

Informal Learning and Transfer of Learning: How New Trade and Industrial Teachers Perceive Their Professional Growth and Development

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Abstract

This study is an examination of the extent to which new inservice trade and industrial (T&I) teachers, enrolled in an alternative certification program, engaged in formal learning through structured experiences and informal learning related to 25 core competencies at their school (work) site. The study also investigated the degree to which the new T&I teachers transferred each of the 25 core teaching skills on the job. The study found that while T&I teachers-in-training reported learning most competencies formally, they perceived that they use those competencies learned informally more often than those learned formally. New perspectives are offered regarding the importance of alternative certification programs acknowledging and integrating informal learning in teacher education programs.

Introduction

Trade and industrial (T&I) teachers take on numerous roles to work effectively in schools. Among their many roles they are, like all teachers, program managers, instructional designers, facilitators of learning, and student advisors. To successfully perform these roles, teachers master a myriad of complex skills that fall into at least four categories. Danielson (1996) defined these categories as planning and preparation of instruction, creating a supportive learning environment, engaging the students in instruction, and assuming professional responsibilities outside of and in addition to those in the classroom.

Customarily, new teachers complete formal training programs through coursework, workshops, student teaching, and other structured events before they obtain certification or licensure. These formal training programs are designed to produce explicit knowledge (Knight, 2002). Explicit knowledge can be expressed in formal and systematic language and is shared in forms such as data, scientific formulas, and specifications (Nonaka, Toyama, & Konno, 2001). This knowledge is intended to prepare new teachers to accept all the roles required of them in their classrooms and laboratories. Traditionally, some teacher educators may have assumed that teaching skills are learned through formal programs. However, research

from corporate training settings has suggested that many job skills are learned on the job through more informal methods (Enos, Kehrhahn, & Bell, 2003).

Theoretical Development and Research

Formal Versus Informal Learning

Formal learning is defined as learning based on direct instruction in which learners engage in lectures, discussions, simulations, role-plays, and other structured activities. These activities are based on specific learning objectives and designed to enable students to master predetermined outcomes. Typically, such instruction is removed from the day-to-day work setting (Enos et al., 2003). Prior to the student teaching experience, preservice teachers enrolled in traditional teacher training programs spend the majority of their time engaged in these types of formal learning activities.

In contrast, informal learning is predominately unstructured and occurs outside an institution of learning. Informal learning occurs spontaneously within the context of real work and is not focused on specific learning objectives, nor does it lead to predetermined outcomes (Marsick & Volpe, 1999). Informal learning happens through trial and error, mentoring, networking, and other self-directed learning modes. It is learning composed of action and reflection (Watkins & Marsick, 1992) and is the result of individuals making sense of experiences they encounter during their daily work lives (Marsick & Volpe, 1999).

In recent years, there has been growing criticism of traditional teacher education programs that some critics contend embrace a theoretical approach that leaves graduates ill-prepared for the realities of the classroom (Hartocollis, 2005). Other critics indicate that there is a lack of formal teacher training programs for in-demand content areas such as mathematics, science, foreign language, and special education, as well as a lack of graduate faculty to train teachers in these critical need areas (Committee on Education and the Workforce, 2007). Still, others have noted that current teacher training programs are simply not able to provide the number of teachers needed in American schools. According to Simon (2005):

In the last five years, 500,000 new teachers have taken jobs in the nation's elementary and secondary school classrooms. In the next five, a half million more will be needed as the student population swells and aging boomers accelerate their march to retirement. (p. 27)

The federal No Child Left Behind Act of 2001 called for a qualified teacher in every classroom by the end of the 2005-2006 school year. Challenges such as these have led to a movement towards alternative methods of teacher certification. Currently, 47 states and the District of Columbia offer alternative routes to teacher certification, with programs, such as Teach for America, that detour from traditional training and fast-track prospective teachers into the classroom (Hartocollis, 2005). In

some states, new methods of teacher certification allow prospective teachers to obtain certification by passing a standardized content and pedagogy test, therefore, side-stepping traditional teacher training programs. These alternative teacher education models tend to be mentor-based with learning taking place mostly at the school site and away from colleges of education ([Georgia Professional Standards Commission, 2007](#)).

With these innovations in teacher training, it seems likely that increasing numbers of teachers will earn their teacher certification outside of traditional, formal learning environments and possibly garner the necessary teaching skills through informal learning methods. While research focused on the impact of informal learning in the corporate workplace is on the rise ([Marsick & Volpe, 1999](#); [Marsick & Watkins, 1997](#); [Watkins & Marsick, 2003](#)), there is a lack of investigation regarding its impact in the school environment. Research on informal learning in the corporate environment began appearing in the literature in the 1980s ([Edwards & Usher, 2001](#)). Several studies have suggested that informal learning is pervasive in the workplace ([Enos et al., 2003](#)). Other research has suggested that while some structured workplace learning occurs, informal learning comprises the majority of workplace learning ([Fox, 1997](#); [Leslie, Aring, & Brand, 1998](#); [Lohman, 2000](#)). However, despite the recognition of the part played by informal learning in the corporate environment, little research has been conducted in the area of informal learning in teacher education programs, specifically in the area of T&I teacher education. The literature has revealed only one exploratory study of T&I teachers enrolled in an alternative teacher certification program ([Burns & Schaefer, 2003](#)). The study concluded that T&I teachers learned informally at their school workplace while enrolled in formal university education coursework.

In the [Burns and Schaefer \(2003\)](#) study, provisionally certified T&I teachers reported that they had engaged in informal learning during their first year on the job. The informal learning ranged from practical “how to” techniques for classroom management to more subtle awareness of their particular schools’ cultures. The teachers also reported learning skills informally that helped them maintain their own personal and emotional balance. The informal learning in this study was categorized as instrumental, emotional, and political ([Brookfield, 1995](#)). Instrumental learning covered topics pertaining to classroom management and instructional competence. Skills that aided in preserving personal and mental balance were in the category of emotional learning. Those skills that helped teachers develop an understanding of the underlying culture that forms a school’s political agenda were categorized as political learning. Participants in the study indicated that in their first year of teaching, some form of informal learning had occurred in each of the three categories. The initial study established that although informal learning occurs for new T&I teachers, it is stimulated and augmented through formal learning techniques. Burns and Schaefer found that “while informal learning plays a role in the lives of new T&I teachers,

informal learning is not a substitute for structured training or education, and often learning is much more productive if it is planned and facilitated” (p. 21).

Transfer of Learning

Transfer of learning refers to the extent to which individuals can apply what was learned in one situation to another situation and has been defined as the degree to which trainees apply the knowledge, skills, and attitudes they gain in training for their jobs (Holton, Bates, Seyler, & Carvalho, 1997). Transfer of learning can be categorized in at least two ways, near transfer and far transfer. Near and far are defined and compared by the relationship between the training content and work task as well as by the training design. The concepts of near and far transfer are often discussed in terms of objectives and learning requirements. Clark & Voogel (1985) suggested that the distinction between the types of transfer is related to the types of skills being transferred. They contrasted procedural learning objectives, such as something that can be learned as a step-by-step sequence of behaviors, with conceptual learning objectives, which are related to information and knowledge, solving problems, making predictions, and other intellectual aspects of learning. These distinctions suggest that procedural objectives lend themselves to near transfer while conceptual objectives are more likely to contribute to far transfer.

Specifically, near transfer requires a close match between training and task content, between the training and task outcomes, and an emphasis on specific concepts and skills. Training design encompasses specific concepts, procedures, problem solving, and decision making (Kim & Lee, 2001). Far transfer, in contrast, calls for an approximate match between training and task content, between training and task outcomes, and emphasis on general concepts and skills. Training design encompasses general concepts, broad principles, problem solving rules, and decision making rules (Kim & Lee). Far transfer suggests that by learning the fundamental aspects of something along with specific skills, there is a greater chance for applying that information to more than one setting.

The literature revealed two distinct transfer theories. Goldstein (1993) described the two theories for explaining near and far transfer as the identical elements theory and transfer-through-principle theory. The identical elements theory posits that transfer occurs when the material being acquired during the training is identical to that which the trainee performs in an actual context. According to this theory, transfer is maximized to the extent to which the tasks, equipment, tools, and environment at the training setting are similar to those encountered at the actual work setting. Some research has suggested that the greater the similarity between the two settings, the greater the likelihood transfer of learning will occur (Baldwin & Ford, 1988; Stolovitch & Yapi, 1997).

In contrast, the transfer-through-principle theory proposes that the general principles necessary to learn a task should be emphasized in training to solve

problems related to the transfer task. The transfer-through-principle theory is not highly concerned with the similarities between the training environment design and the actual work setting. Near and far transfer of learning entail different learning requirements. The requirements for near transfer depend mostly on the similarities between training and the task. However, achieving far transfer requires additional considerations. For example, [Laker \(1990\)](#) suggested that far transfer depends on whether the training includes information about the assumptions underlying the skills and behaviors trainees are learning. In addition, a number of studies have suggested that the more trainees practice in different contexts and use novelty in the practice exercises, the more effective is far transfer ([Baldwin & Ford, 1988](#); [Ellis, 1965](#); [Goldstein, 1986](#)). [Clark and Voogel \(1985\)](#) stressed the importance of incorporating a variety of situations and problems to develop and apply skills when trying to achieve far transfer with trainees. Therefore, near transfer enables learners to meet the relatively known predictable conditions of their jobs and apply their knowledge and skills, while far transfer expects learners to comprehend concepts and principles for dealing with situations not always encountered during the training experience.

There has been much attention paid to the transfer of learning in business organizations since they attempt to ensure that trainees will be able to use what was learned during training on their jobs ([Kim & Lee, 2001](#)). However, transfer of learning research has focused primarily on the transfer of skills learned during formal training and has largely ignored informal learning ([Rouiller & Goldstein, 1993](#)). In the field of T&I teaching, no studies have investigated informal learning and its relationship to transfer of learning. This lack of research has left T&I teacher educators with unanswered questions about ways to ensure that teachers apply what they learn informally. Accordingly, this study investigated if the skills learned informally could be more readily transferred than skills learned in formal training contexts, with the idea that skills learned informally are likely to share similar features with transfer tasks in terms of context and content.

Purpose

Trade and industrial teachers enter the classroom as content level experts who may have acquired their expertise through a combination of formal industry training and informal on-the-job experiences. When they make the career transition from industry to teaching, they must acquire professional teaching competencies. Like the content competencies, these teaching competencies may also involve formal and informal learning experiences, particularly because the majority of T&I teachers are employed by schools and begin teaching while simultaneously attending alternative teacher preparation programs. For new T&I teachers, formal teacher training in the area of pedagogy before entering the school workplace is the exception rather than the norm ([Crawford-Self, 2001](#)).

The purpose of this study was to contribute to the body of research regarding informal learning and transfer of learning by focusing on the school workplace rather than the corporate workplace. Secondly, this study was designed to examine those teaching competencies that new T&I teachers learn formally and those competencies they learn informally, and if a relationship exists between formal or informal learning and teachers' perceived transfer of learning of core teaching competencies. The following research questions were, therefore, addressed in this study:

1. To what extent do new T&I teachers enrolled in an alternative certification program learn the program's core teaching competencies through formal or informal learning?
2. To what extent do new T&I teachers enrolled in an alternative certification program perceive their transfer of learning of the program's core teaching competencies?
3. What is the relationship between perceived transfer of learning and the extent of informal learning or formal learning for new T&I teachers?

Methodology

Population and Sample

An "availability sampling" approach (Keppel, Saufley, & Tokunaga, 1991) was used to represent the target population in this study. This approach permitted exploration of the perceptions of a group of T&I teachers who were completers from two separate years of the same year-long alternative teacher training program administered at a major university located in the southeastern United States. The program was considered as alternative because it enrolled T&I teachers who were provisionally certified and teaching in a public high school, although they had not yet fulfilled the state requirements of formal teacher education to obtain a "Clear Renewable" teaching certificate (Georgia Professional Standards Commission, 2007). All of the 48 participants in the study had at least 12 years of education, 2 years of occupational experience, and industry licensing in their field. Additionally, all participants in the study were employed as full-time teachers in the T&I fields of automotive service technology, broadcast and video production, construction, cosmetology, electronic technology, engineering drawing and design, graphic communication, information technology, manufacturing and engineering sciences, professional foods, public safety, or welding technology. The participants' teaching experience in a T&I secondary education program ranged from one to three years. All subjects were adult learners who ranged in age from 28 to 54 years. The sample consisted of 39 males and 9 females. The alternative certification program included 15 semester hours of coursework structured through formal learning experiences on a university campus. An additional nine semester hours consisted of a field practicum in the schools where the teachers were employed. The field practicum was designed to foster reflective practice (Schön, 1996) and informal learning opportunities.

Teaching Competencies

In the field of education, there is a variety of sets of competencies for the various content areas. A general set of competencies applicable for teachers in all disciplines and grade levels has been developed by the Interstate New Teacher Assessment and Support Consortium (INTASC; [Campbell, Cignetti, Melnyzer, Nettles, & Wyman, 2001](#)). The competencies are organized in a set of 10 numbered standards: Standard 1, knowledge of subject matter; Standard 2, knowledge of human development and learning; Standard 3, adapting instruction for individual needs; Standard 4, multiple instructional strategies; Standard 5, classroom motivation and management skills; Standard 6, communication skills; Standard 7, instructional planning skills; Standard 8, assessment of student learning; Standard 9, professional commitment and responsibility; and Standard 10, partnerships (cited by [Campbell et al.](#)).

In an effort independent of the present study, the researcher, who was the primary T&I educator responsible for the alternative teacher certification program, conducted interviews with T&I teacher supervisors and held focus group interviews with T&I teachers to identify essential T&I teaching competencies. Further, the researcher examined lists of both general teacher competencies and state-specific T&I teacher competencies to develop a set of fundamental T&I teaching competencies. This process resulted in a list of 25 distinct core competencies associated with successful teaching in the T&I area. The advantage of using the T&I-specific list was that it enhanced the content validity of measures in a way that a pre-established list of more generic teaching competencies could not. A questionnaire was developed consisting of the 25 core teaching competencies (see [Table 1](#)). The 25 core competencies were selected to address each of the 10 INTASC teaching standards as well as the curriculum standards outlined and required by the Georgia Professional Standards Commission for certification in the area of T&I education ([Georgia Professional Standards Commission, 2007](#)). Additionally, these competencies were specifically associated with successful completion of the alternative T&I teacher certification program in which the participants were enrolled. Because the 25 core teaching competencies were those that the program was designed to address, the participants had opportunities to acquire the competencies through both formal methods in the academic setting of the university and informal methods on the job. This provided them a basis from which to evaluate the extent to which each of the 25 competencies had been learned by either method.

Table 1
Core Teaching Competencies for Trade and Industrial Teachers

Item	Competency
1.	Write instructional objectives at different levels of cognitive, affective, and psychomotor domains of learning.
2.	Develop lesson plans based on vocational content, county curriculum, and state mandated Quality Core Curricula.
3.	Analyze a learning task and include all prerequisite knowledge as well as all steps.
4.	Set up a grading system.
5.	Maintain records and paperwork.
6.	Develop evaluation techniques and measures.
7.	Implement a classroom and/or laboratory management plan that includes student participation.
8.	Use pro-active classroom/lab management strategies versus reactive strategies.
9.	Recognize ways to involve students through social, interactive, and active participation.
10.	Establish an environment conducive to learning in a vocational program.
11.	Handle discipline problems.
12.	Set up a variety of activities such as whole class discussion, small group discussions, panel discussions, brainstorming, buzz groups, task groups, cooperative learning groups, role-play, case studies, and laboratory experiences.
13.	Develop questions at various learning levels.
14.	Demonstrate basic teaching competencies including transfer, establishing set, managing a block of instruction, and providing closure and transfer at the completion of a block of instruction.
15.	Understand how students learn and how to help students develop intellectually, socially, and personally.
16.	Plan a year long vocational course.
17.	Use various multimedia learning tools in presenting a lesson.
18.	Control and maintain equipment, tools, and supplies in a vocational laboratory.
19.	Display professional teacher behavior.
20.	Examine personal beliefs about teaching and begin to develop a personal teaching philosophy.
21.	Differentiate between best practices and poor teaching practices.
22.	Understand teacher liability and laws relating to teachers.
23.	Establish or maintain a vocational advisory committee.
24.	Understand the relationship between vocational and academic programs.
25.	Implement and provide a safe laboratory environment.

Extent of Formal Versus Informal Learning

The measure of the extent of formal and informal learning was obtained using a questionnaire that asked participants to rate the degree to which they perceived learning each of the core teaching competencies through formal or informal learning activities. A four-point scale developed and validated by Enos et al. (2003) was used. The response alternatives included: (a) learned only from formal learning activities, (b) learned mostly from formal learning activities, (c) learned mostly from informal learning activities, and (d) learned only from informal learning activities. The current researcher provided a definition of formal and informal learning for the participants as, “formal training means competencies/skills learned in the teacher certification program, another academic course, or a staff development course, while informal means on the job, through trial and error, or by suggestion from other teachers and colleagues.” Prior to this study, the validity of the instrument was established. First, there was an initial screening for content validity by previous T&I teacher program completers, followed by a pilot test with previous program completers who did not participate in the study. The responses to the twenty-five items in the instrument yielded high internal consistency reliability (Cronbach’s alpha = .92). From the raw data, a mean value for each of the items was calculated. In addition, for each core competency item, the percentage of responses that fell in each value of the four-point scale was calculated (see Table 2).

Table 2
New T&I Teachers’ Assessment of the Extent to Which They Learned Core Teaching Competencies through Formal Versus Informal Learning

Competency	Rating Value								M
	^a 1		^b 2		^c 3		^d 4		
	n	%	n	%	n	%	n	%	
1. Write objectives	32	.67	14	.29	1	.02	0	.00	1.34
2. Develop lesson plans	19	.40	19	.40	9	.19	1	.02	1.83
3. Analyze task	22	.46	18	.38	8	.17	0	.00	1.71
4. Develop grading system	14	.29	20	.42	13	.27	1	.02	2.02
5. Maintain records/paperwork	3	.06	9	.19	33	.69	3	.06	2.75
6. Develop evaluation techniques	13	.27	30	.63	4	.08	1	.02	1.85
7. Manage classroom	25	.52	17	.35	5	.10	0	.00	1.57
8. Use pro-active strategies	14	.29	28	.58	5	.10	0	.00	1.80
9. Involve students	5	.10	26	.54	15	.31	1	.02	2.24
10. Set learning environment	6	.13	27	.56	13	.27	1	.02	2.20
11. Handle discipline	3	.06	19	.40	25	.52	0	.00	2.47

Table 2 (continued)

Competency	Rating Value								<i>M</i>
	^a 1		^b 2		^c 3		^d 4		
	n	%	n	%	n	%	n	%	
12. Use multiple learning modalities	27	.56	21	.44	0	.00	0	.00	1.44
13. Access multiple learning levels	34	.71	14	.29	0	.00	0	.00	1.29
14. Show basic teaching competencies	38	.79	10	.21	0	.00	0	.00	1.21
15. Develop students	17	.35	24	.50	5	.10	1	.02	1.78
16. Plan course	15	.31	17	.35	12	.25	3	.06	2.07
17. Use multimedia	9	.19	14	.29	20	.42	4	.08	2.43
18. Maintain equipment	4	.08	8	.17	23	.48	12	.25	2.92
19. Display professional behavior	5	.10	14	.29	26	.54	3	.06	2.56
20. Develop teaching philosophy	11	.23	24	.50	11	.23	2	.04	2.08
21. Differentiate best teaching practices	15	.31	27	.56	6	.13	0	.00	1.81
22. Understand legalities	22	.46	25	.52	0	.00	0	.00	1.55
23. Have advisory committee	24	.50	17	.35	5	.10	1	.02	1.66
24. Relate T&I to academics	6	.13	32	.67	8	.17	1	.02	2.07
25. Provide safe lab	8	.17	15	.31	21	.44	2	.04	2.38

Note. Percentage may not total 100% due to rounding. *N* = 48 for 12 of the 25 items.

^a1 = Learned only from formal learning activities. ^b2 = Learned mostly from formal learning activities. ^c3 = Learned mostly from informal learning activities. ^d4 = Learned only from informal learning activities.

Transfer of Learning

Participants also used a questionnaire to rate the degree to which they applied each of the 25 core teaching skills on the job. Respondents were asked to consider how often they used each core competency skill and to rate themselves on a five-point scale developed by Enos et al. (2003). The response alternatives included: 1, never; 2, rarely; 3, sometimes; 4, very often; and 5, always. The internal consistency reliability estimate of the Transfer of Learning responses was acceptable (Cronbach's alpha = .88). The researcher provided a definition of transfer of learning as, "how often each of these skills is applied in your profession." Participants were asked to consider whether they used the skills on a rare or regular basis. A mean value for each item and the percentage of responses that corresponded to each value on the instrument scale were calculated (see Table 3).

Table 3
New T&I Teachers' Assessment of Their Transfer of Learning of Core Teaching Competencies

Competency	Rating Value										<i>M</i>
	^a 1		^b 2		^c 3		^d 4		^e 5		
	n	%	n	%	n	%	n	%	n	%	
1. Write objectives	1	.02	3	.06	16	.34	24	.51	3	.06	3.55
2. Develop lesson plans	1	.02	0	.00	3	.06	24	.51	19	.40	4.32
3. Analyze task	1	.02	1	.02	9	.19	29	.62	7	.15	3.72
4. Develop grading system	0	.00	2	.04	1	.02	16	.34	28	.60	4.36
5. Maintain records/paperwork	0	.00	0	.00	4	.09	16	.34	27	.57	4.55
6. Develop evaluation techniques	0	.00	1	.02	5	.11	21	.45	20	.43	4.36
7. Manage classroom	0	.00	3	.06	4	.09	18	.38	22	.47	4.27
8. Use pro-active strategies	1	.02	0	.00	5	.11	18	.38	23	.49	4.18
9. Involve students	1	.02	0	.00	10	.21	18	.38	18	.38	4.14
10. Set learning environment	0	.00	0	.00	2	.04	25	.53	20	.43	4.40
11. Handle discipline	0	.00	2	.04	3	.06	16	.34	26	.55	4.55
12. Use multiple learning modalities	2	.04	6	.13	12	.26	15	.32	12	.26	3.77
13. Access multiple learning levels	1	.02	5	.11	17	.36	19	.40	5	.11	3.27
14. Show basic teaching competencies	1	.02	3	.06	7	.15	24	.51	12	.26	3.86
15. Develop students	1	.02	1	.02	8	.17	22	.47	15	.32	3.91
16. Plan course	3	.06	2	.04	10	.21	18	.38	14	.30	3.64
17. Use multimedia	1	.02	1	.02	6	.13	17	.36	22	.47	3.95
18. Maintain equipment	0	.00	0	.00	3	.06	15	.32	29	.62	4.55
19. Display professional behavior	0	.00	0	.00	0	.00	8	.17	39	.83	4.82
20. Develop teaching philosophy	0	.00	3	.06	10	.21	21	.45	13	.28	3.88

Table 3 (continued)

Competency	Rating Value										<i>M</i>
	^a 1		^b 2		^c 3		^d 4		^e 5		
	n	%	n	%	n	%	n	%	n	%	
21. Differentiate best teaching practices	0	.00	0	.00	8	.17	23	.49	16	.34	4.32
22. Understand legalities	0	.00	5	.11	7	.15	20	.43	15	.32	4.05
23. Have advisory committee	2	.04	6	.13	18	.38	13	.28	8	.17	3.59
24. Relate T&I to academics	0	.00	2	.04	19	.40	20	.43	6	.13	3.59
25. Provide safe lab	0	.00	0	.00	2	.04	11	.23	34	.72	4.82

Note. Percentage may not total 100% due to rounding. *N* = 47.

^a1 = Never use this skill. ^b2 = Rarely use this skill. ^c3 = Sometimes use this skill. ^d4 = Very often use this skill. ^e5 = Always use this skill

Procedures

The two survey instruments were distributed to and completed by the participants at the close of the final program seminar for each of the two consecutive years. Potential participants were assured that their decision to complete the questionnaire was entirely voluntary and independent of any grading procedures for the program. Participants were not identified by name on the questionnaires and were also assured that the content of their responses would remain strictly confidential and be reported in aggregate form only. Of the 55 teachers completing the teacher training program over the course of the two-year study, 48 completed all sections of the questionnaires.

Data Analysis

The numerical values of the survey instruments were used to determine whether a respondent had acquired a competency more or less formally or whether a respondent felt he or she was able to apply a competency on a more or less regular basis. The means were calculated to summarize the participants' ratings of the 25 core competencies. The mean values were used to analyze how the respondents believed they had acquired each of the competencies through formal or informal learning methods. Additionally, the respondents' perceptions regarding how they were able to transfer these (formally or informally) learned skills to their professional teaching environments were also analyzed. The relationship of perceived formal and informal learning to perceived transfer of learning was examined using the Pearson product-moment correlation coefficient.

Results

Formal Versus Informal Data

The respondents used a value of 1 to indicate a competency they felt they had acquired only through formal learning activities. They used a value of 4 to indicate a competency they perceived they had learned only through informal methods. Therefore, the lower the mean score, the more formally the respondents, as a group, perceived they had acquired that core competency.

The lowest scoring competencies on the formal versus informal learning questionnaire were items 1, 13, and 14 (see [Table 2](#)). Item 14 (Show basic teaching competencies) yielded the lowest overall value with a mean of 1.21. Item 13 (Access multiple learning levels) revealed a mean of 1.29. The mean for item 1 (Write objectives) was 1.34. The competencies that scored highest on the formal versus informal learning questionnaire were items 5, 11, 17, 18, and 19 indicating respondents tended to feel they had learned these skills largely through informal methods. Item 18 (Maintain equipment) had the highest mean, 2.92. Item 5 (Maintain records/paperwork) had a mean of 2.75, and the mean for item 19 (Display professional behavior) was 2.56. The means for items 11 (Handle discipline) and 17 (Use multimedia) were 2.47 and 2.43, respectively.

Transfer of Learning Data

The rating scale for perceived transfer of learning ranged from 1 to 5, with 5 representing the highest perceived transfer of learning (i.e., “always use this skill”) and 1 representing the lowest (i.e., “never use this skill”). In the transfer of learning survey instrument, items 5, 18, 19, and 25 received the highest ratings (see [Table 3](#)). The highest scoring competencies, items 19 (Display professional behavior) and 25 (Provide safe lab) both had a mean of 4.82. The means for items 5 (Maintain records/paperwork), 11 (Handle discipline), and 18 (Maintain equipment) were 4.55. Items 1, 13, 23, and 24 scored the lowest in perceived transfer of learning. Item 13 (Access multiple learning levels) had a mean of 3.27, the lowest transfer of learning value. The mean for item 1 (Write objectives) was 3.55. Items 23 (Have advisory committee) and 24 (Relate T&I to academics) both had a mean of 3.59.

Relationship Between Formal/Informal Learning and Transfer of Learning Data

The data in this study were treated as interval data, and a Pearson product-moment correlation coefficient matrix was constructed to examine how the variables related to each other in terms of strength and direction. The guidelines were satisfied for the use of parametric procedures by assessing normality in distribution of data for each variable and the linearity between the variables. The statistical null hypothesis tests were set at the $p = .05$ level of significance. The scatterplot in [Figure 1](#) reveals

that teaching competencies learned predominately through informal learning are positively related ($r = 0.67$, significant at $p < .0003$, scatter plot equation is $y = 0.6070x + 2.906$) to transfer of learning.

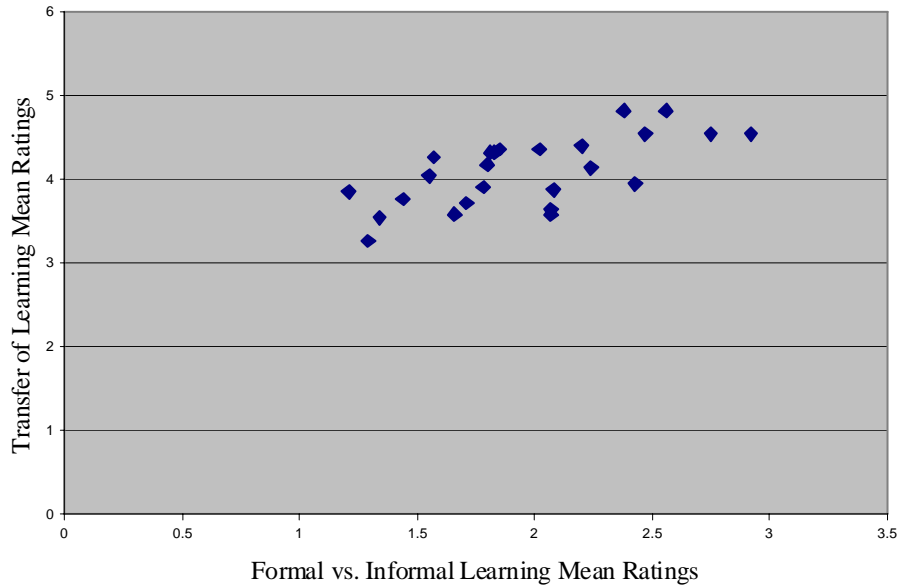


Figure 1. Correlation Between Formal vs. Informal Learning Mean Ratings and Transfer of Learning Mean Ratings.

Discussion and Conclusions

A low score on the formal versus informal learning rating scale indicated that the survey respondents, in general, perceived they had learned the corresponding competency largely through formal learning methods. Both item 1 (Write instructional objectives at different levels of cognitive, affective, and psychomotor domains) and item 13 (Develop questions at various learning levels), which revealed low scores on the formal versus informal questionnaire, are competencies that are theoretical in nature and, therefore, are more likely to be learned in formal settings. Although item 14 (Demonstrate basic teaching competencies including transfer, establishing set, managing a block of instruction, and providing closure and transfer at the completion of a block of instruction) is a less theoretical competency, the wording of this item utilized language specific to the T&I alternative certification program in which the participants were enrolled. It is possible that the phrasing itself may have cued survey participants to rank item 14 as learned in the formal training program even if the respondents had, in fact, learned aspects of it on the job.

Items with high means on the formal versus informal learning rating scale represent competencies that, overall, the survey participants felt they had learned more through informal learning. Examination of the four highest scoring items revealed some possible explanations for the relatively high means. Item 5 (Maintain records and paperwork) and item 18 (Control and maintain equipment, tools, and supplies in a vocational laboratory) both pertain to classroom organization and the maintenance of records or supplies, skills that are more likely to be learned by trial and error than in a formal classroom setting. Item 17 (Use various multimedia learning tools in presenting a lesson) is an instructional skill that may involve technical expertise or the use of program-specific equipment such as interactive whiteboards or computer programs developed for particular T&I fields. When rating this item on the questionnaire, respondents may have considered these specialized tools rather than the use of more generic audio-visual taught in the formal teacher training program. Item 19 (Display professional teacher behavior) relates to school culture and is possibly acquired more frequently through mentoring and modeling, therefore, making it a largely informally learned competency. Item 11 (Handle discipline problems) data may indicate that T&I teachers need more training in the area of classroom management, that the methods of delivering this training need to be improved, or that the challenges of classroom management are diverse and ongoing.

The competencies that received the highest transfer of learning ratings by the survey respondents also suggest closer examination. One of the two items that received the highest transfer of learning rating, item 19 (Display professional behavior) is most likely a result of T&I teachers modeling the behavior of their teacher educators and peers at their school workplace settings. The high transfer of learning mean score for this item suggests that respondents can readily adapt and apply their instrumental knowledge of professional behavior to the school workplace. Similarly, for item 25 (Implement and provide a safe laboratory environment) for item 18 (Control and maintain equipment, tools, and supplies in a vocational laboratory), the T&I teachers are likely to have acquired these competencies in their previous professional lives prior to entering the teaching profession. Thus, they perceived themselves as being readily able to transfer their mastery of these competencies to the school setting. These findings lend support to the theory of far transfer since T&I laboratories are at best an approximate match to the settings the teachers experienced in industry workplaces. Trade and industrial teachers bring their understanding of the fundamental principles of operating a safe work environment and are able to apply this knowledge to their school laboratory settings. Similar to competencies 18 and 19, which received high transfer of learning ratings, item 5 (Maintain records and paperwork) was also perceived to have been learned mostly informally.

The lowest transfer of learning ratings belonged to competencies 1, 13, 23, and 24. Item 13 (Develop questions at various learning levels), which had the lowest

mean, requires a high degree of skill, training, and experience. This competency was addressed and practiced using general content in the T&I teachers' formal training program. Accordingly, this finding suggests that learning transfer might increase by utilizing near transfer of learning with a more content-specific approach to professional training in the area of questioning techniques. For example, automotive teachers should work with automotive content, and cosmetology teachers should work with cosmetology content. Item 1 (Write instructional objectives at different levels of cognitive, affective, and psychomotor domains of learning) is a competency that was extensively threaded through the alternative certification program. Why the T&I teachers perceived that they were not transferring this competency daily through lesson planning and sequencing instruction is worthy of further investigation. Item 23 (Establish and maintain an advisory committee) requires outreach, coordination, and management tasks beyond the realm of the day-to-day classroom setting. Therefore, despite having an understanding of the purpose, organization, and function of an advisory committee, T&I teachers may find it difficult to apply this knowledge given the inherent demands of forming and sustaining an advisory committee. Item 24 (Understand the relationship between vocational and academic programs) is an important competency in the career and technical education environment, and it would be beneficial to investigate how to facilitate transfer in this area.

Research question one asked, "To what extent do new T&I teachers enrolled in an alternative certification program learn the program's core teaching competencies through formal or informal learning?" The results of this study revealed that 13 of the 25 competencies (52%) had mean values greater than 1.20 and less than 2.00, indicating they were perceived as being learned completely or mostly formally. The remaining 48% of the competencies had means greater than 2.00, indicating the respondents felt they had learned these skills mostly informally.

Research question two posited, "To what extent do new T&I teachers enrolled in an alternative certification program perceive their transfer of learning of the program's core teaching competencies?" The study results showed that 100% of the competencies had mean scores of 3.27 or above, indicating at least average ("sometimes use") on perceived transfer of learning on all 25 items. Nineteen of the competencies received mean scores between 3.50 and 4.50; therefore, 76% of the competencies were ranked above average ("often use") on perceived transfer of learning. Only item 13, or 4% of the competencies, ranked in the average ("sometimes use") transfer of learning range. The remaining five items received ratings in the excellent ("always use") transfer of learning range. These relatively high transfer of learning ratings may suggest that when planning alternative T&I teacher training programs, where T&I teachers are already on the job, program designers need to ensure that they are covering critical content. The vital objective of an alternative certification program is to enable teacher trainees to function on their jobs with at least satisfactory proficiency in core teaching competencies.

Research question three examined the relationship between perceived transfer of learning and the extent of informal learning or formal learning for new T&I teachers. The data suggested that competencies learned informally may be used more often. However, there may be several unidentified factors other than the method by which a skill or competency is acquired that may have an affect on transfer of learning. Items 5, 18, 19, and 25, which had the highest mean values for transfer of learning, were also between learned mostly formally to learned mostly informally. Conversely, items 1, 13, 23, and 24, which received the lowest transfer of learning ratings, had scores that skewed towards the formal rating continuum. These findings, while far from definitive, may suggest that competencies learned both in formal and informal settings may lead to higher rates of perceived transfer of learning than those learned strictly through formal methods.

Implications and Recommendations

The results of this study are limited in several ways. First, the relatively small number of teachers in the sample limits generalizability. Secondly, the results were intended to describe only the group of T&I teachers who participated in the study. Therefore, the results offer an understanding of this particular group and some insights about their informal learning. Finally, the study design prevents drawing any inferences concerning cause and effect. This study provided evidence to support the conclusion that informal workplace learning occurs with new T&I teachers. Additionally, the T&I teachers participating in this study indicated, as did those in the earlier study (Burns & Schaefer, 2003), that some form of informal learning occurs during an alternative teacher certification program. The 2003 study used data reconstruction to capture categories of informal learning; the current study respondents reported perceptions of formal or informal learning based on program-specific core competencies.

The results of this exploratory study suggested that new T&I teachers tended to learn the core teaching competencies more often through formal methods than through informal learning activities. These results differed from those of studies conducted with employees in corporate settings. Studies in corporate settings indicated that informal learning was the more prevalent of the two forms of learning (Fox, 1997; Leslie et al., 1998; Lohman, 2000). Perhaps a factor in explaining why teachers reported learning more through formal than through informal methods may be the differences in corporate and school environments. When one considers a teacher's typical workday, it may be vastly different from the standard workday of an employee in a corporate setting. For example, most T&I teachers work alone in their classrooms or laboratories and, for the majority of their day, interact largely with students. Their days are often spent isolated from other teachers or school employees. Conversely, employees in a corporate environment tend to have more interaction with other employees during the course of a day and may even perform their work in

teams or groups. The tenets of social learning and social practice theories have suggested that the limited interaction of teachers with other teachers may restrict their opportunities for informal learning in the workplace. Social learning theory suggests that informal learning is accomplished through social modeling (Bandura, 1986). The tenets of social practice theory (Lave & Wenger, 1991) propose that learning is a social process that occurs through participation in communal work activities that cannot occur in isolation. It is conceivable that there are too few opportunities for social interaction among teachers in the workplace to promote informal learning for the majority of teaching competencies. This situation might be remedied by affording novice teachers opportunities to work collaboratively with veteran teachers, for example, through team teaching or integrated curriculum partnering.

Various other factors could have played a part in explaining the results and may not have been adequately controlled in this study. Factors such as where and how T&I teachers use a particular skill or competency in their workdays may have affected how they viewed the extent of formal versus informal learning. Trade and industrial teachers may have considered competencies that rely on interpersonal skills or those that must be applied in the schoolwork environment on a regular basis as being learned informally, even when some degree of formal learning actually occurs. Competencies unrelated to more familiar industry skills, although acquired informally, may have been viewed as being learned through formal methods. Additionally, the wording of the competency may have prompted respondents to score a competency item higher or lower on the formal or informal end of the rating scale. Complicated sentence structure or new and unfamiliar vocabulary and phrases such as “cognitive, affective, and psychomotor domains” might have skewed a respondent towards the formal end of the scale. Conversely, direct, simple sentences such as “Display professional teacher behavior” might have focused the respondent towards the other, more informal side. In future studies, these factors should be considered in the design of survey instruments.

Additional research is needed to understand the complex role that formal and informal learning play towards the acquisition of teaching skills in T&I teacher education programs. For example, studies should be replicated in other alternative teacher certification programs in T&I and other fields. This study revealed that both methods of learning occurred and suggested that T&I teacher education programs should incorporate activities that facilitate both types of learning experiences. Since informal learning does occur with new T&I teachers, it should stimulate and complement formal learning experiences. To employ informal learning effectively, future research is needed to discover which teacher education competencies are best learned informally. Further, if future teacher education programs rely more heavily on workplace learning, education researchers must investigate how a school’s learning culture and climate affect informal learning. The new T&I teachers in this study, while engaging in informal learning, acquired 52% of the core competencies

in their training program through formal learning methods. Accordingly, the integration of both formal and informal learning could be an effective approach for professional development and personal growth of T&I teachers.

With regard to transfer of learning, this study suggested that competencies learned informally are perceived to be used more often. It seems likely that alternative teacher certification training programs for T&I teachers will continue to be the norm rather than the exception. Therefore, based on the findings, it is suggested that teacher educators develop a more comprehensive understanding of which competencies are more transferable based upon whether they are learned formally or informally. Furthermore, T&I teachers-in-training do acquire competencies informally. Consequently, opportunities aimed at informal learning such as interactions with other teachers in the workplace, observing others, and mentoring should be integrated as part of alternative T&I teacher training programs.

It is recommended that this study be replicated with larger, stratified groups of teachers based on their fields of expertise (e.g., automotive technology, cosmetology, graphic communication), size of student population in teachers' schools, and school setting (i.e., urban, suburban, rural) to determine if differences exist. Additionally, new T&I teachers should be afforded the time and opportunity to reflect upon their informal learning experiences under the direction of professional teacher educators. Further research is desirable in the area of instructional design focusing on near and far transfer of learning in alternative T&I teacher certification programs. Further exploration of T&I teacher training methods that utilize both formal and informal learning activities and tasks is recommended. Trade and industrial teacher educators and teacher educators in other content areas should explore these phenomena in their teacher preparation programs. It is hoped that this study will contribute to the theory base regarding other teacher populations and informal learning. However, teacher educators should use caution in over-reliance on either formal or informal training programs in T&I teacher education.

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