good idea to compare this dialogue with the one in the textbook or the one on the cassette in
the language laboratory." "Or, to make it really authentic, fun, and efficient practice with a class-mate, taking turns with the roles." "This exercise will reinforce the vocabulary and the grammar structures you have learned in the MINIDRAMA so that you can use them in future situations." "Concentrate! Word order is very important in German." "This exercise is in the form of a guessing game."

The efficient use of language learning strategies could promote the resetting of parameters, as some parameters are harder to set than others. An example supporting the idea that some parameters are harder to set than others is the Accessibility Hierarchy proposed by Keenan and Comrie (1977). According to this hierarchy, marked features are harder to reset because the parameters in the L1 and the L2 are different, and unmarked features are easier to reset because the parameters in the L1 and the L2 are parallel. The example that Keenan and Comrie give states that the degree of difficulty of relativizing on a particular noun phrase proceeds from top to bottom along the following hierarchy (McLaughlin 1987, 85):
The Accessibility Hierarchy

Least difficult

Subject: 'the child that was hit by him'
Direct object: 'the child that he hit'
Indirect object: 'the woman to whom he sent the book'
Object of a preposition: 'the rock under which he put the letter'
Genitive: 'the woman whose child went across the river'
Object of comparative: 'the amount less than which he wanted'

Most difficult (McLaughlin 1987, 86)

According to Keenan and Comrie, "subjects are predicted to be easier to relativize than direct objects, and so on down the hierarchy" (qtd. in McLaughlin 1987, 85).

Cook explains that this concept of markedness relates to the choice between settings for a parameter (1988, 54), as described in Corollary 1. Cook also describes how this could affect the L2 learner:

The switch might be initially neutral, in which case neither setting is more marked than the other; it makes no difference which language they are learning as it is equally easy to switch in either direction. Or they might start with the switch set one way; depending on the language they encounter, they have either to keep it the same way or turn it the other way. (Cook 1988, 54)

As stated above, unmarked features are easier to reset, and marked features are harder to reset. Cook explains how this might affect learners of Spanish and English:
If the switch is initially set to pro-drop, learners acquiring Spanish have nothing to acquire since Spanish is a pro-drop language; those learning English have to acquire something extra and vice versa if the switch is initially set the other way. (Cook 1988, 54)

Cook concludes this argument by stating that markedness is linked to learnability (1988, 54), which supports the concept that parameter resetting involves a cognitive process as shown in Corollary 2. This relates to the potential benefit of language learning strategies, as language learning strategies entail cognitive processes:

Cognitive strategies are essential in learning a new language. Such strategies are a varied lot, ranging from repeating to analyzing expressions to summarizing. With all their variety, cognitive strategies are unified by a common function: manipulation or transformation of the target language by the learner. Cognitive strategies are typically found to be the most popular strategies with language learners. (Oxford 1990, 43)

Regardless of whether the learning environment involves explicit or implicit teaching, deductive or inductive learning, a focus on form or on meaning, or whether it could be defined, as in McLaughlin's definition, as either 'learning' or 'acquisition', a student could be made aware of certain learning strategies in order to make the resetting of parameters more efficient. Oxford and Crookall argue that learning strategies do make learning more efficient:
Learning strategies are steps taken by the learner to aid the acquisition, storage, and retrieval of information. Strategies are referred to as learning techniques, behaviors, or actions; or learning-to-learn, problem-solving, or study skills. No matter what they are called, strategies can make learning more efficient and effective. (Oxford & Crookall 1989, 404)

Larsen-Freeman and Long mention a study conducted by O'Mally et al. (1985), which substantiates the above claim by Oxford & Crookall:

Analyses of the effects of training produced the anticipated mixed results: the subjects' skills on the speaking task were improved, relative to a control group which had received no learning strategy training. (Larsen-Freeman and Long 1991, 213)

In summation, the unique flexibility of CALL could be directed to enhance a learner's use of language learning strategies. This, in turn, would result in making UG parameter resetting more efficient.

These three corollaries, or inferences, form the basis for the next section, which demonstrates the reciprocal nature of CALL and SLA theory in an empirical study of achievement and language learning strategies.
AN EMPIRICAL STUDY OF ACHIEVEMENT AND LANGUAGE LEARNING STRATEGIES IN CALL

The first purpose of this study was to determine whether a difference exists in German 102 students' achievement on chapter examinations depending on whether they used the Auf Deutsch computerized workbook (Kraft and Futterknecht 1989) or the standard Auf Deutsch workbook (Kraft and Kosta 1990b). The second purpose was to determine whether a difference exists in the students' understanding of language learning strategies based on the Strategy Inventory for Language Learning (SILL)\(^1\), and explores the advantages and disadvantages of both types of workbooks and their potential effects on language learning strategies.

The hypothesis for the first study was: A random sample of forty-five German 102 students (CALL group) who completed their homework using the Auf Deutsch computerized workbook for eight weeks will obtain a mean grade that is different than the mean grade of sixty-two German 102 students (control group) who completed their homework using the standard Auf Deutsch workbook.

The hypothesis for the second study was: A random sample of forty German students who completed their homework using the Auf Deutsch computerized workbook for eight weeks

will obtain a mean score on the Strategy Inventory for Language Learning that is different than the mean score of forty foreign language students who completed their homework using standard workbooks.

The studies relating to these two hypotheses will be addressed separately. Hypothesis one states that the CALL group will obtain a mean grade that is different than the mean grade of the control group. The following investigation clarifies the methodology used to test this hypothesis:

Sample: Forty-five students from three sections of second semester German (102) at the University of Arizona participated in the CALL study. An additional sixty-two students from three other sections of second semester German (102) formed the control group.

Materials: The students in this study used the *Auf Deutsch* computerized workbook (Kraft and Futterknecht 1989) and the control group used the standard *Auf Deutsch* workbook (Kraft and Kosta 1990b). Both the computerized workbook and the standard workbook provide additional instruction to the various language exercises presented in the *Auf Deutsch* textbook (Kraft and Kosta 1990a). The organization, content, context, and exercises of the software program coincide directly to the organization, content, context, and exercises of the workbook and the textbook.
Each exercise in the computerized workbook is introduced with general directions in German and English, exercise examples, a brief description of the context of the exercise, and the page numbers in the *Auf Deutsch* textbook where the students can find additional explanations and examples for the exercises. For example, when practicing vocabulary from the so-called *MINIDRAMA* (or dialogue), the computer presented the CALL group with the following introduction:

(EXAMPLE 1):

This exercise is based on *MINIDRAMA 1, Der doppelte Georg*.

Before you attempt the following exercise: Study the *MINIDRAMA* carefully, or even better, with the help of the audio-tape for this chapter, attempt to learn it by heart.

The exercise will help you learn vocabulary and grammar structures through context

You will be asked to type the missing words for each blank in the passage.

This is the first part of a three-part exercise.

Press any key to continue

Willi: Wie ________ es dir, Jack?


Breitmoser: Bitte.

Jack: (Die Katze läuft ________) Georg, Georg!

Breitmoser: (böse) Wie ________ Sie mit mir? Wie ________ Sie denn?


Breitmoser: Wie ist ________ Name?

Move the arrow to a line with a choice/blank using the ↑ or ↓ and press RETURN.

Options: F1... Go back  F9... Hint  F10...
Answer (Kraft and Futterknecht 1989, MINIDRAMA 1)

When practicing grammar, the computer presented the CALL group with the following introduction:

(EXAMPLE 2)

The following exercise is based on the section SPRACHLICHE BESONDERHEITEN in chapter one of Auf Deutsch.

These verbs and prepositions are challenging. Be sure to repeat this exercise often!

(Psst! Willst du wiederholen? Sieh Seite 10 in Auf Deutsch!) (Do you want to review? See Page 10 in Auf Deutsch!)

Press any key to continue
zu oder nach? / gehen oder fahren?

   (geht/fährt) (nach/zu)

2. Wir sind __________________ Hause.
   (nach/zu)

   (nach/zu)

Move the arrow to a line with a choice/blank using the ↑ or ↓ and press RETURN.

Options: F1... Go back   F9... Hint   F10...

Answer (Kraft and Futterknecht 1989, SPRACHLICHE BESONDERHEITEN 1)

When working on such exercises, the computer program provides immediate feedback to the answers, and can offer suggestions for finding the correct answer. For example, if a student answers a question correctly, the computer affirms the correct answer with a statement like 'Ganz gut', 'Ausgezeichnet', 'Hervorragend', 'Ja, sehr gut', 'Prima', etc., in addition to giving some feedback to reinforce why the answer is correct. For example, the answer to #1 in SPRACHLICHE BESONDERHEITEN above (example 2) is 'fährt'. If the student answers this correctly, the computer responds with the following statement:

   Perfekt! Wenn man nicht zu Fuß geht, benutzt man meistens 'fahren'. (If you don't walk, you use 'fahren' most of the time.)

At this point the student can go on to the next question. If the student answers this incorrectly, the computer
rejects the answer with a statement like 'Nicht ganz', 'Fast', 'Das ist leider nicht richtig', etc., and gives the student feedback indicating why the answer is incorrect. For example, if the student answers #1 above with 'geht', the computer responds with the following statement:

Leider nein! Ein typischer Fehler! 'gehen' meisten nur 'zu Fuß'. (Sorry, no. A typical mistake. Don't use 'gehen' when not walking.)

At this point, the student can either try to answer again, or request a 'hint'. If the student requests a hint, the computer responds with the following statement:

Sie geht nicht zu Fuß. Und Berlin ist eine Stadt. Welche Präposition? (She is not walking. And Berlin is a city. Which preposition?)

The computer can also provide a 'hint' for problems relating to verbs, nouns, pronouns, etc. For example:

Verbs:
'vesehen' Vokaländerung von 'e' zu 'ie' in der 2 & 3 Person Singular. (Vowel change from 'e' to 'ie' in the 2nd & 3rd person singular.)

Bei verben in der 3. Person Plural ist die Endung '-en'. (Verbs in the 3rd person plural take the ending '-en'.)

Das Subjekt ist in der 3. Person Plural! (The subject is in 3rd person plural.)

Nouns (Straße vs. straße):
Substantive werde groß geschrieben! (Nouns are capitalized!)

(Buch vs. Bücher):
Was ist der Plural von 'Buch'? (What is the plural of 'Buch'?}
Formal/Informal (*Ihr* vs *ihr*):
Fast richtig! Wie schreibt man das Pronomen bei Formeller Anrede? (Almost right! How do you write the pronoun using formal address?)

Thus, the computer encourages the students to use specific language learning strategies that can be implemented in order to find the correct answer. Some of these strategies are as follows: 1) the computer refers the student to the proper section in the textbook where additional information and examples can be found; 2) the computer furnishes the students with an immediate response that explains either why the answer is correct, or, if the answer is incorrect, how to go about finding the correct answer; 3) for vocabulary, the computer encourages the student to read the MINIDRAMA carefully, to listen to the audio-tape beforehand, and in some cases, to practice with a partner; 4) the computer advises the student that a particular exercise is difficult, and that it should be repeated and/or reviewed often; and 5) the computer focuses the student on form and encourages him or her to be accurate.

Exercises in the standard workbook are introduced with a sentence explaining the context of the activity, and an exercise example. The standard workbook also provides a key to the exercises at the back of the book.
The following example displays the layout for a vocabulary exercise in the standard workbook (page 2 & 3). This corresponds to example 1 above from the computerized workbook:

Variation zum Minidrama

Bitte fügen Sie die folgenden Wörter in den Text ein:

<table>
<thead>
<tr>
<th>danke</th>
<th>kommen</th>
<th>es</th>
<th>Sie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frau</td>
<td>Sonntag</td>
<td>heißen</td>
<td>und</td>
</tr>
<tr>
<td>heute</td>
<td>versthe</td>
<td>ist</td>
<td>zum</td>
</tr>
</tbody>
</table>

Willis Schwester Marie (1) Sonja, eine neue Studentin an der Freien Universität Berlin, fahren in der U-Bahn.

Lautsprecher: Kurfürstendamm!


Sonja: Ja? Ich auch. Was studieren ________?

Marie: Mathematik. Ach, das ist so langweilig!

Sonja: Ich studiere auch Mathematik. Aber für mich (4) das interessant.

Marie: Oh weh, mir geht (5) schlecht.

Sonja: Das (6) ich nicht.


Frau Professor Probst: Ah, guten Tag, Frau Sommer. Wie geht es Ihnen?

Marie: (8) gut. Und Ihnen?
Frau Professor Probst: Mir geht es wunderbar. Ich fahre zum Wannsee Schwimmen.

Marie: Aber... ist (9) ___________ nicht Montag?

Frau Professor Probst: Aber nein. Morgen ist Montag. Heute ist (10) ___________. (zu Sonja) Und wie (11) ___________ Sie?

Sonja: Jonja Mattis.

Marie: Heute ist...

Frau Professor Probst: Mein Name ist Ingeborg Probst. Sind Sie auch Studentin?

Sonja: Ja, ich bin Mathematikstudentin an der Freien Universität.

Frau Professor Probst: Gut so. Mit Mathematik (12) ___________ Sie weit.

Marie: Heute ist Sontag! (Kraft and Kosta 1990b, 2)

The following example displays the layout for a grammar exercise in the standard workbook (page 2). This corresponds to example 2 above from the computerized workbook:

Stolpersteine

1. Freitag fährt Frau Breitmoser ___________ München.

2. Sie ist jetzt ___________ Hause.

3. Sie kommt ___________ Bayern. (Kraft and Kosta 1990b, 2)
In the key to the standard workbook, only the correct answer is listed. The workbook does not provide an explanation about why an answer is correct or list the page number in the textbook were an explanation can be found.

**Procedures:** Three sections totaling forty-five students were drawn from ten different sections of German 102. The first section to participate in the CALL group was chosen randomly out of a base of seven German 102 sections. The second and third sections involved in the study were the two courses taught by the investigator. This study coincided with a pilot project that was later implemented into the regular German 101/102 curriculum at the University of Arizona. This writer was involved in the pilot project and was familiar with the *Auf Deutsch* software, computer hardware, and with the overall organization of the system. Accordingly, due to the organization of this pilot study and the constraints of the investigation in general, it was impossible to eliminate teacher/researcher bias completely.

Instead of using the standard *Auf Deutsch* workbook for the homework exercises, the three sections in the CALL group were assigned homework from the *Auf Deutsch* computerized workbook. These students still had to use the standard workbook for the listening exercises and the communication exercises; however, the vocabulary and grammar sections of the workbook were replaced by the computer courseware.
For example, the *Hörverständnis* (listening comprehension) and the *Kommunikative Übungen* (communication exercises) in the standard workbook were still a portion of the CALL group's normal homework assignments, as these sections are not duplicated on the computer. The sections *Muster und Modelle*, and *Strukturen im Kontext* in the standard workbook were substituted with the corresponding exercises in the computerized workbook.

Sixty-two students from three different sections of German 102 served as the control group. These students were assigned homework exclusively from the standard workbook. The forty-five students participating in the CALL group had access to the software at three different sites on campus, which were free for use between 8 a.m. to 11 p.m. Monday through Sunday.

**Measurement:** The measurement and analysis for this study were conducted on three levels. The first analysis compared the mean score of each group for the vocabulary scores for a single unit test (there were three unit tests in all). The second measurement compared the mean score of each group for the overall test scores for a single unit test. The third measurement compared the mean of each group based on the overall test scores for all three tests combined.
The test results were analyzed by computing the means of the two populations with a two-sampled t-test. Because the null hypothesis states that the mean of the CALL group is different than the mean of the control group, a two-sampled t-test determined whether the means of the CALL group and the control group were significantly different. When two means differ, it is possible to determine how profound the discrepancy is by calculating the 'significance level', which tells the researcher how much 'risk' is involved in accepting or rejecting the null hypothesis.

If the null hypothesis is rejected at the 0.05 significance level, then the risk is 5 in 100 that the researcher will incorrectly or erroneously reject [or accept] the null hypothesis...

Researchers are usually willing to accept their hypothesis if the amount of risk in being incorrect is 5% or less (Sax 1979, 381).

In the following tables, the means of the CALL group are listed first, and the means of the control group second:
### TABLE 1.1 (VOCABULARY)

1. **TWO-SAMPLED T-TEST FOR VOCABULARY (CHAPTER EXAM #1):**

<table>
<thead>
<tr>
<th></th>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>52</td>
<td>12.21</td>
<td>2.16</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>44</td>
<td>9.86</td>
<td>2.45</td>
</tr>
</tbody>
</table>

\[ T = 4.94 \quad P = 0.0000 \quad DF (DEGREES OF FREEDOM) = 86 \]

The P value (significance level) of 0.00 with 86 degrees of freedom strongly supports the hypothesis.

2. **TWO-SAMPLED T-TEST FOR VOCABULARY (CHAPTER EXAM #2):**

<table>
<thead>
<tr>
<th></th>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>43</td>
<td>9.58</td>
<td>4.15</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>53</td>
<td>8.66</td>
<td>3.05</td>
</tr>
</tbody>
</table>

\[ T = 1.21 \quad p = 0.23 \quad DF (DEGREES OF FREEDOM) = 75 \]

The P value of 0.23 with 75 degrees of freedom requires rejection of the hypothesis.

3. **TWO-SAMPLED T-TEST FOR VOCABULARY (CHAPTER EXAM #3):**

<table>
<thead>
<tr>
<th></th>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>48</td>
<td>8.29</td>
<td>2.63</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>64</td>
<td>7.75</td>
<td>3.01</td>
</tr>
</tbody>
</table>

\[ T = 1.01 \quad P = 0.31 \quad DF (DEGREES OF FREEDOM) = 107 \]

The P value 0.31 with 107 degrees of freedom requires rejection of the hypothesis.
TABLE 1.2 (UNIT EXAMS)

1. **TWO-SAMPLED T-TEST FOR CHAPTER EXAM #1:**

<table>
<thead>
<tr>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>49</td>
<td>84.9</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>59</td>
<td>79.6</td>
</tr>
</tbody>
</table>

\[ T = 2.25 \quad P = 0.027 \]  
\[ \text{DF (DEGREES OF FREEDOM)} = 104 \]

The P value of 0.027 with 104 degrees of freedom strongly supports the hypothesis.

2. **TWO-SAMPLED T-TEST FOR CHAPTER EXAM #2:**

<table>
<thead>
<tr>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>48</td>
<td>85.33</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>62</td>
<td>80.4</td>
</tr>
</tbody>
</table>

\[ T = 2.37 \quad P = 0.020 \]  
\[ \text{DF (DEGREES OF FREEDOM)} = 107 \]

The P value of 0.020 with 107 degrees of freedom strongly supports the hypothesis.

3. **TWO-SAMPLED T-TEST FOR CHAPTER EXAM #3:**

<table>
<thead>
<tr>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>49</td>
<td>86.4</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>42</td>
<td>85.0</td>
</tr>
</tbody>
</table>

\[ T = 0.55 \quad P = 0.59 \]  
\[ \text{DF (DEGREES OF FREEDOM)} = 87 \]

The P value of 0.59 with 87 degrees of freedom requires rejection of the hypothesis.
**TABLE 1.3 (TOTAL TEST SCORES)**

1. **TWO-SAMPLED T-TEST FOR CHAPTER EXAMS 15-20:**

<table>
<thead>
<tr>
<th></th>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>146</td>
<td>85.5</td>
<td>11.2</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>163</td>
<td>81.3</td>
<td>12.4</td>
</tr>
</tbody>
</table>

\[ T = 3.17 \quad P = 0.0017 \quad DF (DEGREES OF FREEDOM) = 306 \]

The \( P \) value of 0.0017 with 306 degrees of freedom strongly supports the hypothesis.

Overall, the results show that 1) the CALL group's achievement on vocabulary was better than the control group's achievement in one of the three exams, 2) the CALL group's achievement on unit exams was better than the control group's achievement in two out of three exams, and 4) the CALL group's overall achievement was better than the control group's overall achievement.

The results of this first portion of the study were mixed. The following two questions were then addressed in order to interpret the mixed results:

1. Why did the two groups perform about the same on the three vocabulary sections?

2. What role does the feedback function play in the outcome of these results and how does this tie into language learning strategies?

**Discussion of question 1:** Although the overall exercises in the two workbook formats, such as layout, context, and content, were almost exactly the same, the vocabulary exercises in the computerized workbook differed in that they could not be completed without using the
textbook. The vocabulary exercises were typically a variation of the 'Minidrama' in the textbook. Thus, in order to find the correct answer on the computer, the students had to examine the context of the computer's version and the textbook's version. By comparing the two texts, it was possible to complete the computer exercises. The standard workbook also offers a variation of the textbook's MINIDRAMA, but the missing words of the text were listed at the top of the exercise.

Except for this difference, the vocabulary exercises between the two types of workbooks were basically the same. Even the computer-feedback option did not offer the CALL group any distinct advantages over the standard workbook. Whereas it is easy for the computer to predict potential mistakes on grammatical exercises, and to then offer suggestions leading the student to the precise answer, it is more difficult for the computer to offer suggestions on vocabulary. In the case of vocabulary, the computer could 1) bring to the student's attention that nouns in German must be capitalized, and 2) simply affirm or deny an answer.

This could explain why the CALL group performed about the same as the control group did on vocabulary. Nevertheless, as explained above, the CALL group needed to compare the context of two texts in order to answer a question, whereas the standard workbook required the control
group only to fill in blanks using the words listed above the text. This difference in approach to learning vocabulary did not affect the achievement of the CALL group, as the significance level on the t-test for vocabulary was not small enough to confirm any vast difference in achievement between the two groups.

Discussion of question 2: What role does the feedback function play in the outcome of these results and how does this tie into language learning strategies? In order to answer this question, the subsequent analysis focuses on 1) the feedback that the CALL group received from the computer, 2) the feedback the control group received from the workbook, and 3) the ways the difference between the two types of feedback might have affected the students' achievement and application of language learning strategies.

As computers become more prevalent in language instruction, their effectiveness as educational responders will become increasingly more important (Robinson 1991, 155). There are many different types of feedback in CALL programming that can be used to respond to a student's needs, and that can promote the application of language learning strategies. For example, in a study conducted by Robinson et. al. (1985), at the Center for Language and Crosscultural Skills (CLCCS), four types of help were compared:
1. No help available.

2. Total program-controlled help. (The program automatically displays a help screen pertinent to the particular error made.)

3. Combined program- and student-controlled help. (After students request help, the program automatically displays a help screen pertinent to the particular error.)

4. Total student-controlled help. (After students request help, a help menu is displayed. Students then choose the type of help screen desired, which is subsequently displayed. (Robinson et al. 1985, 163)

These researchers found that when learner control is balanced properly with program control (number 3 above), then language learning strategies become more efficient (Robinson et al. 1985, 163). They also suggest that the amount of student control, as defined above, might be more useful if it increases as competencies increase: "A combined position might be more effective in beginning and intermediate levels of instruction, and total student control might be more effective at advanced stages of instruction" (Robinson et al. 1985, 164).

The feedback provided by the Auf Deutsch computerized workbook falls under category three above, i.e., some sort of feedback is always provided, but a 'help' key is also available for students wishing to receive additional help. This help is always directed to the student's particular error, and does not give the student the option to choose a
particular type of help from a screen or menu. In addition to the results found by Robinson et al., social learning theory also suggests that this type of feedback is the most effective:

Proponents of social learning theory would favor a midway position between the two extremes, one which allows learners to control the availability of help (i.e., help on demand), followed by program control or guidance as to the specific help needed and the course of ensuing CALL activities. Such a combined position would provide a psychological match with learners who perceive help as desired, yet it does not put them totally in charge until they have developed the competencies necessary to succeed. (Robinson et al. 1985, 163)

This is important when examining the results of this study for two reasons: 1) the students involved in this study were in a second semester German class, which means that their proficiency level was at a beginning level. Thus, according to the above mentioned results and theory, the type of student control available in the Auf Deutsch program is properly balanced with the needs of the students involved in this study. 2) When feedback is properly balanced, it leads to more efficient use of language learning strategies (Robinson et al. 1985, 163).

This might explain why the CALL group performed better on the overall tests (see Table 1.3), and why they rated higher on three out of five strategies studied in the Strategy Inventory for Language Learning (see Table 2.1).
The control group received less feedback on their answers and less assistance on where and how to find the correct answers. For example, the standard workbook offers the students a key to check their answers, which could be defined as some sort of feedback; however, if a mistake is made, this type of feedback does not encourage further analysis of the problem at hand, nor does it demand accuracy. If beginning German students compare 'sie' with 'Sie', 'fahrt' with 'fähr't', or 'schon' with 'schön' they might not always see a difference, which could happen when comparing answers with the key; nevertheless, in written and spoken German there is a great difference in the meaning and appropriateness of the above examples. In a situation like this, the Auf Deutsch program would suggest to the student where to look in order to better understand these differences. Computer feedback provides immediate visual and auditory cues that signal errors which may otherwise go unnoticed by students during the course of completing homework in traditional ways (Robinson et al. 1985, 156). Robinson et al. confirm that the former type of feedback is more effective than the latter: "CALL feedback which guides learners to discover correct and incorrect responses themselves is more effective than program disclosure of answers and incorrect responses" (Robinson et al. 1985, 165). Social learning theory supports this as well:
From the perspective of social learning theory, student discovery of correct responses allows the development of internal learner control, by developing within the learner the self-efficacy judgement of 'can do', whereas disclosure of correct answers does not because it provides external control (Robinson et al. 1985, 160).

The unit-test designs were very similar to the exercises used in the two workbooks. Therefore, as students completed these tests, the CALL group performed better than the control group because they were not only more aware of the amount of accuracy required to perform well on the tests, they were also more familiar with the language learning strategies that were needed to overcome their errors. Robinson et al. support this when they state that: "...it follows that feedback which guides students to discover their own errors should improve achievement more than feedback which discloses errors as well as correct answers" (1985, 160).

As a result of this information, it would be valuable to look into how the feedback from the Auf Deutsch program relates to the application of language learning strategies. It is conceivable that as the computer encourages students to discover the right answer, students learn to use language learning strategies more productively. Oxford categorizes this type of learning as 'self-monitoring:
This strategy does not center as much on using the language as it does on students' conscious decision to monitor - that is, notice and correct - their own errors in any of the language skills. (Oxford 1990, 161)

The *Auf Deutsch* computer feedback promotes 'self-monitoring' because it advises students to monitor their answers more accurately, which is a very useful tool not only for helping students understand more about the language, but also for helping students understand more about language learning strategies: "In considering a particular 'faux pas', learners can often benefit from trying to determine the reason why it was made" (Oxford 1990, 161).

Accordingly, the writer explored the following hypothesis in order to better understand the likely relationship between computer feedback and language learning strategies: Hypothesis #2: A random sample of forty German students who completed their homework using the *Auf Deutsch* computerized workbook for eight weeks will obtain a mean score on the Strategy Inventory for Language Learning that is different than the mean score of forty foreign language students who completed their homework using standard workbooks.

The following investigation clarifies the methodology used to test this hypothesis:
Sample: Forty first- or second-year German students who had used the *Auf Deutsch* computerized workbook for at least one semester were randomly selected to take the Strategy Inventory for Language Learning (SILL) (Oxford 1990, 283). The SILL results from these students were compared to 40 foreign language students who had not used the *Auf Deutsch* computerized workbook. These students were randomly selected from first- or second-year German and French courses.

Materials/procedures: As a result of the type of learning strategy that the *Auf Deutsch* computerized workbook promotes (self-monitoring), not all of the questions on the Strategy Inventory for Language Learning applied to this analysis. Therefore, this investigator selected five statements out of the seventy-six statements on the SILL that related to the strategies promoted by the *Auf Deutsch* software. The students responded to these statements based on how they felt they learned a new language. For example, the students were given the following instructions before completing the SILL:

**Directions**

The STRATEGY INVENTORY FOR LANGUAGE LEARNING (SILL) is designed to gather information about how you, as a student of a foreign or second language, go about learning that language. On the following pages, you will find statements related to learning a new language. Please read each statement. On the separate answer sheet [we used
a computer-readable answer sheet[1], mark the response 1 (never or almost never true of me), 2 (generally not true of me), 3 (somewhat true of me), 4 (generally true of me), or 5 (always or almost always true of me) that tells how true the statement is in terms of what you actually do when you are learning the new language (Oxford 1990, 283).

The following five statements on the SILL were analyzed:

1. I go back to refresh my memory of things I learned much earlier (statement 15).

2. I read a story or dialogue several times until I can understand it (statement 18).

3. I revise what I write in the new language to improve my writing (statement 19).

4. I use reference materials such as glossaries or dictionaries to help me use the new language (statement 31).

5. I work with other language learners to practice, review, or share information (statement 75). (Oxford 1990, 284)

Measurements: The students in the CALL group scored significantly higher on statements 18, 19, and 31. There was no significant difference between the two groups on statements 15 and 75. The following Table, shows the results of the t-test performed on each question:

---

TABLE 2.1 (SILL RESULTS)

1. **TWO-SAMPLED T-TEST FOR STATEMENT 15** (I go back to refresh my memory of things I learned much earlier):

<table>
<thead>
<tr>
<th></th>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>40</td>
<td>3.30</td>
<td>1.09</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>40</td>
<td>3.17</td>
<td>1.01</td>
</tr>
</tbody>
</table>

\[ T = 0.53 \quad P = 0.60 \quad DF (DEGREES OF FREEDOM) = 77 \]

The P value of 0.60 with 77 degrees of freedom requires rejection of the hypothesis.

2. **TWO-SAMPLED T-TEST FOR STATEMENT 18** (I read a story or dialogue several times until I can understand it):

<table>
<thead>
<tr>
<th></th>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>40</td>
<td>3.65</td>
<td>0.834</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>40</td>
<td>3.20</td>
<td>1.04</td>
</tr>
</tbody>
</table>

\[ T = 2.13 \quad P = 0.036 \quad DF (DEGREES OF FREEDOM) = 74 \]

The P value of 0.036 with 74 degrees of freedom strongly supports the hypothesis.

3. **TWO-SAMPLED T-TEST FOR STATEMENT 19** (I revise what I write in the new language to improve my writing):

<table>
<thead>
<tr>
<th></th>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>40</td>
<td>3.00</td>
<td>1.06</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>40</td>
<td>2.30</td>
<td>1.07</td>
</tr>
</tbody>
</table>

\[ T = 2.94 \quad P = 0.0043 \quad DF (DEGREES OF FREEDOM) = 77 \]

The P value of 0.043 with 77 degrees of freedom strongly supports the hypothesis.

4. **TWO-SAMPLED T-TEST FOR STATEMENT 31** (I use reference materials such as glossaries or dictionaries to help me use the new language):

<table>
<thead>
<tr>
<th></th>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>40</td>
<td>4.35</td>
<td>0.834</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>40</td>
<td>3.80</td>
<td>1.07</td>
</tr>
</tbody>
</table>

\[ T = 2.57 \quad P = 0.012 \quad DF (DEGREES OF FREEDOM) = 73 \]

The P value of 0.012 with 73 degrees of freedom strongly supports the hypothesis.
5. **TWO-SAMPLED T-TEST FOR STATEMENT 75** (I work with other language learners to practice, review, or share information):

<table>
<thead>
<tr>
<th></th>
<th># OF STDNTS</th>
<th>MEAN</th>
<th>STDEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALL GRP</td>
<td>40</td>
<td>2.80</td>
<td>0.939</td>
</tr>
<tr>
<td>CNTRL GRP</td>
<td>40</td>
<td>2.75</td>
<td>1.28</td>
</tr>
</tbody>
</table>

\[ T = 0.20 \quad P = 0.84 \quad DF (DEGREES OF FREEDOM) = 71 \]

The \( P \) value of 0.84 with 77 degrees of freedom requires rejection of the hypothesis.

Each of these statements relates to one or more of the strategies encouraged in the *Auf Deutsch* program. For example, the computer program often requests the student to review material already covered, which relates to statement 15. The computer program advises the student that a particular exercise is difficult, and that it should be repeated often, which relates to statement 18. The increased use of 'revising' in order to improve writing (statement 19) relates to a combination of strategies that the computer promotes. For example, the computer encourages reviewing and repeating, and focuses the student on form and accuracy, which relates to the revising process involved in 'effective' writing. Daiute (1985a, 1985b) supports this assertion by stating that computer prompting might be most useful just at the point when a student is becoming aware of those specific issues in writing that the prompts address: "While teachers and peers are the best audiences and interactants, computer conversations of the prompt type can probably play an additional, although very limited, role in
promoting certain aspects of written L2 development" (qtd. in Johnson 1991, 72). In addition to referring the student to his or her textbook (a type of reference material), the computer focuses the students on form and accuracy, which encourages students to use their charts and paradigms when using the language, which relates to statement 31. The computer program often requests the students to work with a partner in order to make the learning more interesting and communicative, which relates to statement 75.

The computer was not consistent in suggesting and encouraging the strategies that relate to statements 15 and 75, which could explain why the means on these statements did not differ significantly. However, the computer was very consistent in every chapter and exercise to foster the strategies that relate to statements 18, 19 and 31. Nevertheless, it should be noted that the means for the CALL group on statements 15 and 75 were still higher than the control group's, but that the difference was not significant.
CONCLUSIONS

Do these results demonstrate that the application of language learning strategies leads to the resetting of parameters? While a direct causal relationship is not demonstrable here, this type of research could indeed be developed to test the parameter-resetting hypothesis. CALL tracking of language learning can indeed provide data on L1 transfer, markedness, UG parameter resetting, and which LLS are most efficient in the resetting of parameters.

Although the writer cannot verify that these students' parameters were reset, a logical progression of events has been illustrated that may contribute to actual parameter resetting. Parameter resetting is possible by means of engaging certain cognitive processes, and language learning strategies improve the efficiency of these processes.

The computer is a flexible classroom aid which can be used by researchers, teachers and learners in a variety of ways and for a variety of purposes (Jones and Fortescue 1987, 5). By presenting this discussion, it has been demonstrated that CALL must be applied within the framework of current SLA theory so that it can become an even more useful tool in the learner-centered, proficiency-oriented classroom.

The classroom use of CALL needs to be determined by teachers and not by software writers. Teachers know most
about the needs and capacities of their students, and about how the learning experience should be structured. Therefore, it should be the teachers who decide what emphasis to place on CALL in a learning program, and what role it should play. Pusack supports this idea: "Whether it be by critiquing packages, implementing existing CALL materials, authoring new programs, or engaging in long-term experiments, all foreign language teachers can play a decisive role" (Pusack 1982, 38).

In order to gain the full advantages from CALL it will be necessary to engage in a long-term, cooperative process that involves SLA theorists, CALL programmers, and language teachers. This means providing teacher training programs so that teachers will begin their careers with a foundation for building CALL into the curriculum. At the same time, SLA theorists and CALL programmers must work together to make their findings more applicable for teachers and the classroom. A goal of the profession must be for all concerned to systematically explore the possibilities of computers in foreign language education, to intelligently exploit what has been done in the past, and to work towards synchronizing the use of CALL with the context of current SLA theories and pedagogical practice. The present discussion represents a step toward accomplishing this goal.
LIST OF REFERENCES


