VALUE OF SCHEDULING-RELATED INSERVICE EDUCATION, OPPORTUNITY TO IMPLEMENT EFFECTIVE TEACHING PRACTICES, AND PERFORMANCE OF BLOCK-SCHEDULED LEARNERS IN AGRICULTURAL EDUCATION: A CORRELATIONAL STUDY

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Abstract

The purpose of this study was to examine relationships among teacher perception of the value of teacher inservice in preparation for a block schedule, teacher satisfaction with the opportunity to implement effective teaching practices, and student achievement. Volunteer teachers (N = 22), including 12 Modified A/B Block scheduled schools (189 students) and 10 Nine-Week (4X4) Block scheduled schools (136 students), provided the data. Teachers completed a questionnaire and administered a student examination. The value of inservice education was positively related to satisfaction with opportunity to use effective teaching practices; it was also positively related to achievement. This association was statistically significant and positive for lower-order and higher-order thinking skills (HOTS), and overall achievement. Teacher satisfaction with opportunity to use effective teaching practices was also positively related to achievement. This relationship was statistically significant for HOTS. Teachers should receive inservice that helps them to acquire instructional behaviors that are effective when used under a block schedule.

Introduction and Conceptual Framework

If systematic and continuous improvement of student learning is an ultimate aim of education then inservice education of teachers should prepare them to use effective teaching practices. Researchers (Birman, Desimone, Porter, & Garet, 2000; Darling-Hammond & Falk, 1997; Darling-Hammond & McLaughlin, 1995; Hoyle, English, & Steffy, 1994) have supported this premise. Professional development may include assistance in developing teaching behaviors appropriate for an instructor's unique school setting. For example, if teachers are faced with professional challenges associated with changing their school-day schedule (e.g., to block scheduling), then inservice education can address their needs, and, if new teaching behaviors

are adopted and used properly, the result should be improved student achievement. However, Garrett (2000) recommended that "successful management of change cannot be undertaken without a clear understanding of the reaction of the professionals involved (including teachers) to changes in their work and the higher expectations being made of them" (p. 2). Conley and Woosley (2000) supported this position when they concluded, "educational managers should take the opportunity to strategically evaluate reform efforts to redesign the work of teachers" (p. 196).

Wortman, Moore, and Flowers (1997), in investigating the phenomenon of block scheduling and its impact on students in agricultural education, posited that "by understanding how people act to change, adjustments can be made to the innovation" (p. 441). These investigators relied on the Concerns-Based Adoption Model (CBAM) to support their contention about change. According to Hall and Hord (2001), the CBAM is based on twelve principles or major themes. Six of these principles were most relevant to this study: change is a process, not an event; an organization does not change until the individuals within it change; the school is the primary unit for change; the context of the school influences the process of change; interventions are the actions and events that are key to the success of the change process; appropriate interventions reduce the challenges of change (Hall & Hord, 2001, pp. 4-16). These themes are closely related to the human dynamics undergirding the implementation of block scheduling, i.e., the roles and behaviors of teachers and students.

The transition to block scheduling is a reform that many schools have undergone (Cawelti, 1997). The Modified A/B (Alternating Day) Block Schedule and the Nine-Week Accelerated (4X4) Semester Block Schedule are two principal patterns (Canady & Rettig, 1995). On the Modified A/B Block Schedule, the school day is divided into four instructional blocks of approximately 90 minutes each. Students alternate class attendance between "A" day and "B" day classes, and they may be simultaneously enrolled for as many as eight courses. On this schedule, most courses meet on alternate days for an 18-week semester. On the Nine-Week Block Schedule, the school day is divided into four instructional blocks of approximately 90 minutes each, and students attend the same four classes each day for one nine-week period.

In the context of using time in a school-day schedule and how scheduling modifications can lead to improved teaching, DiRocco (1998/1999) asserted, "Intensive schedules [i.e., block scheduling] can be a powerful catalyst for change and for improved instruction in our secondary schools when implemented properly" (p. 83). Yet, Shortt and Thayer (1995) maintained that during this process of transformation, the "behaviors that affect student learning and teacher behaviors need to be monitored and assessed so that adjustments can be made to maximize success for both teachers and students" (p. 61). Further, these researchers concluded that, "classroom instructional time and learning are two variables that need additional study to determine the correlation between time and student achievement as they relate to block scheduling" (1998/1999, p. 81).

To date, investigators (Cobb, Abate, & Baker, 1999; Edwards & Briers, 1999; Louden, 1997; North Carolina Department of Public Instruction, 1996; York, 1997) who have examined effects of block scheduling on student achievement have produced ambiguous results. Cobb et al. (1999) and Edwards and Briers (1999) have suggested that to further understand this phenomenon, there is a need to contrast different block scheduling formats and determine if there are variations related to differences in student performance.

Inherent to the premise that significant gains in student learning can be realized are the behaviors of the teacher (e.g., instructional practices) in the context of a reconfigured learning resource, such as a block-scheduled class. Concomitantly, how valuable is the professional development that teachers receive to effectively implement teaching behaviors made possible by their schedule? That is, as a result of inservice education, can teachers use practices that enhance learner performance, including student gains in critical and higher-order thinking skills (Durkin, 1997; Kruse & Kruse, 1995; Lasley, 1998; Rettig & Canady, 1996; Shortt & Thayer, 1995; Watson, 1998)? Shortt and Thayer (1995) stated that "any major change in a high school requires education of the faculty" (p. 60). Further, they maintained, "If block scheduling is to continue to provide unrestricted opportunities for students and teachers, opportunities must also be made available for teachers to grow professionally and sharpen teaching skills" (p. 60). The Center for Applied Research and Education Improvement (1995), Hackman (1995), and Irmsher (1996) have echoed similar contentions. That is, for teachers to skillfully use a restructured school day so that teaching practices associated with increased student performance can be planned, actualized, and assessed, related professional development must be carried out.

Finally, is teacher satisfaction a fundamental component of the teaching-learning "equation"—one that cannot be overlooked? Hoyle et al. (1994) contended that the significance of satisfaction as it relates to work roles and work motivation, for example, psychological and hygienic "motivators" (satisfiers) and "dissatisfiers" identified by Herzberg and others, has been well documented. Researchers in agricultural education (Cano & Miller, 1992; Castillo & Cano, 1999a; Castillo & Cano, 1999b) have used the Motivator-Hygiene Theory as a basis for describing and exploring variables related to the "job satisfaction" of agriculture teachers. However, Castillo and Cano (1999a) stated that "the relationship between level of…achievement of agricultural education students and their teacher's level of job satisfaction has not been explored" (p. 75). These investigators recommended that this association be examined.

Other theorists (Hoy & Miskel, 1991; Hoyle et al., 1994) have linked the phenomenon of teacher satisfaction to that of "school climate." Hoy and Miskel (1991) defined school climate as "a relatively enduring quality of the school environment that is experienced by participants, affects their behavior, and is based on their collective perceptions of behavior in schools" (p. 221). Buckman, King, and Ryan (1995) concluded that qualities comprising school climate, for example, "openness, trust, communication, and support shared by teachers," were "factors that encourage[d] learning for students and job satisfaction and improved performance for teachers" (p. 14). Yet, Hoyle et al. (1994) concluded, "In spite of the tremendous amount of energy expended by researchers of school climate, the exact effect of school climate on student achievement has yet to be determined" (p. 19). However, Hoy and Miskel (1991) identified "formal organization" (p. 221) as a significant variable influencing a school's climate. Arguably, school-day schedule is a fundamental or "formal" component of any school setting.

Assuming relevant inservice is provided, will teachers' perceptions of "value" for that inservice be related to their satisfaction with subsequent opportunity to implement new, different, or modified teaching practices? Further, is there an association between a teacher's perceived value of professional development preparing them to teach on a block schedule and subsequent achievement of their students? Finally, if teachers are "satisfied" with their school-day schedule and feel satisfactorily prepared through inservice education to use effective instructional practices supported by their schedule, will student performance improve? (Figure 1).

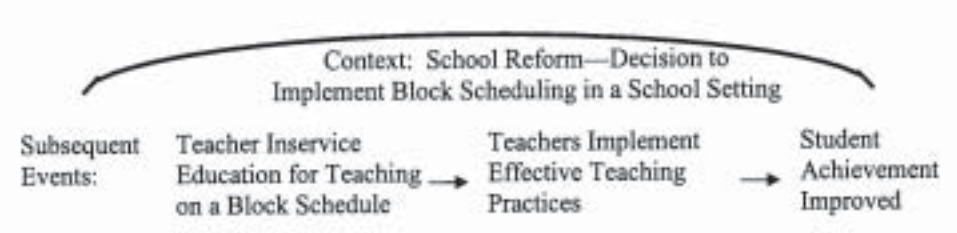

Figure 1. Conceptual framework for school reform under block scheduling.

Purpose and Research Hypotheses

The purpose of the study was to examine relationships among teacher perception of the value of teacher inservice in preparation for school-day schedule, teacher satisfaction with the opportunity to implement effective teaching practices, and student achievement. The following research hypotheses were tested to accomplish this purpose:

$H_{1:}$ The perceived value of teacher inservice education in preparation for school-day schedule (i.e., a block schedule) is positively related to teacher satisfaction with opportunity to use effective teaching practices.

H_2: The perceived value of teacher inservice education in preparation for school-day schedule is positively related to achievement of students in block-scheduled classes.

H_3: Teacher satisfaction with opportunity to use effective teaching practices is positively related to achievement of students in block-scheduled classes.

Methods and Procedures

This was an ex post facto, descriptive-correlational study. The target population consisted of instructors teaching, and students enrolled in, the agricultural education course Animal Science (AGSC 332) in Texas public schools during the fall semester of 1998. A list of schools in which the course Animal Science had been taught for the school years 1996-97 and 1997-98 ($\underline{n}$ = 388) was obtained from the Texas Education Agency and served as the sampling frame. Participants included 22 volunteer teachers and schools, representing two different school-day schedules—12 Modified A/B Block scheduled schools (189 students) and 10 Nine-Week (4X4) Block scheduled schools (136 students). A form of cluster sampling (Gall, Borg, & Gall, 1996) was used, i.e., Animal Science classes and teachers; individual students were the sampling units for the measures of achievement. An alpha level of .05 was used.

Teachers responded to a questionnaire with items describing themselves and their schools; one of the items asked teachers to rate the value of inservice education in which they had participated to prepare them to teach on their current school-day schedule. (Teachers were not asked to describe the nature of their related inservice education.) Responses ranged from "0," indicating "no value for inservice education," to "4," indicating that inservice education was "very valuable." Part two of the questionnaire included seven items about instructional practices conducive to implementation under block scheduling and associated with improved student achievement. For each of the seven statements, teachers indicated their level of agreement concerning whether their schedule had afforded them opportunities to use that teaching practice (Edwards, 1999). This portion of the instrument was developed using Kruse and Kruse (1995), Lasley (1998), Rettig and Canady (1996), Shortt and Thayer (1995), and Watson (1998). A resulting scale—an average of the seven items—was used to indicate teacher satisfaction with the school-day schedule in terms of it providing opportunities to implement the selected practices. So, a score of "1" indicated "high dissatisfaction" and a "5" indicated "high satisfaction." Cronbach's coefficient alpha for the seven items assessing teacher satisfaction with opportunity to implement effective instructional practices was .96.

The students completed a two-part instrument. Part one consisted of selected demographic items, e.g., length of FFA membership. The second part was an end-of-course achievement examination. Glaser (1963) stated that "Underlying the concept of achievement measurement is the notion of a continuum of knowledge acquisition . . ." and that one's "achievement falls at some point on this continuum as indicated by the behaviors he [or she] displays during testing" (p. 519), thus suggesting a link between thinking behaviors and achievement. The examination was developed from recommended curriculum materials for the course Animal Science (AGSC 332) (Instructional Materials Service, n.d.). Three agricultural educators—a curriculum specialist, a classroom teacher, and a measurement specialist—reviewed the items for clarity and content. The assessment included 56 multiple-choice items and was divided into two scales based on the "levels of learning" model described by Newcomb and Trefz (1987). The two scales consisted of 23 lower-order (remembering and processing) and 33 higher-order (creating and evaluating) thinking skills items (Edwards, 1999). Cronbach's coefficient alpha reliability estimates for the scales were .79 and .78, respectively. The student achievement scale including all 56 items yielded a measure of internal consistency of .88.

A researcher-developed packet, consisting of teacher questionnaires, student questionnaires/examinations, pre-coded scan sheets, and postage-paid return envelopes, was mailed to participating teachers. Due to varying end-of-course dates, two general mailings were necessary. Teachers completed their questionnaires and administered the student questionnaires/examinations at about the same time. Student responses were coded so that they could be identified with their particular teacher and school-day schedule. Descriptive statistics were used to summarize selected teacher and student characteristics. For the research hypotheses, correlational statistics were used to examine relationships between variables (See Figure 2).

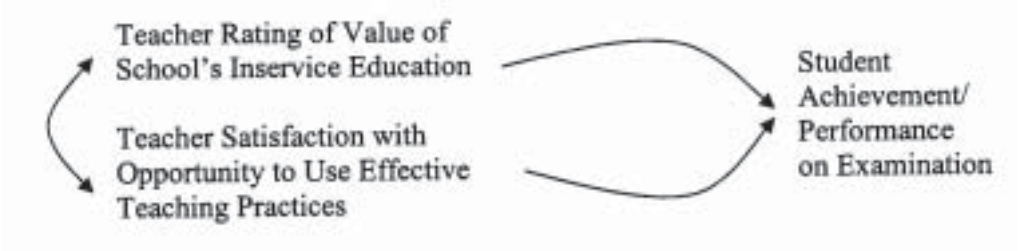

Figure 2. Model for examining relationships among perceived value of inservice education, satisfaction with opportunity to use effective teaching practices, and student achievement.

Results/Findings

Selected characteristics of instructors who were teaching the course Animal Science are shown in Table 1.

Table 1

Selected Characteristics of Instructors Teaching Animal Science (N = 22)

Characteristic	9-Week Block n	Modified A/B Block n	Overall N	Overall %
Gender				
Male	7	10	17	77.3%
Female	3	2	5	22.7%
Highest Level of Education				
Bachelor's degree	4	7	11	50.0%
Master's degree	6	5	11	50.0%
Years Agriculture Teaching Experience				
1 – 12 years	7	4	11	50.0%
13 or more years	3	8	11	50.0%
Years of Service at Current School				
1 – 10 years	7	6	13	59.1%
11 or more years	3	6	9	40.9%
Number of School-Day Scheduling Patterns Teacher Had Taught Under				
One	1	1	2	9.1%
Two	3	4	7	31.8%
Three or more	6	7	13	59.0%

Selected characteristics of students who were enrolled in the course Animal Science are shown in Table 2.

Table 2

S*elected Characteristics of Students Enrolled in Animal Science* (N = 324)

Characteristic	9-Week Block n	Modified A/BBlock n	Overall N	Overall %
Gender				
Male	68	105	173	53.7%
Female	67	82	149	46.3%
Ethnicity				
Anglo (White Non Hispanic)	84	152	236	73.8%
People of Color	51	33	84	26.2%
FFA Membership				
Never	73	42	115	35.9%
Less than one year	24	35	59	18.4%
Two years	19	44	63	19.7%
Three years	15	48	63	19.7%
Four years	4	19	23	7.2%
Experience with Domestic Animals				
None	18	9	27	8.3%
Little experience	37	34	71	21.9%
Some experience	36	43	79	24.4%
Much experience	22	30	52	16.0%
Great experience	23	72	95	29.3%
High School Grade Classification				
12th grade	44	59	103	31.9%
11th grade	56	62	118	36.5%
10th grade	31	53	84	26.0%
9th grade	4	14	18	5.6%

Pearson product moment correlation coefficients were calculated to examine relationships among the perceived value of teacher inservice education in preparation for school-day schedule, teacher satisfaction with opportunity to use effective teaching practices (Table 3) under their school-day schedule, and student achievement.

Table 3

Effective Teaching Practices[*]

My current school-day scheduling pattern permits me to include a variety of student-directed instructional strategies in my teaching.
My current school-day scheduling pattern permits me to use learning activities that require students to practice higher-order thinking skills.
My current school-day scheduling pattern permits me to use learning activities that require students to practice problem-solving skills.
My current school-day scheduling pattern permits me to use learning activities that require students to work cooperatively to acquire new knowledge and skills.
My current school-day scheduling pattern permits me to use learning activities that require students to plan and conduct research projects.
My current school-day scheduling pattern permits me to use learning activities that require students to use computer technology to acquire new knowledge and skills.
My current school-day scheduling pattern permits me to use learning activities that create opportunities for students to be responsible for their own learning.

[*]*Note:* Response scale was "1" = "high dissatisfaction" to "5" = "high satisfaction."

There was a substantial relationship (Davis, 1971) between perceived value of teacher inservice education in preparation for their school-day schedule and teacher satisfaction with the opportunity to use effective teaching practices ($\underline{r}$ = .63) (Table 4). That is, as a teacher's rating of value increased for the professional development received in preparation to teach on a block schedule, the more satisfied the teacher was with the opportunity to use effective teaching practices. The relationship between perceived value of teacher inservice education in preparation for school-day schedule and end-of-course student performance—lower-order thinking skills, higher-order thinking skills, and overall achievement (Table 5)—was also examined. As a teacher's rating of value increased for the inservice education received in preparation to teach on a block schedule, the lower-order thinking skills (LOTS) achievement of students improved ($\underline{r}$ = .45). The correlation indicated a moderate association. There was a substantial relationship (Davis, 1971) between a teacher's rating of value for inservice education and student performance on higher-order thinking skills (HOTS) achievement items ($\underline{r}$ = .59). As a teacher's rating of value increased, students' HOTS achievement also increased. A similar relationship was found between a teacher's rating of value for inservice education and students' overall achievement ($\underline{r}$ = .53). The correlation indicated a substantial association (Davis, 1971). As a teacher's rating of value increased, students' overall achievement improved as well (Table 5).

Table 4

Relationship[1] of Perceived Value of Teacher Inservice Education in Preparation for School-Day Schedule and Teacher Satisfaction with Opportunity to Use Effective Teaching Practices

	Teacher Satisfaction with Opportunity to Use Effective Teaching Practices
Perceived Value of Inservice Education	.63*

Note. [1]Pearson Product Moment Correlation Coefficient.

*p < .05.

Table 5

Relationship[1] of Perceived Value of Teacher Inservice Education in Preparation for School-Day Schedule and Student Achievement

	Lower-Order Thinking Skills Achievement	Higher Order Thinking Skills Achievement	Overall Achievement
Perceived Value of Inservice Education	.45*	.59*	.53*

Note. [1]Pearson Product Moment Correlation Coefficient.

*p < .05.

As shown in Table 6, there were moderate (Davis, 1971) relationships between teacher satisfaction with opportunity to use effective teaching practices under their school-day schedule and the achievement of students. That is, as teacher satisfaction increased, student achievement also improved. However, only the relationship between teacher satisfaction with opportunity to use effective teaching practices and students' higher-order thinking skills (HOTS) achievement was found to be statistically significant.

Table 6

Relationship[1] of Teacher Satisfaction with Opportunity to Use Effective Teaching Practices Under Their School-Day Schedule and Student Achievement

	Lower-Order Thinking Skills Achievement	Higher Order Thinking Skills Achievement	Overall Achievement
Teacher Satisfaction	.33	.38*	.36

Note. [1]Pearson Product Moment Correlation Coefficient.

*$\underline{p} < .05$.

Conclusions

Due to the nature of this study, i.e., findings based on 22 volunteer teachers and schools who were members of a considerably larger sampling frame, readers are cautioned to take care in generalizing the results of the study beyond participants in the study. The perceived value of teacher inservice education in preparation for school-day schedule (i.e., a block schedule) was positively related to satisfaction with opportunity to use effective teaching practices (Table 3). That is, as teachers' ratings of value for inservice preparation increased, so did their satisfaction with the opportunity to use effective teaching practices (Table 4).

The perceived value of teacher inservice education in preparation for school-day schedule was positively related to achievement of students in block-scheduled classes. As teacher value for inservice preparation increased so did student achievement. This association was statistically significant and positive for lower-order thinking skills, higher-order thinking skills, and overall student achievement (Table 5).

Teacher satisfaction with opportunity to use effective teaching practices was positively related to achievement of students in block-scheduled classes. Thus, as teacher satisfaction with the opportunity to use effective practices under a block schedule increased so did student achievement. However, only in the case of higher-order thinking skills achievement was the relationship statistically significant (Table 6).

Implications and Discussion

The findings of this study support the premise that providing teachers with timely and relevant professional development is "essential," if successful school reform is to occur (Birman, et al., 2000; Conley & Woosley, 2000; Darling-Hammond & Falk, 1997; Darling-Hammond & McLaughlin, 1995; Hall & Hord, 2001; Hoyle et al., 1994; North Carolina Public Schools Info Web, 1997). Further, if the reform targets change in school-day scheduling, for example, the implementation of a block schedule with the concomitant opportunity for effective instructional practices (see Table 3) that have been linked with gains in student learning (see Figure 1), then inservice education to prepare teachers to perform in this "new" learning context should be provided. Other researchers have supported this conclusion (Conley & Woosley, 2000; Durkin, 1997; Garrett, 2000; Hall & Hord, 2001; Kruse & Kruse, 1995; Lasley, 1998; Rettig & Canady, 1996; Shortt & Thayer, 1995; Watson, 1998). Moreover, the findings support fundamental precepts of the Concerns-Based Adoption Model espoused by Hall and Hord (2001). Three principles are especially relevant: "interventions are the actions and events that are key to the success of the change process" (p. 9), "appropriate interventions [e.g., inservice education for teachers] reduce the challenges of change" (p. 15), and "the context of the school influences the process of change" (p. 15), such as the school's scheduling pattern.

In a study involving biology teachers, Louden (1997) found that the amount of inservice and planning before implementing a block schedule pattern had a positive impact on the attitudes of teachers. Further, those teachers who did not receive inservice training or additional time to plan for the impending change to block scheduling "seemed the least pleased with their schedule" (p. 105). This study found that agriculture teachers who reported the highest value for the inservice education they received in preparation for a change to block scheduling also reported the greatest satisfaction with opportunities to implement effective teaching practices. Moreover, these teachers had students who achieved at a higher level.

Concerning the forces of school climate, its association with teacher satisfaction, and what this relationship may portend for affecting improvements in student learning, Hoyle et al. (1994) stated that "school climate may be one of the most important ingredients of a successful instructional program" (p. 15). Moreover, DeMoulin (1993) posited that teachers who had a positive attitude about themselves and their professional roles were more apt to increase the quality of student learning and "were more willing to change procedures in striving for improvements" (p. 155). DeMoulin's contention supports a finding of this study that the more "satisfied" agriculture teachers were regarding their opportunity to implement effective teaching practices (i.e., striving for improvements) the better their students performed, especially on learning tasks identified as higher-order thinking skills (see Table 6).

Recommendations

1) Agriculture teachers should be provided professional development that is "contextual" and "coherent" with school reforms (Birman et al., 2000; Hall & Hord, 2001; Maurer, 2001), e.g., changes in school-day scheduling.
2) If it is anticipated that a change will create opportunities for modification of teaching behaviors, e.g., implementation of "new" or modified teaching practices (see Table 3) that are associated with improved student achievement, then inservice education should be provided to assist teachers in acquiring and using these behaviors (Maurer, 2001).

3) Canady (1995) and Canady and Rettig (1995) have suggested that there is a causal relationship between the use of block scheduling and an improvement in school climate (i.e., classroom environment). Other researchers (Hoyle et al., 1994; Kruse & Kruse, 1995) have discussed the important role that "climate" can play in the behaviors of students and teachers, including their performance as it relates to learning. For example, Wortman et al. (1997) found that for the program components traditionally associated with agricultural education—classroom and laboratory instruction, FFA, and SAEs—North Carolina students were most positive about the impact of block scheduling on the instruction they had received. Accordingly, additional research should be performed to further investigate how factors comprising a school's "climate," such as conditions affecting student satisfaction, may be positively influenced by a change in school-day schedule.

4) In addition, school climate factors that facilitate improved teacher satisfaction, especially those related to instructional practice that may be positively influenced by a change in school-day schedule, should be identified, modeled, and supported (Buckman et al., 1995; Canady, 1995; DeMoulin, 1993; Hoyle et al. 1994).

5) Finally, instructors teaching on different block schedule formats may be demonstrating teaching behaviors that are related to student achievement. For this reason, additional research, e.g., case studies or other qualitative methodologies, should be carried out to describe the instructional behaviors of these teachers.

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