Managing Self-instructed Learning within the IS Curriculum: Teaching Learners to Learn

Felix B. Tan <f.tan@auckland.ac.nz> **and Hazel Chan**
The University of Auckland, New Zealand

ABSTRACT

A significant number of students are enrolled in introductory level information systems courses at New Zealand universities. Some of these institutions require their students to acquire their applications software skills in a self-instructional mode of learning. Most of these students have only experienced teacher-directed learning and when placed in a self-instructional environment may have very limited strategies in their learning. The purpose of this study is to determine if teaching "learners to learn" enhances the acquisition of application software skills. This study considers some of the literature on self-instruction and learner autonomy. The experiment compares two groups of students in self-instructional mode of learning. The control group works independently and the treatment group attends classes that teach the students to manage their own learning. The treatment group is consistent in averaging higher scores demonstrating an overall enhanced learning outcome. This paper challenges IS educators to include learning strategies in courses that require self-instruction. An introduction to working within a new framework should be built in as part of the course. This can prove to be need fulfilling to learners unfamiliar with self-instruction.

Keywords: self-instruction, autonomy, learning strategies, learner training, learning to learn

Introduction

With limited computing resources and increasing number of students enrolling in introductory level information systems (IS) courses, some New Zealand universities require their students to learn application software skills in a self-instructional environment. Students are required to "teach themselves" using a prescribed applications software textbook. Many of these textbooks are designed for self-instruction, taking students keystroke by keystroke through a number of learning objectives for each software module. Most of these students have only experienced teacher-directed learning and, when placed in a self-instructional mode of learning, find themselves asking the question "what am I suppose to do?" Many struggle to accomplish what the text instructs within the given course structure and time frame, exhibiting little or no strategies in coping with this new environment.

Problems confront students when they are faced with an environment for learning that requires an unfamiliar degree of initiative and autonomy. The earlier experiences of students (ie. teacher-directed learning) have rendered almost all of them totally unprepared to exercise independent thought and action in handling their own learning needs. Students need to learn how to manage their learning in the new environment. Nunan (1996) argues that strategies for learning within the new framework should be built in as part of the curriculum design. He contends that developing learning strategies can lead to some degree of learner autonomy. Students should be encouraged to consider their own learning needs and become aware of possible objectives, stages and sequences in self-instructed learning. They should be encouraged to select relevant goals and sub-goals at which to aim, and to monitor and assess their achievements. This process may be conceptualized as teaching "learners to learn" (Holec, 1980; Dickinson, 1987). Others call this learner training (Hallgarten, 1988; Oxford, 1990; Wenden, 1991).

The purpose of this study is to determine if teaching "learners to learn" enhances the students' learning outcomes - the acquisition of application software skills. The experiment compares the performance of the two groups of introductory level university students in a self-instructional mode of learning. The performance of the groups is measured by the results of two application software assignments and then statistically analyzed to see if there is a significant difference. This study is exploratory in nature. Most of the literature on self-instruction and learner autonomy is in the field of language learning. This is discussed in the following section. Few studies have attempted to determine if teaching learners to learn (self-instruction skills) can enhance the acquisition of application software skills in a self-instructional learning environment.

The aim of this experiment is to initiate research that may help the plight of IS students attending tertiary institutions who have only experienced teacher-directed learning. The results of this experiment can be used to encourage IS edu-

cators to develop greater learner autonomy by teaching self-instructional learning strategies within their existing curriculum.

Self-instruction and Learner Autonomy

Self-instruction is concerned with responsibility in learning. Individuals who are involve in self-instruction (as learners) have taken on some extra responsibility for their own learning which in other circumstances would be held on their behalf by a teacher.

(Dickinson 1987, pp. 8)

Self-instruction describes a situation in which learners can assume varying degrees of responsibilities for their learning. Using this concept of responsibility, we can view self-instruction on a continuum. On one end of the continuum, Dickinson (1987) describes learners with 'complete autonomy' as being totally responsible for all the decisions to do with their learning and the implementation of them, and is also free of all specially prepared material. This mode of self-instruction is learner-centered. In the middle of the continuum there is 'semi-autonomy', a stage where learners are preparing for autonomy. At the other end, is a state of 'programmed learning' (Dickinson 1987, p.10), where learners use materials and resources that manages the learning and leaves them only the responsibility of deciding when to do the work. This is a material-centered form of self-instruction.

As seen above, self-instructional modes are of varying levels of learner autonomy. These various degrees of autonomy are dependent on the learners' ability to organize and manage their learning. In order for self-instructed learning to occur, two conditions must be satisfied (Holec, 1980):

1. The learner must be able to take charge of his or her learning This means that s/he must *know how* to make decisions concerning all aspects of learning including determining the objectives, defining progressions, selecting techniques used and evaluating what has been acquired.

2. There must be a learning structure in which the learner can exercise control over the learning. This means that course structure must be designed to allow learners to exercise his or her ability to take charge.

Holec (1980) emphasizes that the ability to assume responsibility for one's own learning is not inborn. Therefore to fulfil the above first condition learners have to 'learn to learn'. The purpose of learner training is to enable learners to make all decisions about learning, such as deciding the objectives; as-

sessing progress and performance; and selecting method and technique (Hallgarten, 1988). Hallgarten believes that learner training should be a central curriculum objective to teaching. Work in this area by Wenden (1991), Ellis and Sinclair (1986), and Oxford (1990) has highlighted the need for learner training for the successful promotion of learner autonomy. To be able to achieve autonomy, learners require the opportunity to exercise the skills of managing their own learning - Holec's (1980) second condition to self-instructed learning. A learning environment that is learner-centered, conducive to commitment and is need-fulfilling for the learner is what Kohonen (1992) prescribes. Hallgarten (1988) believes that "learning is about acquiring skills to do something else" (p.114). It should develop transferable skills "to broaden the opportunities for autonomy in a wider area than the classroom" (p.114). Learners with these skills will then see themselves competent to assume more and more responsibility for their own learning and become autonomous learners.

In summary, self-instruction is where the learner undertakes part or all the instructional tasks involved in learning. The degree of autonomy learners achieve is dependent on the amount of responsibility for their learning they assume and the amount of management tasks they undertake. To be successful in self-instructional modes of learning the learner *must know how* to go about learning without constant direct intervention from a teacher. Learners who have not the skills to manage self-instruction can be taught these learning strategies.

Methodology

Research Design

All introductory level IS students attend 3 one-hour lectures per week. These lectures cover the theoretical aspects of the subject. At the same time, these students are expected to complete application software assignments due fortnightly. As such they have been allocated weekly computer-time to acquire these skills in a self-instructional mode of learning. The applications software textbook selected to support the applications software aspect of the coursework has been designed for self-instruction. However, most of these IS students have only experienced teacher-directed learning and as such may be unable to manage self-instructed learning.

The aim of the study is therefore to determine if teaching these student learners "to learn" will enhance the acquisition of application software skills. IS students are invited to register their interest in the study. A total of 103 students respond to the invitation. These students are divided into two groups:

Figure 1. **Average Assignment Scores for Treatment and Contol Groups**
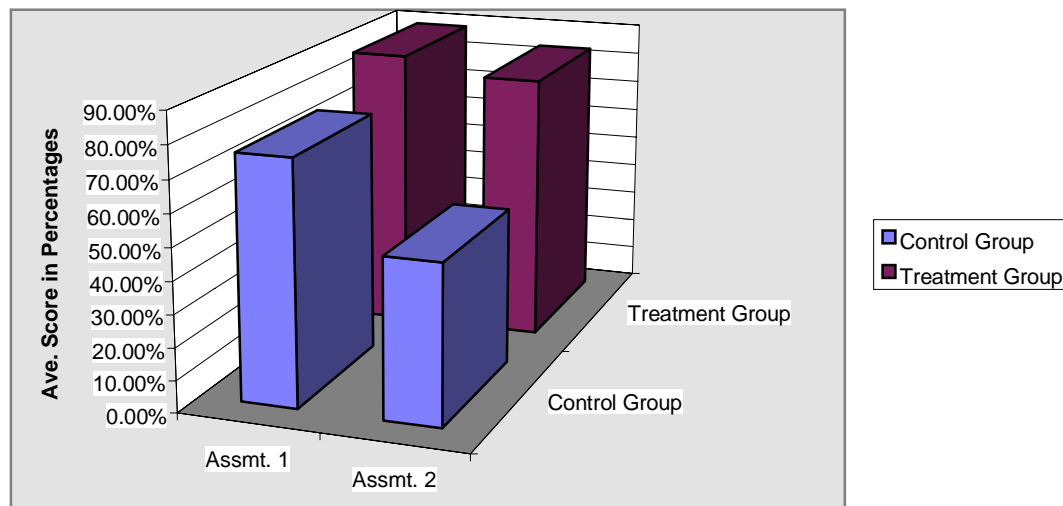
1. The Treatment Group attends classes that teach the students to manage their learning. These are discussed in the next section.

2. The Control Group instructs themselves using the prescribed text.

The Treatment Group consists of 35 students. These students have been included in this group simply because their timetable permit them to attend the classes. The remaining 68 students form the Control Group.

The Classes

As indicated in the earlier section, Holec (1980) contends that two conditions must be satisfied in order for self-instructed learning to occur. The classes have therefore been designed to:

- "Train the learner" to take charge of their own learning (first condition). This include learning strategies such as planning and organizing, evaluating, practicing, timed practicing, getting help, developing and using memory aids, asking for correction and peer-learning.

- Explain to the students the course structure in which they can exercise the skills of managing their own learning (second condition) - pointing out the choices in instructional resources. Students can use the pre-

scribed text, CD-ROM tutorials, or any other text available. They can decide to complete their assignments at any time before the stated due date. Help can be accessed either via email or at problem clinics supported by experienced teaching assistants.

Data Analysis

The learning outcomes are measured by the results of 2 applications software assignments. Average scores for each assignment are computed for each group. The average score for each assignment is computed by summing the results of all the students within the group and then averaged by the number of students in each of the groups. The average scores are then translated into percentages. This is presented in Figure 1. There is consistency in the results, with the Treatment group appearing to score better overall. It is interesting to note that the Treatment group perform better, averaging 34.1% higher than the Control group, in Assignment 2. While in Assignment 1 the difference is less marked, the Treatment group average is only 12.8% higher than the Control Group.

A further analysis to test for statistical significance between the mean score of the 2 groups is also performed. The mean score for each group is computed by summing the results for each assignment and then averaged by the number of students in each of these groups. The two-sample F test is then used to compare the mean scores of both the Treatment and Control groups. If the results of the

F test indicate that there is a statistically significant difference between the mean scores of these two groups, then it means that there is a link between teaching learners to learn and the performance of these learners. Table 1 presents the results of the F test.

The results of the analysis suggest that the calculated F value is larger than the critical value for both assignments. This implies that there is a statistical significance in the differences in the mean scores between the Treatment and Control Groups (at p<0.05) for both assignments. The study can therefore conclude that teaching learners to learn self-instructional strategies can enhance the acquisition of application software skills as manifested in superior assignment results.

Discussion

Students who have only experienced learning under the direct control of a teacher tend to display limited abilities to manage their learning when placed in a self-instructional environment. For students to be successful in self-instructed learning, they must assume varying degrees of responsibilities for their learning (Dickinson, 1987). These students can be prepared to take on these responsibilities if they know the learning strategies to adopt. The results of this experiment suggest that teaching learners to

manage self-instructed learning can enhance learning outcomes. The Treatment group is consistent in averaging a higher score for both assignments and the two-sample F test shows a significant difference (at p<0.05) between the performance of these two groups.

For Assignment 1, the results are encouraging. Both Treatment and Control groups return relatively similar scores. Student experiences and comments from the Treatment group are also very positive, for example:

> *"...it's (referring to the class) really good..."*
> *"...the others (those not in the Treatment Group) asked us to teach them what we learned!"*
> *"Some good tips, saved us some time..."*
> *"Should do this at beginning of the year, with Windows."*

In addition, members of the Treatment group are often found helping others - an added dimension that has not been expected.

The disparity in the Assignment 2 results is great with the Treatment group scoring 34.1% higher than the Control group. A possible reason for this is that students in the Control group may still be struggling with the concept of self-instruction.

Table 1. **Results of the Two-sample *F* test Comparing the Mean Scores of the Treatment and Control Groups**

	Assmt.1 Treatment Group	Assmt.1 Control Group	Assmt.2 Treatment Group	Assmt.2 Control Group
Mean	1.77	1.51	1.66	1.09
Standard Deviation	0.378	0.532	0.567	0.944
Observations	35	68	35	68
Degrees of Freedom	(1,101)		(1,101)	
F	1.979		2.775	
F critical (one tail)	1.566	Note: the comparison is significant at p<0.05	1.566	Note: the comparison is significant at p<0.05

In order for learners to take charge of their own learning they must know how. Perhaps students coming straight from high school find it hard to come to terms with no 'teacher directions'. This leading to poor management of their learning objectives has left them with insufficient time to complete their assignments. Assignment 2 is more complex than the first. In order for students to complete this assignment adequately, they have to work through the relevant sections of the text and experiment with the application software. Working through the text is a slow process especially for learners who are unfamiliar to the concept of autonomy in learning. O'malley and Chamot (1990) implicated that the retention of technical terms (declarative knowledge) is often a problem. This may be the problem faced by the Control group. Treatment group students on the other hand may have developed and used memory aids to recall terms or practiced peer learning to assist their retention. This argument has support from a study by Kohonen (1992). He contends that the presentation and repeated use of the new terms in an 'experiential' learning experience have enhanced the learning of the terms.

Implications

For learners to succeed in self-instruction, they must have the skills to manage their own learning (Holec, 1988). These skills can be learnt. Learners with these skills will then be competent to assume more and more responsibility for their own learning, to become autonomous learners, faring better than those who have not these skills.

The results of this study suggest that teaching learners to learn and manage self-instruction can be linked to enhanced learning outcomes in a self-instructional environment. This therefore supports Nunan's (1996) call for the inclusion of learning strategies in classrooms through syllabus and materials design. The teacher should not assume that learners have these skills at the beginning of the learning process, nor are all learners prepared for self-instruction. Nunan (1996) supports his argument by making reference to research studies of learner-centered approaches to teaching which lead to improvements in learning outcomes and in the ability to take responsibility for learning. He also provides practical illustrations of how learning skills, and hence learner autonomy, may be developed in a classroom.

Although this study focuses on assisting and preparing learners to learn in a self-instructional mode of learning, it supports the notion that teaching learning skills should be seen as the most basic and important educational objective no matter what learning mode is adopted (Dickinson, 1987). Whether the learning is teacher-directed, self-instructed or computer assisted, teachers are encouraged to build into the subject curriculum the skills necessary to promote effective learning.

If learners are to take more control over their self-instructed learning, they will need a lot of assistance along the way, particularly if their previous experience has been overwhelmingly teacher-directed. Kelly (1996) argues that in order to help learners assume more responsibility in their learning, teachers too need to develop the required skills in the development of learner autonomy. Although the learner is central to learner autonomy, the teacher should not be marginalized.

Limitations of the Study

When interpreting the results of this study or attempting to make generalizations, it is necessary to consider the limitations imposed by the design and methodology.

The sample population of this study is made up of individuals who feel that they 'need a little help'. Thus those who respond to the project may have been prompted by their motivation and attitude to learning. This means that the sample population is an unrepresentative sample. This in turn may introduce a bias into the results of the study and therefore not truly representative of the general student population. Research with learners from the wider population is needed before the findings can be extended further.

The size of the sample population is another limitation, which makes the interpretation of the results limited. Henry (1990) states that sampling error decreases as the sample size increases. Better timing, such as conducting the study earlier in the course may result in a better response and thus larger samples. In general, statistical tests comparing data categorized into groups require large sample sizes for adequate power and accuracy. The statistical test used to analyze the data of this study is one such test.

This study is guided by a simple research design that focuses on teaching learners to learn. There may be other factors that can impact on the learner's ability to manage self-instruction. These tend to center around learner diversity (Thompson, 1996) and include differences in attitude to learning (Sheerin, 1991), motivation (Dickinson, 1987) and cultural orientations (Esch, 1996; Little, 1996). In addition, the data from the two assignments shows only the effects in the short term - four weeks of a 12-week course. The time factor - shortness of the experiment - can also distort the accuracy of the results. Finally, the student respondents in both Treatment and Control Groups may

already possess different levels of learning skills acquired through earlier years of education.

Suggestions for Further Research

Future research needs to test the generalizability of the findings of this study. The use of larger sample populations and taking the study through the whole course can contribute to the generalizability of the findings.

An important aspect of self-instruction not addressed in this study is the concept of self-direction. Self-direction refers a particular attitude (to learning) rather than techniques or modes of instruction (Candy, 1991; Dickinson, 1987). It is important to distinguish between the attitude to learning (to be self-directed**) and the mode of learning (self-instruction). To use self-instructional modes of learning the learner must know how to go about learning without constant direct intervention from a teacher. Learners who have not the skills to manage self-instruction will need teacher guidance. Those who may have the skills may not have the self-direction or motivation to be self-instructed (Dickinson, 1987). Research into self-direction and self-directed learning may be warranted to better understand self-instruction.

This study is exploratory in nature and does not set out to examine the types of self-instructional learning skills acquired or adopted by the learners in the Treatment Group. Future studies involving some degree of measurement of learning skills (perhaps both pre and post) may permit IS educators to better prepare for the inclusion of learning strategies in their existing curriculum.

Finally is the issue of teacher training. Wenden (1991) suggests that teacher education is crucial for the successful introduction and promotion of learner autonomy. The techniques and processes involved in learner training require teachers to be capable, motivated and informed. Perhaps research is required to help teachers better understand what is involved in learner training.

Conclusion

The focus of this study is on teaching learners to manage self-instructed learning. The paper contends that more consideration should be given to learner training for courses that require their students to work in a self-instructional

---

** Holec uses the terms self-direction and self instruction in reverse to Dickinson. For this study Dickinson's terms are used throughout.

mode of learning. As the intake of students is on the increase in tertiary institutions in New Zealand, IS educators are challenged to include learning strategies in courses that require self-instruction. An introduction to working within a new framework should be built in as part of the course. This can prove to be need fulfilling to learners unfamiliar with self-instruction.

References

Candy, P.C. (1991). Self-direction for lifelong learning: A comprehensive guide to theory and practice. San Francisco: Jossey-Bass Publishers.

Dickinson, L. (1987). *Self-instruction in language learning.* Cambridge: CUP.

Ellis, G., & Sinclair, B. (1989). Learner training: A systematic approach. *IATEFL Newsletter.* 92, 13-14.

Esch, E. (1996). "Promoting learner autonomy: Criteria for selection of appropriate methods", In R. Pemberton, E.S.L. Li, , W.W.F. Or, & H.D. Pierson (Eds.), *Taking control - Autonomy in language learning*. Hong Kong: Hong Kong University Press.

Hallgarten, K. (1988). "Student autonomy - learner training and self-directed learning". In S. Nicholls (Ed*.), Current issues in teaching english as a second language to adults.* UK: Edward Arnold.

Henry, G.T. (1990). Practical sampling. *Applied Social Research Methods Series*, 21.

Holec, H. (1988). A*utonomy and language learning: Present fields of application*. Strasbough: Council of Europe.

Kelly, R. (1996). "Language counselling for learner autonomy: The skilled helper in self-access language learning", In R. Pemberton, E.S.L. Li, , W.W.F. Or, & H.D. Pierson (Eds.), *Taking control - Autonomy in language learning*. Hong Kong: Hong Kong University Press.

Kohonen, V. (1992). "Experimental language learning", In D. Nunan (Ed.), *Collaborative Language Learning and Teaching*. Cambridge: CUP.

Little, D. (1996). "Freedom to learn and compulsion to interact: Promoting learner autonomy through the use of information systems and information technologies", In R. Pemberton, E.S.L. Li, , W.W.F. Or, & H.D. Pierson (Eds.), *Taking control - Autonomy in language learning.* Hong Kong: Hong Kong University Press.

Nunan, D. (1996). "Towards autonomous learning: Some theoretical, empirical and practical issues", In R. Pemberton, E.S.L. Li, , W.W.F. Or, & H.D. Pierson (Eds.), *Taking control -*

Autonomy in language learning. Hong Kong: Hong Kong University Press.

O'malley, J.M., & Chamot, A.U. (1990). *Learning Strategies in Second Language Acquisition.* Cambridge: CUP.

Oxford, R. L. (1990). *Language Learning Strategies: What Every Teacher Should Know.* Boston, MA: Heinle & Heinle.

Sheerin, S. (1992). *Self-access" in language learning.* Cambridge: CUP.

Thomson, C. K. (1996). "Self-assessment in self-directed learning: Issues of learner diversity". In R. Pemberton, E.S.L. Li, , W.W.F. Or, & H.D. Pierson (Eds.), *Taking control - Autonomy in language learning.* Hong Kong: Hong Kong University Press.

Wenden, A. (1991). *Learner strategies for learner autonomy: Planning and implementing learner training for language learners.* Hemel Hempstead and Englewood Cliffs, NJ: Prentice Hall.

<!--msnavigation--><!--msnavigation--><!--mstheme-->