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Effects of Learning-Style Responsive Versus Traditional Approaches on Grammar Achievement

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Abstract

This study examined the effects of teaching through traditional versus learning-styles instructional methods on a sample of 323 heterogeneously grouped adolescent and adult learners' achievement, retention, attitudes, overall assessment and understanding of the advantages of learning Swedish grammar. In a counterbalanced design, the control group was taught about grammar with a traditional teaching method and the experimental group was taught the same content with Multisensory Instructional Packages (MIP) (Dunn & Dunn, 1993). Statistical analyses included analysis of variance with two independent variables (learning-style versus traditional methods) and three between-subjects variables (sequence, age, and learning-style type). Discriminant analysis and *F*-tests were used. The research design was quantitative, but incorporated qualitative components of triangulation. Significantly more positive differences ($p \leq 0.01$) were revealed in achievement, attitudes, retention, overall assessment and understanding of the advantages of grammar when students were taught with learning-styles responsive instructional strategies as opposed to when they were taught traditionally. The findings indicated that learning-styles methodology provided a practical, positive means of individualizing instruction and simultaneously improving learners' attitudes toward learning grammar.

Introduction

In Sweden, many students leave upper secondary school without having earned certification, whereas others require additional time to complete their studies (Skolverket 2000). Since the new reform for upper high school was initiated in 1994, the subject Swedish Grammar has become one of the core requirements. However, according to the annual statistics from government authorities, 10-24 % of students fail Swedish in high school (Skolverket 2001a; Skolverket 2002a; Skolverket 2003a). Furthermore, approximately one in three students withdraw from their elective program in upper high school (Skolverket 2003b). Two reasons were suggested for this--lack of stimulation and boredom (Skolverket 2001b).

There have been many discussions about the cause of academic failure in the Swedish educational literature. What has not been focused upon is the instructional delivery system—how students are taught. Since 1994, in LPO/LPF-94, Swedish National Curriculum Guidelines, Steering Documents (Skolverket, 1998), the Swedish curriculum has emphasized knowledge and a variety of methods based on individual differences. Simultaneously, educators have considered individualization, students' personal development, freedom of choice and variety, active student participation in the instructional process, and individuals' ability to consistently learn and retain challenging information and skills. Overall, teachers have failed to identify the individual traits that effectively impact on achievement so as to permit each learner the opportunity to develop through personal strengths. Such adaptations within any institutional context may create challenging problems.

In Scandinavia (Sweden, Norway and Denmark), there has been a tremendous interest in learning styles, most likely because the national curriculum emphasises individualization and many teachers wonder how to manage and change their teaching from traditional, teacher-centred instruction to differentiated learning strategies for individuals (www.planb.tv2.dk, www.kampanje.com/medier/article472731.ece). Many Swedish, Danish and Norwegian schools that cater to adolescents and adults use the Dunn and Dunn Learning-Styles Model as their pedagogical framework. Nonetheless, no well-controlled empirical research or program evaluation has been published on this model in Scandinavia.

Statement of the Problem

The need to restructure approaches to education is evidenced by the recent demands for individualization and every student's right to succeed in school. Although teachers verbalize the need for individualizing instruction, few identify the kind of individual differences that impact on academic achievement and, when they attempt to do so, they often lack funds to obtain appropriate instrumentation, rarely know what to do with the results of such analyses, and often lack administrative support for sustained change (Kroksmark, 1997).

The inability to succeed in school also generates embarrassment and boredom, none of which is eased by highly abstract teaching methodology that often leads to "blockings against learning" Brodow (2000, p. 105). Although teachers recognize the value of using correct grammar and its importance (Skolverket, 1993), and they may also acknowledge the diversity that exists in every classroom, they continue to teach conventionally. This study evaluated the effects of alternative strategies on the learning

of a very difficult part of linguistics – grammar. Instead of focusing on students’ failures and deficiencies, this study emanated from the identification of students’ learning-style strengths.

Research Questions

The purpose of this study was to investigate the differences that resulted from utilizing learning styles-based methodology as compared with traditional teaching. Variables such as participants’ attitudes, retention, understanding of the usefulness of grammar, and opinions concerning the process itself were considered.

The following six hypotheses were generated:

- H 1: There will be significantly higher achievement test results in grammar when students are allowed to utilize their learning-styles preferences compared to when they are exposed to traditional teaching.
- H 2: There will be significantly more grammar content retention when students are allowed to utilize their learning-styles preferences compared to when they are exposed to traditional teaching.
- H 3: There will be significantly more positive attitude toward grammar when students are allowed to utilize their learning-styles preferences compared to when they are exposed to traditional teaching.
- H 4: There will be significantly better understanding about the usefulness of knowledge of grammar when students are allowed to utilize their learning-styles preferences compared to when they are exposed to traditional teaching.
- H 5: There will be significantly better results of the overall assessment of the grammar section when students are allowed to utilize their learning-styles preferences compared to when they are exposed to traditional teaching.
- H 6: There will be significant differences between adults and youths in test results, attitudes toward grammar, retention, evaluation of the overall assessment and understanding about the usefulness of knowledge of grammar depending on learning strategies.

Related Literature

Selection of the Dunn and Dunn Model

There are many pedagogical theories; learning styles being one of them. The starting point in understanding learning styles is to find the most effective methods with which each student is able to achieve. The focus for capitalizing on learning styles is the didactic question “How can individual students most efficiently and most enjoyably learn new and difficult material” (Dunn & Dunn, 1999, p. 11) There are numerous other learning-style models with their own definitions and diverse focus points (DeBello, 1990); however, the Dunn and Dunn Learning-Style Model is one of few comprehensive models with an extensive research base (www.learningstyles.net).

Learning style is defined as “... the ways in which individuals begin to concentrate on, process, internalize, and retain new and difficult information or skills.” (Dunn & Dunn, 1993, p 12). This particular model synthesises many others – e.g., Dewey’s (1980) concept of learning by doing, Montessori’s (1998) activity-oriented pedagogical emphases, Bligh’s (1998), mediation pedagogy and even Gardner’s (1983) construct of multiple intelligences. The Dunn and Dunn Model of Learning Styles combines diverse theories and assumptions and applies them to individuals’ natural learning-style characteristics rather than promoting whole group, across-the-board applications.

The Dunn and Dunn Learning-Styles Model was selected from among many models, because it (a) is one of only three comprehensive models, (b) is supported by international research in all subject areas, (c) has documented that instruction that matches students’ learning-styles strengths significantly improves their achievement, attitudes, and in-class discipline (Dunn & Griggs, 2007), (d) has both valid and reliable instrumentation (Curry, 1990; De Bello, 1990), and because researchers at more than 130 institutions of higher education have contributed more than 900 studies to its extensive research base (Dunn & Dunn, 2003, Dunn & Griggs, 2007).

The Dunns describe their construct as “a biological and developmental set of personal characteristics that makes the identical instruction effective for some students and ineffective for others” (Dunn & Dunn, 1993, p. 5). Most people have learning-styles preferences, but individuals’ preferences differ significantly. Learning styles vary by (a) age, (b) achievement level, (c) gender, (d) nation, and (e) global versus analytic brain processing (Dunn, Thies, & Honigsfeld, 2001). The Model’s definition indicates that learning styles is comprised of each individual’s personal reactions to 20 characteristics

or variables called elements (Dunn & Dunn, 1993). These are grouped into five stimulus strands; environmental, emotional, sociological, physiological, and psychological.

Environmentally, students' preferences for sound, light, temperature and design are examined as they contribute substantially to their comfort during concentration. At the emotional level, the focus is on motivation, persistence, responsibility, and structure. Sociologically, students' preferences for consistently learning alone, in pairs, with groups, with or without an authority present, or in a variety of patterns are considered. Physiologically, the focus is on students' perceptual strengths (visual, auditory, tactile, or kinaesthetic), time-of-day, need for intake, and mobility. Finally, psychologically, the elements of information-processing (analytic or global) and students' reflective or impulsive response patterns are examined (see Figure 1).

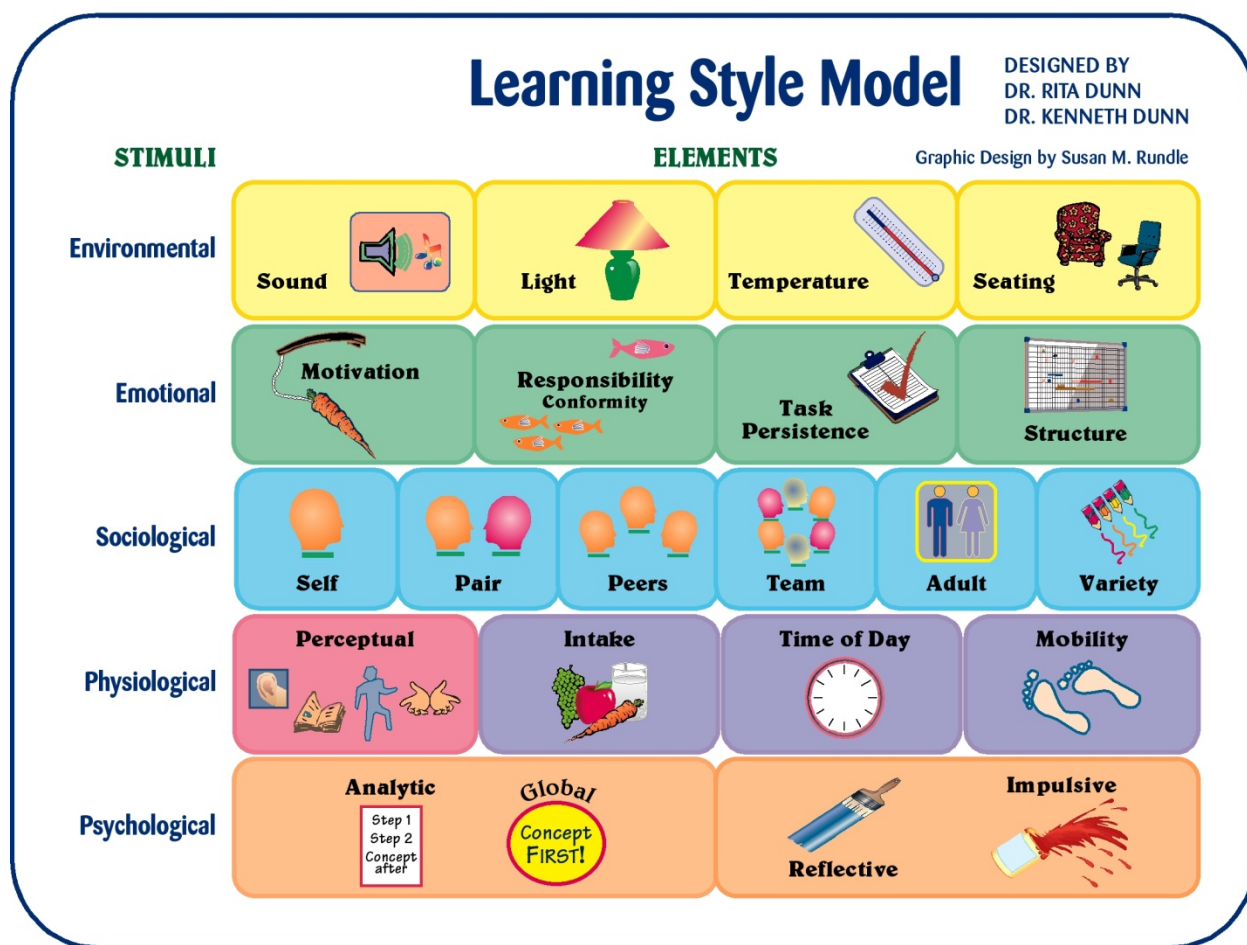


Figure 1. The Dunn and Dunn Learning Style Model

During the past 40 years, research based on the Dunn and Dunn Model has revealed significant differences between learning-style responsive versus traditional approaches in every discipline and in many elective subjects at all levels of education (Dunn & Dunn, 1972). Many practitioners, who have used the Dunn and Dunn approaches, reported standardized achievement- and attitude-test gains at every academic level (Andrews, 1990; Dunn & De Bello, 1999; Farkas, 2002; Fine, 2002; Lenehan, Dunn, Ingham, Singer, & Murray, 1994; Quinn, 1993; Stone, 1992).

A meta-analysis of 42 experimental studies conducted with this model between 1980 and 1990 at 13 different universities revealed that students whose learning-styles characteristics were accommodated by educational interventions responsive to their learning styles could be expected to achieve 75% of a standard deviation higher than students whose styles were not accommodated. In other words, it was evidenced that students' learning-styles preferences – when matched with responsive instructional strategies – are advantageous to their academic achievement.

A second meta-analysis of 76 experimental studies conducted with the Dunn and Dunn Model by researchers at 18 universities was completed by Lovelace (2003; 2005). The total sample size was 7,196 and the total number of individual effect sizes was 168. The overall data reported significantly higher test scores when the Dunns' learning-style strategies were employed and compared with traditional teaching, regardless of the university at which the study was conducted. Most effect sizes were medium to large dependent on the elements tested. Very few effect sizes were small, but some elements affect students more than others do.

Grammar Didactics

According to the Swedish National Encyclopaedia (2005), "A descriptive grammar looks at the way a language is actually used by its speakers and then attempts to analyse it and formulate rules about the structure. Descriptive grammar does not deal with what is good or bad language use; forms and structures that might not be used by speakers of standard Swedish would be regarded as valid and included. It is a grammar based on the way a language actually is and not how some think it should be. Svenska Akademiens Grammatik, SAG, (1999), (Swedish Academic Grammar) is grounded in descriptive grammar; the elements of which may also be found in most other Swedish grammatical theories. In addition, the grammatical concepts described in SAG often serve as the basis of grammar development or instruction.

Grammar has occupied a natural place in the Swedish curriculum, with few challenges to its autonomy until the last 20 years. Knowledge of grammar is recommended by many researchers, but the traditional argument for it is as a cornerstone for the development of writing and speaking is debatable (Brodow, 2000; Hetzberg, 1990; Teleman, 1987). Developing an understanding of ourselves as human beings, learning foreign languages, and developing meta-cognitive skills, all currently in support of teaching grammar in school. Other arguments include that knowledge of grammar enhances the understanding of different sociological groups and skills that contribute to one's personality (Teleman, 1987, Bolander 2001).

Despite the apparent need for a strong grammatical knowledge and skills base, many secondary students perceive learning grammar as an imposed requirement that is extremely demanding. Several researchers purport that grammar education in its present state is a product of teachers' past experiences with the same subject; they conclude that it should be taught more effectively (Teleman, 1987; Bolander, 2001; Hertzberg, 1990; Josefsson, 2003). Indeed, it has been posed that the mission of schooling is to expand students' awareness of language and to increase the ease and efficiency with which they use it. One important way of doing that is to develop a strong practical base and building blocks that relate to students' lives when using the language. However, when examining textbooks that frequently are used in upper secondary schools, two distinct sections are apparent: parts of speech and syntax – both of which are representative of a traditional scholastic grammar education.

Experimental research with upper secondary Swedish grammar exists only marginally. The few studies that are available are essentially qualitative. There is, on the other hand, an extensive international research base with the Dunn and Dunn Learning-Styles Model indicating broad-based statistical support for significantly higher achievement and attitudes, and improved school decorum, based on school-based studies involving children, adolescents, and adults in many different subjects (Dunn & Griggs, 2007; www.learningstyles.net). There is no comparative research base in grammar education with both adolescents and adults, and none describing the results of using learning styles to teach grammar in Sweden.

Educational Context

Education in Sweden is compulsory between the ages of 7 and 16, though most children start school at the age of 6. Attending a compulsory nine-year school is followed by going on to upper secondary school. Compulsory schools may be national, municipal, or independent. Most students (98%) are enrolled in municipal compulsory

schools. Education at the compulsory and upper secondary levels is comprehensive and coeducational, and the new curricula and assessment procedures – which came into effect in 1994 – are uniform nationwide. Students completing compulsory school are awarded a leaving certificate (Passed, Passed with Distinction, or Passed with Exceptional Distinction), and approximately 98% of them continue their education at a three-year upper secondary school, which offer both academic and vocational programs. (Swedish Institute, 1998). Through vocational education, students receive training in practical fields and are granted a certificate after three years of study. Academic programs focus on theoretical subjects, thus, students receive no vocational training. However, there are six subject matters common to both academic and vocational upper secondary programs: Swedish, English, Maths, Science, Religion, and Health Education and students in both upper secondary programs are eligible to continue in intuitions of higher education (Skolverket, 2005).

Methodology

Participants

There were 323 participants in the study randomly selected from a total population of 1,370 students. The division among the total sample (323) were 181 adolescents (105 males, 76 females) and 142 adults (67 males, 76 females). The researchers' interest in a comparative analysis of adolescent and adult education led to the selection of these two sub samples. The average age of the adolescents was 16.4 years and of the adults 35.3 years. All these students were studying Swedish A – the first of three courses scheduled over a three-year period. This research was conducted in three economically similar towns in northern Sweden.

Materials

The following instruments were used in this study:

1. The Productivity Environmental Preference Survey (PEPS) (Dunn, Dunn, & Price, 1984, 1991, 2000) is a measurement of learning-style preferences for traditional college students. It consists of 100 dichotomous questions that elicit self-diagnostic responses on a 5-point Likert-type scale in approximately 25 minutes. Data collected from this assessment yield computerized profiles of each student's preferred learning-styles traits based on the 21 variables of Dunn and Dunn elements illustrated in Figure 1. The PEPS has repeatedly evidenced predictive validity (Dunn, Griggs, Olson, Gorman & Beasley, 1995; Leneham, Dunn, Ingham, Singer & Murray, 1994; Nelson, Dunn, Griggs, Prima-

vera, Fitzpatrick, Baciliou, & Miller, 1993) and the reliability coefficients for each elements fall into the .75 to .88 range (Dunn et al., 1995). The Swedish translation of the instrument was utilized.

2. The Semantic Differential Scale (SDS) is a 5-point scale consisting of 11 bipolar adjective word-pairs (i.e. tense versus relaxed, or successful versus unsuccessful), comparing students' attitudes towards two different strategies. The SDS was originally developed by Pizzo (1981) for comparative studies concerned with learning style. In this research, students compared their attitudes toward traditional lectures versus learning-styles instruction. Students rated their feelings five times. Prior to using the SDS in this research, reliability analyses were conducted for the SDS-scale. A Cronbach's Alpha of .92 was calculated when students compared their attitudes toward traditional versus learning-styles strategies. Values of .90 and above were interpreted as indicating sufficient reliability (De Poy & Giltin, 1999). The Swedish translation of the instrument was utilized.

3. Achievement Examinations. A pre-test, a posttest, and a subsequent test administered after five weeks directly focused on the grammar curriculum prepared by this researcher. The achievement tests was designed based on the Swedish National Curriculum Guidelines (also referred to as Steering Documents) and addressed all six levels of Bloom's taxonomy. They were designed "traditionally," focusing on knowledge of facts, comprehension, application of grammar rules, and grammatical usage. The pre-test determined the equivalence of the Control and Experimental Groups, whereas the immediate post-test assessed participants' knowledge directly following the grammar treatment and, then again, five weeks later to determine long-term retention. The grammar tests were jury evaluated and was deemed valid measures of the construct.

4. Evaluation. An overall assessment to determine students' attitudes toward each of the two instructional treatments was utilized with a Likert-type scale designed specifically to evaluate the relative impact of the two treatments. On a scale of 1 to 5, the participants rated their attitudes toward the grammar studies after the posttest by using 12 pairs of words, such as good planning versus poor planning or interesting versus not interesting.

5. Usefulness of Grammar Knowledge. This study also investigated whether participants perceived that knowledge of grammar was advantageous and whether their attitudes were related to methods through which they had learned. On Likert-type a scale of 1 to 5, the participants rated their attitudes toward the usefulness of grammar knowledge after the posttest by using 6 arguments for grammar, such as I need grammar for studying foreign languages (Agree – Disagree) or Grammar knowledge gives

me insights about human beings (Agree – Disagree). The results were analysed by a factor analysis. This research question was based on frequent discussion in Sweden concerning grammar didactics. Many students do not have even a fundamental knowledge of correct grammar and often express stress concerning its mastery. Teachers and grammarians are confused by students' attitudes concerning this basic subject and they participate in multiple discussions and arguments concerning this problem (Teleman, 1987; Brodow 2000; Bolander 2001).

6. Learning-Styles Based Intervention. Multisensory Instructional Package (MIP) Approach. MIPs were used to present and review the grammar content through visual, auditory, tactual and/or kinaesthetic instructional strategies (Dunn & Dunn, 1993). An MIP is a self-contained teaching resource that enables students to master a set of objectives according to their individual perceptual strengths. According to Burke (2003), research on MIPs indicates that matching students' learning-styles preferences with complementary methods increases their achievement significantly when they begin with their modality strengths and reinforce new and difficult information through their secondary or tertiary strengths. Thus, in this study, visual learners mastered the content with the textbook by reading and then answering questions; auditory learners used audiotapes first and then read the textbook, listened to their teacher, or discussed with a classmate the same questions on which the visual learners had focused. Tactual learners initially studied grammar with self-correcting manipulative or puzzles. Kinaesthetic learners mastered the content with games at various in-the-classroom learning stations, by role-playing, or by utilizing Floor Games. (In this last strategy, learners master the material by walking around with question-and-answer cards). Therefore, regardless of their perceptual preference, students started with their strongest modality, reinforced what they had learned with another modality and then used the knowledge they gained in practice.

7. Procedures. This investigation was conducted during one academic year, from Fall 2000 through Spring 2001. Eight classes were grouped together for a counterbalanced research design. A counterbalanced design reduces the possibility of the Hawthorne-effect by eliminating the novelty in a situation. In addition, the researchers also recognize that this design "controls well for the subject characteristics threat to internal validity," ...even though it may be vulnerable to multiple treatment interference ..." (Fraenkel & Wallen, 2003, p. 279). In light of this possible threat, Fraenkel and Wallen recommend a careful examination of the datasets and findings. The researchers not only followed these recommendations but also supplemented quantitative data sets with a follow-up, qualitative analysis.

The grammar objectives were divided into two major units—Parts of Speech and Syntax. Two groups worked traditionally with both units, two groups started traditionally and then continued with learning styles, two groups worked in the opposite sequence—first with learning styles and then with traditional teaching. Finally, two groups worked only with matched learning-styles methods. Figure 2 indicates the timetable utilized.

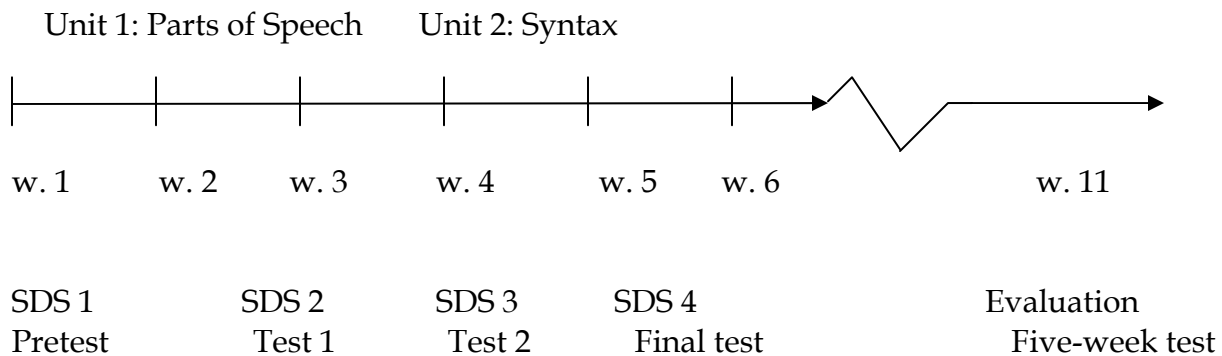


Figure 2. Timeline for the Research Procedures

Note: w = week

Prior to the investigation, all students' learning styles were identified with the PEPS (Dunn, Dunn & Price, 1984, 1991, 2000). Before being exposed to Unit 1, the Experimental Group received their Individual Learning Style Profile. Students were administered the SDS (Pizzo, 1981) and the pre-test to measure their attitudes toward, and their previous knowledge of, grammar. Subsequently, students worked with Unit 1 for five lessons of 60 minutes each. Directly after the unit on Parts of Speech, students were administered an achievement test and the SDS.

Similarly, Unit 2 consisted of five lessons followed by the SDS (Pizzo, 1981) and the second achievement test. After one week, the participants were administered a post test of all grammar content and the fourth SDS. After five weeks, students were given a test to measure their retention of the content.

Research Design

The scientific methods used in this study were mainly of a quantitative nature, but were deeply embedded in a basic qualitative approach. All inquiries and findings that required statistical analysis belong in the former classification. In depth interviews

and open-ended questions interwoven into the inquiries exemplify the latter. Therefore, the cornerstone of this study was triangulation, a process that involves both methods as corroborating bases for each other.

Statistical Analyses

Data were collected and analyzed with SPSS. Statistical procedures included (a) an analysis of variance (ANOVA) with two dependent variables (traditional vs. learning-styles based methods) and three between-subjects variables (sequences, age, type) and (b) a discriminant analysis. The *F*-test was used and effect sizes were reported.

Results

Achievement and retention

Figure 3 indicates the real mean for the three major tests. The pure learning-style group attained and retained the best results on the post-tests. Participants in the pure traditional group evidenced the lowest mean on both tests. The two divided groups performed better on both tests compared with the traditional groups. As seen in Figure 3, learning-styles strategies produced statistically higher grammar achievement scores when compared with traditional teaching.

To examine the effects of learning-styles strategies, it was necessary to analyze the pre-test as a covariate against the ANOVA results. The analyses of variance demonstrated significant differences between the grammar test results of the traditional group and of the other three groups. A pairwise mean analysis with Fisher's PLSD is provided in Table 1, indicating a significant difference on the post test. The differences were also large on the retention test for all groups that worked with learning-styles-responsive grammar resources, whether partially or totally as compared with the group that mastered the content traditionally.

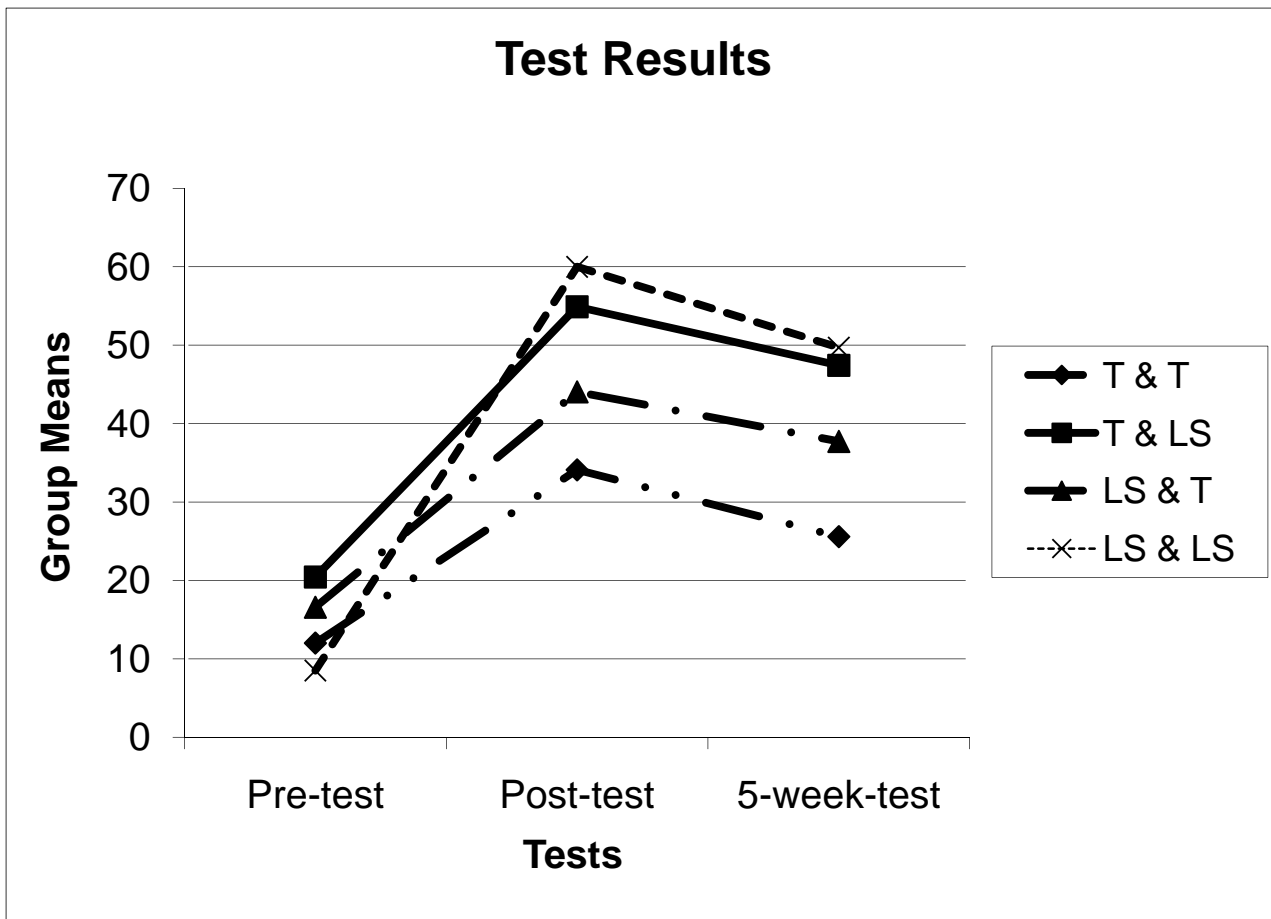


Figure 3. Test Results for the Four Different Groups Related to the Three Major Grammar Assessments

Note: T & T indicates “pure” (repeated) traditional teaching; T & LS stands for traditional teaching followed by the learning-styles based intervention; LS & T stands for learning- styles based intervention followed by traditional teaching; LS & LS indicates “pure” (repeated) learning-styles instruction.

Table 1
Achievement-Test Scores Based on Statistical Analyses for All Groups

Tests	T & T (n = 83) M (SD)	T & LS (n = 72) M (SD)	LS & T (n = 67) M (SD)	LS & LS (n = 101) M (SD)	F (df 2)	η^2
Pre-test	12.01 (10.54)	20.43 (13.38)	16.59 (11.36)	8.51 (12.76)	92.072 ***	.280
Posttest	34.10 (22.15)	54.89 (24.32)	44.04 (22.08)	58.98 (23.34)	75.857 ***	.253
Five-week test	25.58 (18.51)	47.42 (22.19)	37.74 (21.48)	49.69 (22.57)	77.958	.370

Table 2
Main and Interaction Effects for the First Unit with the Dunn & Dunn Learning Styles Model for Adolescents and Adults

Effect	Df	Mean Square	F	p-value	Effect Size (η^2)
Pre-test	1	8337.264	92.072	.000 ***	.280
Methods 1 (T vs LS)	1	560.683	6.192	.014 *	.025
Age (adolescents vs adults)	1	5.283	.001	.981	.000
Methods 1 by Age	1	32.885	.363	.547	.002

Notes: * $p < 0.05$; *** $p < 0.001$

Correlations for Achievement and Retention Concerning Methods, Age, and Styles

We also examined main and interaction effects. As shown in Tables 2 through 5, the pre-test was significant at a very high level. All four tests indicated a main effect for methods, thus the findings supported the positive benefits of learning-styles strategies. Test 1 and the final test indicated no significant differences between ages, but on Test 2 and the last five-week test, there were significant differences. There was just one interaction effect between age and methods on the five-week test.

Table 3

Main and Interaction Effects for the Second Unit with the Dunn & Dunn Learning Styles Model for Adolescents and Adults

Effect	Df	Mean Square	<i>F</i>	<i>p</i> -value	Effect Size η^2
Pre-test	1	6499.671	62.675	.000 ***	.211
Methods 2 (T vs LS)	1	1121.942	10.819	.001 ***	.044
Age (adoles- cents vs adults)	1	520.315	5.017	.016 *	.021
Methods 2 by Age	1	83.242	.803	.371	.003

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 4

Main and Interaction Effects for Final Test with the Dunn & Dunn Learning Styles Model for Adolescents and Adults

Effect	Df	Mean Square	F	p-value	Effect Size η^2
Pre-test	1	16215.579	57.459	.000 ***	.214
Methods 3 (T vs LS)	1	11237.819	14.386	.004 **	.060
Age (adoles- cents vs adults)	1	57.871	.205	.651	.012
Methods 3 by Age	1	242.079	.642	.424	.005

Notes: ** $p < 0.01$; *** $p < 0.001$

Table 5

Main and Interaction Effects for the Five-Week Test with the Dunn & Dunn Learning Styles Model for Adolescents and Adults

Effect	Df	Mean Square	F	p-value	Effect Size η^2
Pre-test	1	12213.579	49.649	.000 ***	.272
Methods 4 (T vs LS)	1	1591.617	6.470	.000 ***	.119
Age (adoles- cents vs adults)	1	4404.494	17.904	.012 *	.046
Methods 4 by Age	1	604.496	2.457	.119	.018

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 6
SDS Data Concerning Students' Attitudes toward Grammar

Attitude Tests	T & T (n = 83) M (SD)	T & LS (n = 72) M (SD)	LS & T (n = 67) M (SD)	LS & LS (n = 101) M (SD)	F (df 3)	η^2
Att.1	2.74 (.98)	2.96 (1.01)	2.9 (1.02)	2.89 (.87)	.512	.002
Att.2	2.7 (.89)	2.84 (1.01)	3.12 (0.94)*	3.03 (.81)**	1.608	.008
Att.3	2.64 (.95)	3.09 (.94) **	2.96 (0.99)*	3.19 (.79)***	.871	.008
Att.4	2.58 (1.05)	3.17 (1.01)**	3.19 1.07)***	3.32 (.79) ***	.211	.015

Notes: Att=Attitude test administration

The control group is compared statistically with all the others

Students were tested with the Semantic Differential Scale (SDS),(Pizzo, 1981) four times: (a) before receiving any grammar instruction, (b) prior to the onset of Unit 1, (c) prior to the onset of Unit 2, and finally, (d) before the post-test. The four groups scored similarly on the first SDS administration. However, after the students learned about their learning styles and were taught with responsive strategies, an ANCOVA – using the first SDS as a covariate – revealed that they attained significantly higher scores than their peers in the traditional group on SDS 3 and SDS 4 (see Table 6).

A pairwise comparison of attitudes toward grammar among the four groups indicated significant differences in favour of the learning-styles responsive instruction (see Table 7). Statistically measurable differences indicated students' more positive attitudes toward grammar when participating in learning-styles responsive instruction than when being exposed to traditional teaching. There was also an interaction effect with regard to attitudes and style. The visual students in both the learning-styles group and in the traditional group scored significantly higher on the SDS-test.

Table 7
Pairwise Comparison Concerning Attitudes

Effect	Df	Mean Square	F	p-value	Effect Size η^2
Intercept	1	11039.642	3386.074	.000 ***	.914
TEST SEQUENCES	3	13.288	4.076	.007 **	.037

Notes: ** $p < 0.01$; *** $p < 0.001$

Knowledge of Grammar and the Overall Assessment

In this study, students provided their perceptions of the usefulness of grammar through six related questions appearing on a Likert-type scale. They also evaluated their overall assessments of the grammar course, Unit 1 and Unit 2. Two groups were compared on their attitudes – the pure traditional (Control Group) and the pure Learning-Styles classes (Experimental Group). Table 8 indicates the significant differences for all grammar arguments. The Experimental Group perceived the value of one's knowledge of grammar statistically more positively than the learners in the Control Group.

Table 8 provides the results of the evaluation procedures for the Experimental and Control groups. There were significant differences at each element, except for high demands. The Experimental Group evaluated the design more positively than the students in the Control Group. There were no differences, however, concerning perceptions of high difficulty, which indicates that students in both groups felt the same level of difficulty or ease with the grammar content, taught during the course of the study.

Quantitative Results

In the quantitative part of the study, six hypotheses were formulated. Of these, the following were confirmed:

H 1: There was significant ($p < .001$) improvement in grammar test results when students were allowed to work with their learning-styles preferences as compared with when they experienced traditional learning.

Table 8

Results of the Grammar Arguments and the Overall Assessment of Data Solicited from the Experimental (Learning Styles) Group Compared with the Control (Traditional) Group

Dependent variables	Arguments for grammar	LS	Tradition	p-value
		Means	Means	
Grammar Argument	Thinking	4.2	3.49	0.002 ***
	Foreign language	4.94	4.10	0.001 ***
	Metacognition	4.32	3.48	.000 ***
	Writing	4.5	3.82	0.008 **
	Understanding cultures	4.43	3.33	.000 ***
	Personally development	4.51	3.11	.000 ***
Overall Assessment	Interesting	3.94	2.84	.000 ***
	High demands	4.56	4.54	0.582
	Funny	3.81	2.39	.000 ***
	Independent	4.5	3.04	.000 ***
	Good planning	4.99	4.06	0.011 **
	Good material	5.16	3.59	.000 ***

Notes: ** $p < 0.01$; *** $p < 0.001$

H 2: There was significant ($p < .002$) improvement in attitude toward grammar when students were allowed to work with their learning-styles preferences as compared with traditional teaching.

H 3: There was significantly ($p < .0001$) higher grammar retention when students worked with their learning-styles preferences as compared with when they experienced traditional teaching.

H 5: Significantly ($p < .008$) more understanding occurred concerning the usefulness of grammar knowledge based on the methodological process utilized, favouring the learning-style approach.

The following hypotheses failed to be confirmed:

H 4: There were significant differences between adults' and youths' responses elicited from the grammar survey, with more positive test and attitude results from the individual learning-style instruction than from traditional teaching. Concerning retention, there were significant differences ($p \leq 0.01$) between age groups, i.e., adult participants remembered better than adolescents.

H 6: The overall assessment of the grammar section differed depending on the learning strategy.

The data derived from this study indicated that the overall assessment for all statements significantly differed between the two groups, except for high demands.

Qualitative Results

According to the Grammar Teacher Survey (Boström, 2000), the participating teachers of Swedish think that grammar instruction is rather important to students. There are, however, diverse opinions concerning how grammar should be classified and how education should be provided – as an individual subject or integrated into the writing practice. This study also found that many teachers of Swedish believe that knowledge of grammar brings concept formation into language, which is important in the process of learning a foreign language. At the same time, many teachers emphasised the lack of time and the importance of prioritising within the course. It was also found that grammar research is not at the top of the agenda of in-service training for teachers of Swedish.

The qualitative research points in the same direction as the quantitative concerning the methodology of individual learning styles compared with traditional teaching. The majority of the responses indicated positive attitudes toward alternative methods when compared with traditional instruction. By responding to individual learning styles, emphasis is placed on diversity and, therefore, the possibility of success becomes increasingly attainable for more students. In addition, learning, in and of itself, becomes regarded as pleasurable.

The interviews showed broad support for reaching the best results possible, regardless of strategy and without stressing any particular learning styles method. However, teachers revealed some concerns with the methodological approach. These concerns can be grouped into three major themes, such as: (a) the methodology of learning styles demands additional preparation; (b) the role of the teacher changes, and (c) without training, the classroom can become confusing and disturbing to some students when compared with traditional teaching with which they are familiar – but with which they may not be succeeding. Utilizing the learning styles approach, teachers reported that they did not have to “teach” all the time, they had to assume the role of a facilitator or counsellor to enhance students’ learning. They had to structure the material and the lessons much more than with traditional teaching, and they had to be much more aware of how the students learnt. Some quotes from the interviews clearly indicate the challenge teachers faced as they experimented with learning-style responsive strategies:

“It is a kind of a paradox. The more you give the students choices and responsibilities the more you need structure as a teacher.” (Teacher B)

“Traditional methodology is easier for me as a teacher because I am used to it and its structure. With LS methodology I sometimes lost the control over the group and sometimes the students thought I wasn’t clear enough in my directions.” (Teacher G)

Some traditional teachers believed that knowledge of the subject was more focused upon and, because of that, they had to prepare more thoroughly. Their emphasis was on keeping students in a good mood during the grammar lessons. Student interviews revealed no observations concerning whether teachers behaved differently depending on the specific learning strategy.

In general, the differences between youth and adult responses in the survey and in the interviews suggested that the adults’ awareness of prior experiences in school was a result of learning styles being a new concept to them. Results also indicated the importance of building on learners’ prior experiences and receiving clear explanations from the teacher.

Discussion

This investigation has revealed significant differences in achievement test results, attitudes, retention, and an understanding of knowledge of grammar when learning styles based vs., traditional methodologies were used. The positive effects of learning styles methodology can be explained from different perspectives:

- (1) Positive results create motivation and satisfaction to continue working.
- (2) Through the multisensory character of the methodology, the students who earlier had anticipated difficulties with grammar now had new strategies for learning difficult material.
- (3) The methodology of learning styles had given them new tools in the learning process.
- (4) Understanding their personal ways of learning had provided a higher level of awareness, flexibility, and opportunities for group learning.

A question to reflect on is whether the positive achievement and attitudinal gains are the results of individualized learning opportunities, or if the learning-styles model itself has raised awareness about individuals' learning styles. The correlation between cause and effect is not evident.

The students who were working according to their learning styles responded to all grammar arguments significantly more proficiently than the students who worked with the section via traditional teaching. Perhaps the relationship between methodology and usefulness is so simple that if the students succeed in grammar, it may simply be perceived as useful. The data have not revealed, however, whether the former group (traditional teaching) critically examined conventional grammar arguments or not.

Because of our relatively large sample representing diverse groups, we do not consider teachers' personalities to be a substantial intervening variable. It was found that even those teachers utilizing a traditional approach to teaching grammar employed more activity and demonstrated personal engagement. The findings also indicated that the methodology of learning styles works just as well for both the adolescent and adult populations.

There are multiple pedagogical implications of the study: adjusted methodology (utilizing some learning-styles based techniques) may be the first step toward a change in grammar education in Sweden and a base for discussing suitable methodologies for teaching grammar effectively. A more radical step would be to expand on the methods and strategies for individualization from learning-styles theory and to develop learning-styles based units of the grammar curriculum in secondary and adult education. The importance and appropriate teaching methodologies of the grammar curriculum should also be discussed in the different programmes in the upper secondary school

system. These considerations may have even further reaching effects. If we postulate that knowledge of grammar is important for success, creating different types of upper secondary programme tracks – and placing less or more emphasis on teaching and learning grammar in Sweden – may be questionable. The consequences of this type of tracking may be substantial: Those students who already have a well developed language and grammatical system will continue into further education even more, while the individuals who have a less-developed language and really need to increase their linguistic and grammatical skills will not. This, in turn, may create even greater class and economic distinctions between students following the various upper secondary tracks regarding access to language and education.

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