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Teacher and administrator perspectives on formative student assessment in career and technical education: for career and technical teachers and administrators

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TEACHER AND ADMINISTRATOR PERSPECTIVES ON FORMATIVE STUDENT ASSESSMENT IN CAREER AND TECHNICAL EDUCATION: FOR CAREER AND TECHNICAL TEACHERS AND ADMINISTRATORS

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SIGNATURE PAGE

I hereby affirm that the following project meets the high academic standards for original scholarship and creative work established by my discipline, college, and the Graduate College of Marshall University. With my signature, I approve the manuscript for publication.

Project Title: Teacher and Administrator Perspectives on Formative Student Assessment in Career and Technical Education: For Career and Technical Teachers and Administrators

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Table of Contents

LIST OF TABLES

ABSTRACT

The purpose of this study was to investigate career and technical education teachers' level of knowledge and use of formative student assessment practices in the classrooms and laboratories of comprehensive high schools and technical education centers across West Virginia. In addition, this study examined factors identified by teachers as supports or barriers to implementation of formative student assessment. Finally, this study described administrator perspectives on teachers' knowledge and use of formative student assessment practices and explore administrator perspectives on identified supports and barriers to their teachers' implementation of formative student assessment practices.

A researcher-developed survey was used to collect data from teachers (n = 397). The study population included career and technical education teachers engaged in teaching a program in one of the sixteen nationally recognized career clusters offered in West Virginia's public schools. Administrator interviews (n = 15) were conducted from a sample of building level administrators who directly supervise career and technical education teachers.

In general, West Virginia's CTE teachers described their level of knowledge regarding the individual 20 formative student assessment practices as good to very good. When asked to describe their frequency of use of the same individual 20 formative student assessment practices, teachers most often reported a use level of fair to very good. There were significant differences in levels of knowledge found in 19 separate formative student assessment practices across five independent variables. Significant differences in levels of use were found in 18 separate formative student assessment practices across five independent variables.

Major factors which support the implementation of formative student assessment practices are WVDE / CTE initiatives and administrative and peer teacher support. The factor most often identified as a barrier to the implementation of formative assessment practices is lack of sufficient time. Administrators rated their teachers' knowledge of formative student assessment as fair to good. The same administrators rated the level of use as sometimes to regularly. Administrators identified quality professional development, adequate time, and adequate support as factors which support their teachers' implementation of formative student assessment practices. Administrators identified insufficient time, teachers' lack of understanding and knowledge, and lack of professional development specific to formative assessment as barriers to teachers' efforts to implement formative student assessment.

Study findings provide a foundation for career and technical education administrators and teacher educators to address formative student assessment practices in teacher induction and professional development programming. Findings describe the levels of knowledge and use of formative student assessment practices from a statewide sample of teachers. Insight from this study will provide a foundation for administrators to include formative student assessment as a key component in teacher training and professional development efforts.

CHAPTER ONE: INTRODUCTION

This chapter provides an introduction and establishes the foundation leading to the study investigating career and technical education teachers' level of knowledge and use of formative student assessment practices in West Virginia's career and technical education programs. This study will further examine factors that support and impede the implementation of formative student assessment. Finally, this study will describe administrator perspectives on teachers' knowledge and use of formative student assessment practices and explore administrator perspectives regarding supports and barriers to their teachers' implementation of formative student assessment practices. This chapter includes the problem statement, the research questions, the operational definitions, the significance of the study, the delimitations of the study, and the organization of the study.

In 2008, the West Virginia Department of Education Division of Career and Technical Education began the process of revising the content standards of career and technical concentrations to address 21st Century Learning and GLOBAL21 initiatives. A year later, the Division of Career and Technical Education adopted a performance based student assessment model with the goal of ensuring optimal student preparation and effective summative evaluation of student mastery of content, technical skills, job seeking and job keeping elements identified by employers as necessary to function in the 21st Century workplace (WVDE, 2009). After one year, during which the summative performance based student assessment model was piloted in a selected group of schools, and two years of state-wide implementation of that model, the West Virginia Department of Education administrators discussed the possibility of discontinuing the summative model, with thoughts of moving toward a more

formative student assessment model, which, they believed would be more relevant to benchmarking student mastery of essential skills (WV CTE Administrators, 2010).

This dialogue was based on discussions with the Business and Industry Advisory Committee for West Virginia Career and Technical Education (2011), the adoption of current best practices recommended by the Southern Regional Education Board (SREB) (2012), and feedback from the previous year's Global21 Assessment Program (2012). The expressed intent was to provide for a higher level of accountability for career and technical administrators and educators, providing evidence of student mastery of content standards and objectives in the areas of knowledge, skills, and 21st Century workplace readiness skills.

A part of the West Virginia Department of Education (WVDE) Mission for Career and Technical Education is to provide the opportunity for all students to have documented knowledge, skills, and workplace readiness attributes, whether or not the student completed all parts of a career and technical education program (West Virginia Career and Technical Administrators, 2013). Teachers were also required to comply with state policy (and any inherent federal and state mandates) in order for their career cluster student completers to be eligible for certification in field upon graduation (WVDE, 2010). At a state-wide CTE administrators meeting, then Assistant Superintendent of Schools, Dr. Stanley Hopkins discussed his expectation that the High Schools That Work (HSTW) and Technical Centers That Work (TCTW) initiatives of the SREB (2013), would be re-instituted within the next few years.

Administrators anticipated a need to shift from the previous, largely summative, student assessment model to one which was more fundamentally formative in nature (West Virginia Career and Technical Administrators Meeting,

2010). This shift to a formative assessment model would enable teachers to provide evidence of student knowledge and skills at any exit point in a student's career preparation program, thereby supporting a student in seeking employment armed with a concise portfolio of mastered skills, including the level of mastery achieved. These progressive levels of mastery were not evident in the results of prior Global21 summative testing (GLOBAL21, 2010).

At the end of the 2011-2012 school year, state school administrators announced that the primarily summative GLOBAL21 Student Assessment for program completers would be phased out and replaced by a more formative-focused model (WVCTE Administrators, 2013). In discussions with local West Virginia career and technical education administrators, state level school administrators expressed a desire to take adequate time to research best practices and develop a meaningful and workable model for more formative-focused student assessment, and it was their expectation that the next two or three years' experience with state-wide CTE initiatives would give direction in developing or adopting a suitable student assessment model (WVDE, 2012).

A model for summative performance based student assessment was adopted by the West Virginia Department of Education, Division of Career and Technical Education in 2009, piloted for one year in selected schools, and implemented state-wide by over 400 industrial, technical and health occupations teachers the following year. Administrators and teachers received training and support in implementing the student assessment model. An assessment implementation manual was developed and provided to administrators and teachers and there was a concentrated effort to provide opportunity for business and industry feedback related to the summative assessment model (WVDE, 2009). The West Virginia Career and Technical Education

GLOBAL21 Performance Based Student Assessment was adopted, implemented by career and technical education teachers, and, eventually, set to phase out, all within the span of four years.

A study was conducted during the 2010-2011 school year to describe teacher knowledge and use levels of GLOBAL 21 summative student assessment practices (Tuckwiller, 2012). Tuckwiller (2012) examined career and technical education teachers' level of knowledge and use of performance based student assessment practices in West Virginia public schools. In addition, the study sought to determine what relationships, may exist between levels of knowledge and use of performance based student assessment practices. Finally, the study described factors identified by respondents as supports or barriers to implementation of performance based student assessment (Tuckwiller, 2012).

In Tuckwiller's study, 414 engineering/technical, hospitality, and health science technology teachers from 48 schools responded to the survey. Teachers generally reported good to very good knowledge of performance based student assessment practices, and reported using those practices on a regular to frequent basis. The correlation between knowledge and use levels was significant and moderately strong. Respondents identified administrator support as the most important supporting factor for effectively implementing performance based student assessment practices. The most frequently identified barriers to implementation of performance based student assessment practices included lack of time, resources and infrastructure. At the time of Tuckwiller's study, formal career and technical student assessment reports reflected primarily summative assessment practices (Tuckwiller, 2012).

When the West Virginia GLOBAL21 student assessment model was being phased out, and formative assessment models were being considered, WVDE administrators expressed a need for a research-based description of existing levels of teacher knowledge and use of formative student assessment practices, as well as a description of administrator capacity to support their teachers in implementing such practices in the classroom (Hopkins, 2012). During one conversation regarding the future direction of CTE student assessment, Hopkins, a retired state level administrator assisting the current Assistant State Superintendent with special projects, reflected on the GLOBAL21 summative assessment. Hopkins suggested that the new statewide CTE student assessment framework would be much more formative, but he noted he did not have a clear vision of exactly what the model would look like (Hopkins, 2012). He also indicated that, since there was no such information available, additional information on formative assessment and relevance to career and technical student preparation would be helpful in identifying strategies and assessment models appropriate for documenting skill sets of West Virginia career and technical education students.

Within this context, this study will seek to describe the knowledge and skill levels of in-service career and technical education teachers with respect to formative student assessment, and the perspectives of local administrators regarding teacher use of formative assessment in classrooms and labs. In addition, this study will identify supports and barriers to effective implementation of formative student assessment. Recommendations and guidelines will be developed for administrators and others charged with targeting professional development needs of career and technical education teachers.

Problem Statement

The West Virginia Department of Education adopted and implemented a summative student assessment model in 2009. Following a year-long pilot study, and two years of state wide implementation, a decision to transition to a more formative model of student performance assessment was made. There is an initial database (Tuckwiller, 2012) regarding career and technical educators' knowledge and use of summative assessment practices. No such database exists regarding career and technical education teacher knowledge and use of formative student assessment practices. Concurrently, there is no such database regarding local career and technical education administrators' perspectives on their teachers' knowledge, use, and implementation of formative student assessment practices. This study sought to provide these data bases as a mechanism to inform the implementation of the state wide formative assessment model.

Research Questions

The following research questions were investigated:

1. What is the West Virginia career and technical education teachers' level of knowledge about formative student assessment practices?
2. What is the West Virginia career and technical education teachers' level of use of formative student assessment practices?
3. What differences, if any, are there in the knowledge levels of formative student assessment practices among career and technical education teachers based on selected demographic and attribute variables?
4. What differences, if any, are there in the use levels of formative student assessment practices among career and technical education teachers based on selected

demographic attribute variables?

5. What factors, if any, do West Virginia career and technical education teachers identify as supports and / or barriers to implementation of formative student assessment?

6. What is the West Virginia career and technical education administrators' perception of teacher level of knowledge of formative student assessment practices?

7. What is the West Virginia career and technical education administrators' perception of teacher level of use of formative student assessment practices?

8. What factors, if any, do West Virginia career and technical administrators identify as supports and / or barriers to their teachers' capacity to implement formative student assessment? .

Operational Definitions

Teacher level of knowledge about formative student assessment practices – an individual teacher's perception of his/her personal level of knowledge of formative student assessment practices as self-reported on the survey instrument, *Teacher Perceptions of Formative Assessment in Career and Technical Education*, using a descriptive scale. Level of knowledge will be measured by participant response to each item in Part B, Column A of the survey instrument.

Administrator perceptions of teacher level of knowledge about formative student assessment practices – an individual administrator's perception of teacher knowledge of formative student assessment practices as self-reported using the interview protocol *CTE Formative Assessment Administrator Interview Protocol*

Teacher level of use of formative student assessment practices – an individual teacher's level of use of formative student assessment practices as self-reported on the

survey instrument, *Teacher Perceptions of Formative Student Assessment in Career and Technical Education*, using a descriptive scale. Level of use will be measured by participant response to each item in Part B, Column B of the survey instrument.

Administrator perceptions of teacher level of use of formative student assessment practices - an individual administrator's perception of teacher use of formative student assessment practices as self-reported using the interview protocol *CTE Formative Assessment Administrator Intervention Protocol*

Teacher supports and or barriers – teacher-identified supports are factors identified by teachers as being positive or helpful influences in their efforts to implement formative student assessment. Teacher-identified barriers are factors identified by teachers as being negative or obstructive influences in their efforts to implement formative student assessment. These data will be collected from participant response to Part C, Item one and two on the survey instrument, *Teacher Perspectives of Formative Student Assessment in Career and Technical Education*.

Administrator perceived supports and / or barriers– administrator perceived supports are factors identified by administrators as being positive or helpful influences in their teachers' efforts to implement formative student assessment. Administrator perceived barriers are factors identified by administrators as being negative or obstructive influences in their teachers' efforts to implement formative student assessment. These data will be collected from using the interview protocol *CTE Formative Assessment Administrator Interview Protocol*.

West Virginia career and technical education clusters – career and technical education program concentrations that are based upon the sixteen national career and technical education clusters offered in West Virginia schools.

Program cluster groups – West Virginia CTE Clusters that are sub-divided into five groups based upon related characteristics and similar likeness. Groups consisting of business; welfare and workforce; health and safety; building trades, industrial, and agriculture; and information, technology and inquiry.

Teaching experience in CTE – Years of teaching experience consisting only of the number of years as a teacher in a CTE area and of a CTE program.

Total years of teaching experience – Years of teaching experience consisting of the total number of years as a teacher in CTE, non-CTE including academic studies, K – 12 educational levels, and post-secondary education and training.

Type of facility – Three types of school facilities in West Virginia, consisting of the comprehensive high school, county career center, and multi-county career center. The comprehensive high school is a facility for grades 9 – adult that houses both academic and CTE programs in the same complex. The county career center is a facility that houses primarily CTE programs for grades 9 – adult in a complex designated for a single county. The multi-county career center is a facility for grades 9 – adult that houses primarily CTE programs for grades 9 – adult in a complex designated for more than one county.

Program level – Secondary consist of teaching grades 9 – 12 and post-secondary consist of teaching adults.

Educational initiative – Current emphasized affiliations, practices or strategies promoted by the West Virginia Department of Education within the past three years. Some of the current initiatives are developed by the Southern Regional Education Board (SREB) and promoted by the West Virginia Department of Education.

Professional Development – Sources of education and training specific to formative assessment that teachers have received following employment as a CTE teacher. Sources are specific to the school, county, state and private sectors.

Significance of the Study

Career and technical education teachers are expected to provide learning activities and formative assessments which will prepare all students for summative assessment upon completion of courses or programs, and/or for demonstrating level of mastery of career specific as well as 21st Century skills. Results of this study can be used to inform the curricula of career and technical administrator and teacher preparation and professional development programs.

Data from this study may also be of interest to state and local policy makers for career and technical education as they allocate funding and resources. Current needs for a skilled and credentialed workforce in West Virginia to promote economic growth and development have led state government officials to prioritize training models at the secondary and post-secondary levels. The challenge is to accurately assess and document the mastery of individual skill sets at any point of exit from a training program. State officials are advocating for the use of more formative assessment practices with this objective in mind (West Virginia Curriculum Advisory Board for Career and Technical Education, 2011).

The Global21 Performance Assessment model adopted by WVDE was summative in nature. In 2013, WVDE – Department of CTE adopted several education initiatives which focused heavily on the need for formative assessment models: Technical Canters that Work; Enhanced CTE; Simulated Workplace; National Centre for Construction Education and Research (NCCER); ICAR; Student

Portfolio Assessment; Literacy Design Collaborative (LDC); and Mathematics Design Collaborative (MDC). Plans include the addition of the SREB Administrator Training model in the summer of 2014. However, as of June 2013, no specific training or tools were provided in beginning career and technical education administrator and teacher induction curriculum related to implementation of formative student assessment. The results of this study will inform professional development needs of teachers and administrators as they address the requirements of the new initiatives.

The new WVDE Teacher Evaluation model (West Virginia Department of Education Teacher Evaluation, 2013) which was implemented state-wide in the fall of 2013 contains items related to formative student assessment, yet anecdotal reports from administrators indicate the majority of teachers, when asked to discuss formative assessment, could not respond with certainty and admitted a lack of knowledge, or at least expressed confusion on the topic (Haught, 2013). Results of this study will identify criteria appropriate to assess teacher use of formative assessment strategies during classroom observations.

Study findings may be useful as a basis for evaluation of current administrator and teacher preparation for formative student assessment. Study results could provide the foundation for a guide useful in designing professional development for seasoned teachers focused on gaining and improving knowledge and skills related to formative student assessment in the career and technical education program cluster areas.

Results of the study may also be useful in aligning standards of practice and the performance evaluation process for alternatively certified career and technical education teachers with those of teachers possessing the West Virginia professional teaching certificate.

Delimitations of the Study

This study was limited to describing the knowledge and use of formative student assessment practices by teachers in the sixteen career and technical education clusters identified by the West Virginia Department of Education (see Appendix B). In addition, this study was limited to describing the perceptions of administrators regarding teacher knowledge and use of formative assessment practices as reported by a sample of West Virginia building level CTE administrators.

Organization of the Study

Chapter One provides an introduction to the research. Chapter Two is a review of the literature related to the research. Chapter Three outlines research method and data collection. Chapter Four will present and describe findings. Chapter Five discusses the findings, present conclusions, and articulate implications and recommendations for additional research.

CHAPTER TWO: REVIEW OF THE LITERATURE

Introduction

This chapter will provide a summary of literature relevant to this study. The review is divided in three sections. Section one describes the emergence of formative student assessment. Section two presents a brief history of a recent fundamentally summative student assessment model in West Virginia career and technical education and the subsequent move toward a more formative model of student assessment. Section three emphasizes the importance of teacher knowledge and efficacy in successful system-wide implementation of a new education model, and the importance of administrator capacity to support and facilitate implementation of such student assessment practices with teachers in their schools.

Formative Student Assessment

Discourse and literature are both rich with support for formative assessment and interspersed with admonition for those who would use it. Stephen Sawchuk (2011) describes formative assessment as a cycle of instruction, immediate data-gathering to collect feedback that helps the teacher readjust instruction, and the sharing of that feedback so students themselves are engaged in the learning process. Summative assessment is what we know and what we are familiar with. Summative assessment is what we use to evaluate programs, to provide data on effectiveness, and to determine in a particular point in time what students know and do not know. The problem is that summative assessment typically occurs at the end which is too late to provide information regarding needed instructional adjustments and interventions during the learning process (Garrison, 2007). Formative assessment provides the information needed to adjust teaching and learning while the process is occurring.

Black and Wiliam (1998) define assessment to include all activities that teachers and students undertake to get information that can be used diagnostically to alter teaching and learning. Assessments become formative when the information is used to adapt teaching and learning to meet student needs. Using information to make instructional adjustments, such as reteaching, trying alternative instructional approaches, or offering more opportunities for practice is part of the formative process.

Black and Wiliam (1998) conducted a research review of 250 journal articles, covering a span of 30 years, to determine whether formative assessment raises academic standards in the classroom. The results of the study led to the conclusion that efforts to strengthen formative assessment produce significant learning gains as measured by comparing the average improvements in the test scores of the students involved in the innovation with the range of scores found for typical groups of students on the same test. Learning gains were found for all types of students, including low-achieving students and students with learning disabilities. Black and Wiliam concluded from their research that formative assessment is a vital curricular component, proven to be highly effective in increasing student learning.

According to Moss, Brookhart, and Long (2013), formative classroom assessment is defined as "an active and intentional learning process that partners the teacher and the student to continuously and systematically gather evidence of learning with the express goal of improving student achievement." The key to determining when formative classroom assessment is occurring is only when evidence is used to make instructional changes based upon an identified need. Formative classroom assessment is an active and intentional learning process that partners the teacher and

the students to continuously and systematically gather evidence of learning with the express goal of improving student achievement.

Experienced educators, such as Marsha Ratzel (2011) see tremendous value in helping students understand and invest in their own education. Ratzel believes formative assessment supports this goal, yet encourages vigilance when moving to a formative framework for student assessment. Ratzel points to the two-way feedback generated in the formative assessment process as a medium in which the teacher and student learn from each other. The teacher can utilize the information and observations gained from the interaction with students in reflective practice, thereby improving instruction. Also, the teacher's effectiveness will be magnified, as peers see success with students that might have been previously viewed as marginal or under-achieving. Some of the formative assessment strategies Ratzel prefers include: requiring students to learn how to read textbooks, guiding students in recognizing questioning style in order to come up with the correct answer; teaching students how to extract information from readings; teaching effective note taking; using instructional technology to search and evaluate resources; master the art of summary; evidence collection; debate; presentation of work, etc., with the emphasis being shifted from grading to facilitating a flow of information from teacher to student to teacher to student---the teacher making a difference, and the student ultimately understanding what is necessary to progress and be successful (Ratzel, 2011).

Wolf (2013) agreed with Ratzel, that teachers and students both benefit from an environment of formative assessment, and contends that the classroom in which formative assessment takes place looks and sounds different than the traditional classroom in which there is mainly summative assessment. Formative assessment allows teachers to know where students are in the learning process, who is mastering,

who is struggling, and where there needs to be more emphasis or re-teaching. Instruction becomes more meaningful to the individual. The learning environment becomes more engaging and active. Wolf mentions that the typical formative assessment is not a graded assignment, in the traditional sense. Teachers give students feedback on their work and empower students to make choices in moving forward with their learning. Mutual dialogue and mature collegiality are fostered in the formative learning classroom (Wolf, 2013).

Diverse instructional and assessment strategies are offered by educators as teachers are encouraged to implement formative assessment. Examples include: visual evidence of learning (graphic organizers), verbal and written feedback from students providing evidence of understanding (reflective and anecdotal writing, journal entries), performance evidence of concept mastery (group acting out content-related scenario), and product completion (group /collaborative project based assignment) (Ratzel, 2011; Hafer, 2013; Wolf, 2011).

Hafer (2013) cautions higher education colleagues to use the cumulative portfolio assessment strategy with awareness of the advantages and difficulties of guiding students effectively through the process successfully. Hafer speaks from years of fine-tuning a capstone portfolio component in his university syllabus. Students essentially went through the motions of accumulating artefacts as assigned, but, at the end of three or four years, did not seem to generally demonstrate an appreciation for the work or see the value of the portfolio process to them upon and after graduation. Hafer found that meeting periodically (rather than just at the end) with the students to review and discuss the portfolio provided an on-going connection to the learning activities and supported the student in visualizing the growth of knowledge and skills as they moved through the course. Before changing strategy

and realizing success, Hafer considered abandoning this part of his course. Now, with the more formative approach to engaging students in the ongoing learning process, Hafer found a renewed belief in the value of the portfolio process (Hafer, 2013).

Heritage (2007) found that high stakes standardized testing no longer is regarded as a source of information that can be used to guide instruction. It has become a tool solely for summarizing what students have learned and for ranking students and schools. In this process, teachers have lost the ability to use assessment to guide future teaching and learning and view assessment as something that cannot influence daily practice. To assist with this issue, many districts have supplemented daily assessment with interim or benchmark assessments. The interim or benchmark assessments cover too long of a period of time and provide little detail to use for ongoing instructional planning.

Teachers are unschooled in the principles of sound assessment and learn how to teach by learning very little about how to assess student learning and progress. Additionally, teachers' administrators also lack training in assessment and do not have the skills to support the development of assessment competencies (Heritage, 2007). There is a concern that teachers will view formative assessment as yet another external demand that will take time away from teaching.

Heritage (2007) describes four elements of formative assessment which consist of identifying the "gap," feedback, student involvement, and learning progressions. Identifying the "gap" relates to the gap between a student's current status in learning and some desired educational goal. Feedback consist of providing information to the teacher related to a student's current levels of understanding and guidance as to what the next steps in learning should be. Student involvement consist of the metacognitive

process where the student collaborates with the teacher to develop a shared understanding of their current learning status and what they need to do to move forward in leaning. Finally, learning progressions consist of clear sub goals that constitute progress toward the ultimate goals established for the student. It is the "big picture of what is to be learned and guide teachers in locating students' current learning status on a continuum along which students are expected to progress.

Heritage and Bailey (2006) contend that if we truly want to raise the standards of student performance, we should focus more on the idea of improving formative assessment techniques among teachers than participating in high-stakes accountability test. High stakes assessments do not give the kind of detailed and comprehensive information needed for ongoing improvements in learning. As a result, we now have a generation of teachers who do not see the value of assessment and are suspicious of any type of teaching practice that has the word "assessment" as part of the descriptor.

Stiggins (2002) suggested that the traditional lack of emphasis on assessment in professional training has led to educators in the United States being "a national faculty unschooled in the principles of sound assessment." With sound professional training in both summative and formative techniques, teachers would have the opportunity to see how assessment can be embedded into the process of teaching and over time would lose the negative connotation that is currently associated with the word "assessment."

Cizek (2010) identified 10 elements across the research on formative assessment practices that have been consistently noted to be important features:

1. Requires students to take responsibility for their own learning.

2. Communicates clear, specific learning goals.

3. Focuses on goals that represent valuable educational outcomes with applicability beyond the learning context.

4. Identifies the student's current knowledge / skills and the necessary steps for reaching the desired goals.

5. Requires development of plans for attaining the desired goals.

6. Encourages students to self-monitor progress toward the learning goals.

7. Provides examples of learning goals including, when relevant, the specific grading criteria or rubrics that will be used to evaluate the student's work.

8. Provides frequent assessment, including peer and student self-assessment and assessment embedded within learning activities.

9. Includes feedback that is non-evaluative, specific, timely, and related to the learning goals, and that provides opportunities for the student to revise and improve work products and deepen understandings.

10. Promotes metacognition and reflection by students on their work.

West Virginia's Focus Shifts from Summative to Formative Student Assessment

West Virginia used a system of summative assessment through 2014 when the transition began towards a more formative approach. Local business and industry employee representatives have been integral to the completion of the GLOBAL21 annual assessment of career and technical students completing programs and courses in West Virginia programs during the height of the GLOBAL21 testing program, and some programs and courses still are engaged in the summative testing at the end of the school year. At the Spring, 2013, state-wide CTE Administrators meeting, Dr. Kathy D'Antoni shared on-going discussions with the CTE Advisory Committee in which business and industry leaders expressed the wish for a mechanism by which student career skill-sets could be routinely, and formally, benchmarked throughout the CTE educational process, rather than only at the end of each course or each program year. These advisors recognize the reality that many CTE students leave before

completing an entire program of study, however, they may be exiting the program with a substantial set of skills which would prepare them for some employment or articulation into an industry training program, if only documentation of those acquired skill-sets could follow them in their quest for work. This could be provided routinely for any student enrolled in a career technical program through a framework of assessments and meticulous documentation. Conceivably, a student could exit at any time during a program, taking with them a documented list of acquired skill-sets, both career specific (performance skills) and 21st Century employability skills (job-seeking, job-keeping, and workplace behaviors). D'Antoni expressed hope that West Virginia CTE administrators and teachers would work together to make this a reality for West Virginia students (West Virginia Career and Technical Administrators, 2013).

The new CTE technical assessment is designed to include student involvement, which is a distinction that Garrison and Ehringhaus (2007) indicate as critical to new learning. Student involvement and taking ownership of his or her learning increases the motivation to learn. Teachers still have a critical component in the teaching and learning process as the teacher assist the student in identifying new learning goals, setting clear criteria for success, and designing assessment task that provide evidence of student learning. One of the key components of engaging students in the assessment of their own learning during the portfolio and capstone process is providing students with descriptive feedback as the student progress though the technical assessment process.

Eckstein (2014) advocated breaking from the traditional assessment practices of the past and moving towards a system of authentic assessment. Traditional assessments will not meet the needs of today's career and technical education (CTE)

students. Today's CTE students need a system that provides constant feedback on progress by having the capability of measuring the student's gained theoretical knowledge and the performance of real-world practical skills gained throughout the learning process. Authentic assessment assesses learners as they complete real-world assignments and allows the student to apply knowledge and skills recently acquired. Examples of authentic assessments include portfolios, observations, performance or demonstration evaluations, or any other assessment strategy that allows students to show proof or evidence of concept mastery. Well designed instruction incorporates assessments throughout the curriculum to provide constant feedback and the student with many points to self-check as possible.

Spoerk (2005) identified traits that are essential for CTE programs to be relevant and standards-based. One trait is the program should be assessment driven and these assessments should be authentic, varied, and formative. Students should be able to use assessments as a means for improvement and not solely for the purpose of determining a grade. The West Virginia CTE assessment system consisting of a portfolio and capstone was designed to promote a federal accountability process that includes multiple components that lead to an authentic, varied, and formative process.

The new CTE technical assessment consists of two parts, the student portfolio and the student capstone. According to *Portfolio Guidance Document*, "Student portfolios are a collection of personal documents, which showcase an individual's learning experiences, goals and achievements. Student portfolios are created and controlled by the student, facilitated by the instructor, and evaluated by outside entities" (CTE Portfolio, n.d.). The purpose of the portfolio is to allow students a mechanism to market themselves in future interviews, by using the portfolio to

illustrate skills and talents that the student has mastered during his or her time in a specific CTE program of study. The portfolio is the platform to showcase the "tools" the student acquired while being enrolled in CTE courses.

The portfolio consists of a letter of introduction detailing the student's education, goals, and school and community involvement. The resume component prepares a student for developing an on-going document that builds as the student adds personal, academic, and work-place experiences. The student is specifically directed to list personal information, an objective or summary, work and community involvement, education, earned certificates and credentials, personal skills and interest, and an on-going list of personal or professional references. The students are required to include a minimum of two letters of reference that are personal or professional related attesting to the character or work ethic of the student.

The fourth part of the portfolio is documentation of specific credentials or certifications. In this section, the student will document earned state or national credentials or certifications, document technical skills mastered, and document specific tool or software proficiency.

The fifth section documents attendance. An attendance verification form is used to document attendance rating percent. The sixth section of the CTE Portfolio is open ended and used to illustrate awards, projects, exemplars, service learning, or scholarships that the student participated in or earned while in high school. Students demonstrate evidence by collecting electronic or pictorial artefacts (CTE Portfolio, n.d.).

The final part of the portfolio requires the student to present his or her portfolio to a panel of evaluators. The panel will consist of two to three evaluators which should include representatives from industry.

The student capstone is, “a culminating multifaceted assessment for demonstrating, learning from all courses in a concentration” (CTE Capstone, n.d.). The intent is for the student to plan and initiate the capstone process, while the instructor serves in a facilitative role. “The purpose of the capstone assessment is to showcase mastery of skill sets and knowledge. Capstone completion is the technical assessment required for Perkins compliance” (CTE Capstone, n.d.). There are three components of the capstone assessment. The first component is the written phase. In this phase the student summarizes the capstone project and the project’s relation to the CTE concentration. Second, the student identifies a minimum of five skill sets in the concentration and how mastery of the skill sets is critical to successful completion of the Capstone. The third phase of the written component is explaining three accomplishments or findings that were determined from the process of completing the capstone.

The second component of the capstone is completion of the actual project. The project is either something that will result in a project or an internship of 300 hours. The completion of the project is to involve as many skill sets from the concentration as possible. The third component of the capstone is the presentation of the capstone to a panel of evaluators who are representatives from industry.

The evaluators score the portfolio and capstone projects with guidance from a grading rubric. Building administrators collect the percentage scores earned by students and awarded by evaluators on the grading rubrics. The administrator will

enter the average score for each student into the West Virginia WVEIS platform by mid-June.

The technical assessment process consisting of the portfolio and capstone was created for compliance to federal requirements to be eligible for Perkins funding. This process replaced the Global21 Performance Assessment which was considered summative in nature. The intent of the new portfolio and capstone process was to enable West Virginia's technical assessment process to be more formative in nature. The Global21 Performance Assessment evaluated selected skills at the conclusion of the course to determine if a student could successfully perform task and skills learned throughout coverage of the concentration skill sets. The Portfolio / Capstone model is a process geared to encourage critical thinking and the student driving the direction of the project. The teacher acts as a facilitator and assesses students throughout the entire process, providing feedback as necessary. The process is what makes Portfolio / Capstone more formative in nature.

It is then critical for West Virginia CTE teachers and administrators to possess both knowledge related to formative assessment strategies, and be able to implement these strategies in the CTE classrooms and shop areas. For the new technical assessment methods to be more formative, West Virginia CTE instructors must possess the knowledge and be able to successfully use formative assessment strategies.

Teacher Knowledge and Efficacy

The role of the teacher in learning and assessment is well established. Formative assessment cannot be done on the fly, the techniques have to be planned and executed purposefully as part of a lesson using a variety of strategies (Sawchuk,

2011) . Fullan (2002) asserts the importance of teacher buy-in and facilitation of teacher comfort during any curriculum transition. Entering the career and technical classroom and laboratory from business and industry mandates the teacher quickly acquire a different mind-set, moving from the mind-set of worker to the mind-set of teacher. Not only must the individual work on developing effective instructional strategies, communication skills, and assessment skills, but also must be able to adapt and be flexible in the ever-changing milieu of educational trends and initiatives. Fullan believes support for teachers in moving fluidly between and among educational models and trends is key to facilitating teacher and student success (Fullan, 2002).

Heritage (2007) identified four basic elements of teacher knowledge that are critical if teachers are going to successfully implement the use of formative student assessment in their classroom. The first element is domain knowledge which consist of knowing the concepts, knowledge, and skills to be taught within a domain; the precursors necessary for students to learn new concepts, knowledge, and skills; and what successful performance looks like when acquiring new concepts, knowledge, and skills. The second element is pedagogical content knowledge. This consist of having the knowledge and skills to utilize differentiated instructional strategies in the classroom. The third element of teacher knowledge is having an understanding of students' previous learning. Finally, the fourth element is assessment knowledge. The teacher must have a range of formative assessment strategies to maximize the opportunities for gathering evidence.

Heritage (2007) also identifies skills needed by teachers in addition to an appropriate knowledge base, to successfully implement formative assessment. Teachers need to be able to create classroom conditions that allow for successful

assessment, teach students to assess their own learning and the learning of others, interpret evidence of learning, and match their instruction to identified learning gaps.

A study by the National Center for Education Statistics ("How Assessments," 2000) found that CTE teachers are not savvy regarding alternative (non-summative) assessment measures which included formative student assessment techniques. A survey of nearly 1,200 CTE secondary teachers found that 53 percent responded they needed more information on using authentic assessments, such as portfolios, in their program areas. Twenty percent indicated they use authentic assessments to a "great extent" in their program area, while 64 percent responded that authentic student assessments were better suited for academic classrooms.

Ratzel (2011) advocates professional development for teachers supportive to development of a comfort level in implementing and managing formative assessment. Ratzel sees this as fundamental to teacher empowerment in developing meaningful formative assessment for and with students. While teachers traditionally are trained in summative assessment strategies (written unit tests, standardized testing, etc.), Ratzel sees a need for teachers to develop an appreciation for the potential for formative assessment to better illustrate a student's mastery of not only curriculum-related skills, but also to provide evidence of all student skills that contribute to the big picture of learning and preparation for life and work. For the training and support to be successful, however, Ratzel sees an equally important requirement for commitment from the teacher – a commitment to develop and use formative assessment strategies coupled with the development of a student-teacher information sharing relationship in which the student understands his or her learning process and progress each step along the way (Ratzel, 2011).

According to Dixon and Williams (2001) there is a fundamental confusion in teachers' minds between summative and formative assessment with many teachers not able to distinguish clearly between the two. In their study of teachers' use of assessment, little use of formative assessment was evident. When formative assessment was occurring, the teachers were not aware of its use. Often when teachers believed they were assessing formatively, in reality they were completing an ongoing summative assessment which was being used for grade reporting purposes. Teachers, overwhelmingly, did not view assessment as integral to teaching and learning and saw it as an additional task which bore little relationship to what occurred in the classroom. Because of this view, teachers develop a dislike for any type of assessment as they feel they are overloaded with assessment requirements.

Dixon and Williams (2001) concluded that teachers do not have an understanding of their role in assessment and how formative assessment is a part of this assessment system. Teachers generally have a limited theoretical understanding of how assessment could and should be integrated into the teaching and learning process. Formative assessment is generally weak in practice, with much classroom assessment not encouraging students to think critically.

Due to the fact that teachers do not understand the nature and function of formative assessment, significant long term professional development opportunities are needed to effectively embed formative assessment into classroom practice. Although many teachers identify with the occurrence of school-wide professional development in the area of assessment, the majority of this professional development has been in the area of summative assessment related to upcoming high-stakes assessments. Teachers involved in the Dixon and Williams' (2001) study never received professional development specific to formative assessment, that in turn

provided teachers with the strategies to help their students improve classroom performance.

Professional development is critical as research indicates that teachers need 30 to 100 sustained contact hours of training before altering teaching practice (Sawchuck, 2011). Being able to put together the minimum of 30 hours is difficult. Over an eight-month period, 30 hours would equate to a little less than four hours per month specific to formative assessment practices. Spillane, Hallet, and Diamond (2003) found that targeted professional development that focuses on what students are actually doing during the lesson in order to learn and achieve is critical. What students really do have a marked impact on student achievement.

Professional development in the area of assessment is essential in order to provide individual teachers with the time and support necessary to make changes. Teachers need time to reflect upon their assessment practices and benefit from observing and consulting with other teachers about effective practices (Boston, 2002).

A study conducted by Moss, Brookhart, and Long (2013) found that if formative assessment is going to become part of regular classroom practice, administrators must understand what formative assessment looks like and be able to coach teachers in its effective use. Mastering the skills of formative assessment works best when administrators understand, spearhead, and support teachers' work in assessment practices. Leithwood, Louis, Anderson, and Wahlstrom (2004) found that leadership is second only to classroom instruction among all school-related factors that contribute to what students learn at school and its impact on their achievement. Noyce and Hickey (2011) found that the committed leadership of administrators was essential to accomplish formative assessment goals. Administrators need to move

beyond only focusing on standardized test, they need to prioritize formative assessment as a school goal and work to leverage resources like time, professional development, technology and support for collaboration towards the fulfilment of this goal. The study of Dixon and Williams (2001) supports the importance of leadership in the promotion of meaningful assessment practices. Teachers in this study explained that principals and administrators need to understand clearly the purposes of assessment in general and the role of assessment in the enhancement of the teaching and learning process.

West Virginia CTE teachers often mention to their teacher educators that "Almost as soon as we learn to do things one way, we have to turn around and do it another way." (West Virginia University Institute of Technology, (2010). This serves to illustrate the importance of state and local leadership assessing needs and providing training and support for teachers with each request for change, remembering that few career and technical education teachers come into the classroom with prior teacher-education experience.

Lessons were learned by West Virginia state school administrators from feedback during the four-year use of the Global21 Performance Based Student Assessment model. Anecdotal evidence from formal and informal feedback, as discussed in quarterly state-wide CTE administrators' meetings (WVDE, 2009), revealed teachers' general feelings of being inadequately informed, lacking knowledge of the principles of performance based assessment strategies, and being inadequately prepared for implementation of performance based student assessment practices. Administrators recognized that teacher "buy in" to the assessment model and to integrate performance-based student assessment in their instructional program would have made the implementation much more efficient and palatable. Discussion

among program coordinators led to revisions in the performance based student assessment model and the professional development for teachers and administrators that was necessary to diffuse frustration of those who needed to be "selling" the importance of performance success to students (WVDE, 2010). To illustrate the importance of this, in 2010, eleven West Virginia teachers (who left the classroom to return to business and industry before the end of their first two years of teaching) disclosed feelings of inadequate knowledge of performance based student assessment and lamented lack of support for implementation of performance based student assessment during the first year on the job (WVUIT, 2010).

As the four-year implementation of the Global21 Performance Based Student Assessment model was coming to an end, administrators discussed the need for more thorough planning of the next chosen model, in order to create a culture of investment of teachers the next time around (WVDE, 2012). In preparation for the expected move toward more formative assessment in career and technical classrooms, administrators at one of the multi-county technical centers piloting the new teacher evaluation instrument included a question relative to formative student assessment in each teacher evaluation conference. The prompt was, "Tell me what you know about formative student assessment." With few exceptions, the teachers, regardless of years teaching experience, expressed that they had an overall understanding that formative assessment was something that needed to be done ongoing throughout the program, but they did not have a comfortable grasp of specific strategies or applications of formative assessment principles (Haught, 2013).

CHAPTER THREE: METHODS

Introduction

The purpose of Chapter Three is to describe the methods employed in gathering and analyzing the data collected in this study. This chapter is organized around the following sections: research design, population and sample, instrument development and validation, data collection and data analysis.

Research Design

This study was completed using a mixed methods design, including use of a participant survey and interviews with administrators. Because the survey data were collected from each group of subjects at one point in time, a one-shot, cross-sectional survey was used (Fink, 2003).

Population and Sample

The population for this study included West Virginia career and technical education (CTE) teachers in the sixteen career and technical program clusters as listed in Appendix B who were teaching in either a county CTE center or a multi-county CTE center in January – February 2016. CTE teachers in comprehensive high schools were included for any county whose students did not have the opportunity to attend either a county CTE center or a multi-county CTE center. At the time of this study, the WVDE reported 713 career and technical education teachers in secondary and post-secondary programs who met the inclusion criteria for the sample (WVDE, 2014). In addition, a sample of building level administrators having supervisory responsibility over career and technical educators was interviewed. The administrator sample was stratified by facility type.

Instrument Development and Validation

There was one survey instrument for teachers and an interview protocol for administrator interviews. The teacher survey instrument, *Teacher Survey: Formative Student Assessment in Career and Technical Education,* was a researcher-developed questionnaire (see Appendix C) which consisted of three parts. Part A requested demographic and attribute information from respondents. Part B requested respondents to use two five-point scales to indicate their levels of knowledge and use of formative student assessment practices. The third section, Part C, contained two open-ended questions requesting respondents to identify factors perceived to be supporting/facilitating or perceived to be barriers to implementation of formative student assessment practices in the career and technical education classroom and laboratory.

The list of formative student assessment practices in Part B included practices which were derived from the literature review. The selected list of practices included those identified by Lynch (2000) and Backes (2009) as desirable assessment practices which contribute to student success in skills assessment (Lynch, 2000; Backes, 2009). The list included formative assessment practices identified in the SREB Teacher Training Program (SREB, 2014) which was adopted by West Virginia Department of Education and West Virginia University Institute of Technology for CTE teacher training beginning CTE teacher certification. Finally, the list was cross-referenced with the formative assessment strategies located on the Formative Assessment page of the WVDE website (WVDE, 2013).

An interview protocol, *CTE Formative Assessment Administrator Interview Protocol,* was developed for use in interviews with a sample of administrators who were in direct supervisory roles over career and technical education teachers. The administrator sample

included administrators representing county career and technical centers, multi-county career and technical centers, and comprehensive high schools where students did not have opportunity to attend classes at a county or multi-county career center.

An expert panel of five individuals validated the 20 formative student assessment practices included in Part B of the survey instrument. The group included CTE teachers, teacher educators, administrators and state department specialists who demonstrated knowledge of formative student assessment by virtue of involvement in model development, previous extended training in best practices for student assessment, and/or demonstrated skill in formative assessment practices during the pilot of the new WV Teacher Evaluation model during 2012-2013. A list of members of this panel is included as Appendix F. The expert panel also validated the interview protocol.

Data Collection

An electronic mail message requesting administrators' permission to distribute surveys (Appendix G) was sent to each building level CTE administrator on January 4, 2016. The e-mail message asked for a reply within five work days from the date the electronic message was sent, indicating if the administrator agreed to grant permission to distribute surveys to teachers in their building or county. This initial email included attachments containing a study abstract, teacher consent form, and the survey instrument. Follow-up telephone calls were made within five days to any administrators not responding to the initial email. A list of administrators contacted, with notation of reply, was maintained by the Co-Principal Investigator (PI).

A follow-up email was sent as a response to administrators who replied to the initial email seeking permission to distribute surveys in their building/facility, thanking the administrators who indicated their willingness to participate. In this follow up email, a

request to determine if the administrator was willing to be a part of the administrator interview sample was included (Appendix I).

The applicable number of survey instruments for each teacher in a given school was distributed in all the participating schools. Letters of invitation (consent forms) to participate in the study (Appendix H) were attached to each survey instrument distributed, providing information regarding confidentiality and instruction for handling and return of completed surveys. Each paper survey had a plain envelope attached to facilitate anonymous return. A sealed box was provided for deposit of completed surveys at a central collection site in each participating school. The collection box was identified with the words "Completed CTE Surveys". Collection boxes did not identify any individual or school.

Survey instruments (Appendix C) were distributed to participating schools by four regional teacher educators with the West Virginia University Institute of Technology Department of Career and Technical Education faculty on a regularly scheduled visit to each career and technical education facility. Surveys were distributed by the principal (or principal's designee) in each participating school. Teachers were asked to return completed (or blank) surveys within three weeks from date of distribution, at which time a school secretary secured the box of returned surveys in a locked area until picked up by the teacher educators for delivery to the Co-PI at the end of the survey period.

Administrators who agreed to be interviewed were invited to participate in a telephone interview with the Co-PI. The interview protocol (Appendix E), *CTE Formative Assessment Administrator Interview Protocol,* was utilized during each interview and field notes were taken by the interviewer. Original completed teacher surveys and interview field notes were kept in a secure file by the Co-PI and will be for a period of three years following completion of the study.

Data Analysis

Data collected to address RQ1 and RQ2 were analysed by individual item and total. Mean scores and SD were calculated for each item and the total and a one-sample T-test conducted to determine the level of significance with a $p < .05$. To address RQ3 and RQ4, independent samples t-tests and one-way analysis of variance (ANOVA) were used to determine if any significant differences exist, based on the selected independent variables. Emergent Category Analysis was used to address RQ5, RQ6, RQ7 and RQ8.

CHAPTER FOUR: PRESENTATION AND ANALYSIS OF FINDINGS

Introduction

The primary purpose of this study was to investigate the levels of knowledge and levels of use of formative student assessment practices by career and technical education teachers in West Virginia. The study also sought to determine if there are differences in levels of knowledge and levels of use of formative student assessment practices based on selected demographic and attribute variables. The study also sought to identify factors perceived by teachers to be either supports or barriers to teacher implementation of formative student assessment. Additionally, the study investigated school administrators' perceptions of teacher levels of knowledge and levels of formative student assessment practices. Finally, the study sought to identify factors perceived by administrators to be either supports or barriers to teacher implementation of formative student assessment.

Findings presented in this chapter are organized into the following sections: (a) data collection; (b) participant characteristics; (c) major findings for each of the eight research questions; and (d), a summary of the findings. The study was reviewed and approved by the Marshall University Institutional Review Board (Appendix A).

Data Collection

Two instruments were used to collect data for this study. The first self-report survey, the *Formative Student Assessment in Career and Technical Education*, focused on CTE teachers. The second instrument, the *CTE Formative Assessment Administrator Interview Protocol,* focused on CTE administrators in West Virginia.

The *Formative Student Assessment in Career and Technical Education* instrument (see Appendix C) was a two-page paper-and-pencil survey consisting of three parts. Part A focused on the collection of teacher demographics. Teachers were asked to identify the cluster area in which he or she was endorsed, their total years of teaching experience, their years of teaching only in CTE. Teachers were also asked to identify the type of facility in which they taught, their program level, and any recent WVDE initiatives that he or she has participated in during the most current three years. Finally, teachers were asked to indicate if they had participated in any of nine professional development sources and rate the effectiveness of those in which they had participated.

In Part B of the self-report survey, teachers were asked to look at twenty formative student assessment strategies and report on his or her level of knowledge and frequency of use for each of twenty formative assessment strategies. In Part C of the self-report survey, teachers were asked to respond to two open-ended questions related to factors supportive of facilitating formative assessment implementation and barriers to implementation of formative assessment.

The *CTE Formative Assessment Administrator Interview Protocol* was designed to use with CTE administrators to collect perceptual data related to CTE teacher's knowledge and use of formative assessment. The interview protocol consists of eight questions (see Appendix E). Two questions ask administrators to rate the levels of knowledge and use of formative assessment by the teachers the administrator directly supervises. Administrators were asked to provide examples of formative assessment strategies being used and to identify CTE cluster areas in which there is the most and least frequent levels of use. Administrators were also asked to identify areas of support and barriers related to formative assessment use. Finally,

administrators were asked to identify formative assessment related professional development opportunities to which their CTE teachers have participated and to indicate the extent to which these opportunities were effective.

At the fall of 2015 West Virginia Department of Education Career and Technical Education Administrators' Meeting, a short description of the study protocol was presented by the Co-PI to the West Virginia CTE administrators in attendance. During this presentation, the Co-PI notified administrators they would be receiving an email requesting permission to distribute paper surveys (Appendix G) to the teachers in their schools. CTE administrators were also invited to participate in an administrator phone interview (Appendix I).

On January 4, 2016, school and county career and technical education administrators in seven multi-county career and technical education facilities, 21 county career and technical education facilities, and 21 comprehensive high schools (49 total facilities) state-wide were sent an electronic (e-mail) request for permission to distribute a two-page paper survey to teachers in their buildings (Appendix G). Permission was granted to distribute the surveys in all 49 of the career and technical education facilities in the state.

Upon notification of permission to survey teachers, blank survey forms were distributed to participating schools by West Virginia University Institute of Technology regional teacher education faculty between January 4, 2016 and February 26, 2016. A cover letter (Appendix H) explaining the purpose of the study was attached to each questionnaire. The number of surveys provided to each facility was determined by using data from the West Virginia Department of Education website and data on the number of CTE teachers provided by the participating schools'

administrators. Seven hundred and thirteen (N=713) surveys were distributed to participating schools.

Collection of completed surveys began January 19, 2016, and was completed on April 1, 2016. Sealed boxes of completed surveys were collected from the schools by regional educators from West Virginia University Institute of Technology and delivered to the Co-PI.

Four hundred surveys were returned, reflecting an overall response rate of 56.1%. Of the 400 surveys returned, 397 surveys were usable reflecting a usable response rate of 55.7%. Of the 397 usable surveys, 38% (n = 149) included narrative comments in response to the open-ended item identifying teachers' perceived supports to implementation of formative assessment practices in Part C of the survey. Of the 397 usable surveys, 39.8% (n = 158) included narrative comments in response to the open-ended item identifying teachers' perceived barriers to implementation of formative assessment practices in Part C of the survey.

Upon receiving email responses from administrators granting permission to distribute teacher surveys in his or her respective buildings, administrators were sent a follow-up thank-you email (Appendix I) which also requested for the administrator to consent to a CTE administrator phone interview. Twenty administrators representing four comprehensive high schools, nine county career centers and seven multi-county career centers reported their willingness to participate in the administrator phone interview.

Fifteen administrators, selected from the list of twenty administrators who responded favourably by email to participate in a phone interview, were interviewed by phone. The fifteen administrators represented seven multi-county career centers,

six county career centers, and two comprehensive high schools. The *Formative Assessment Administrator Interview Protocol* was emailed to administrators prior to the scheduled phone interview. Each administrator was asked the eight questions and the Co-PI recorded responses in field notes.

Respondent Characteristics and Demographics

In Part A of the survey, participating teachers were asked to respond to six items which provided demographic or attribute information about themselves or the schools in which they taught. A summary of respondent demographics and attributes is provided in Tables 1 - 4. Of the sixteen nationally recognized career clusters, the Health Science cluster had the largest percentage of respondents with 17.5% (n = 69). The Architecture and Construction cluster represented the second largest number of respondents with 14.2% (n = 56), Transportation, Distribution, and Logistics made up 11.2% (n = 44) of the respondents, and teachers in the Education and Training cluster represented 9.9% (n = 39) of the total number of respondents. The number and percentage responses for each of the clusters are provided in Table 1.

Table 1

Participating CTE Teachers by Program Cluster

Program Cluster	n	%
Health Science	69	17.5
Architecture and Construction	56	14.2
Transportation, Distribution, & Logistics	44	11.2
Education and Training	39	9.9
Manufacturing	28	7.2
Information Technology	28	7.1
Human Services	23	5.8
Science, Technology, Engineering, & Mathematics	22	5.6
Agriculture, Food, Natural Resources	21	5.3
Hospitality and Tourism	19	4.8
Business Management & Administration	17	4.3
Arts, A/V, and Communications	15	3.8
Law & Public Safety, Corrections & Security	8	2.0
Marketing	2	0.8
Government and Public Administration	2	0.5
Finance	---	---

N = 397

When participating teachers were asked to report the number of years of teaching experience in career and technical education (CTE) programs; ninety-one (23.3%) indicated one to two years, one hundred fourteen (29.2%) indicated three to six years, eighty-five (21.7%) indicated seven to twelve years, and one hundred one (25.8%) reported thirteen or more years. Responding teachers were also asked to report their total number of years of teaching experiences including years in career and technical education and academic education. One hundred one (25.7%) indicated one to two years, one hundred (25.4%) indicated three to six years, ninety-two (23.4%) indicated seven to twelve years, and one hundred (25.4%) indicated thirteen or more years. A summary of responses is included in Table 2.

One hundred thirty-one (33%) teachers reported teaching in comprehensive high schools, one hundred eighty-seven (47.1%) are teachers in a county career center, and seventy-nine (19.9%) teach in a multi-county career and technical education center. Three hundred thirty-three (84.5%) of the participating teachers reported teaching at the secondary level, while sixty-one (15.5%) reported teaching at the post-secondary / adult level. A summary of the responses is provided in Table 2.

Table 2

Participating CTE Teacher Characteristics

Characteristic	n	%
Years Teaching Experience (CTE Only)		
1 - 2	91	23.3
3 - 6	114	29.2
7 - 12	85	21.7
13 +	101	25.8
Years Teaching Experience (Total)		
1 – 2	101	25.7
3 – 6	100	25.4
7 – 12	92	23.4
13 +	100	25.4
Location where Teach		
Comprehensive High School	131	33.0
County CTE Center / Academy	184	47.1
Multi-County CTE Center	79	19.9
Program Level Taught		
Secondary	333	84.5
Post-Secondary Only	61	15.5

N = 397

Participating teachers were asked to identify education initiatives or special programs his or her school had participated in during the last three years (see Table 3). One hundred sixty-two (40.8%) reported their school participated in the Tech Centers That Work (TCTW) initiative, ninety (22.7%) participated in the High Schools That Work (HSTW) initiative, three hundred fifty three (88.9%) participated in the Simulated Workplace (SWP) initiative, one hundred ninety-two (48.4%) participated in Academic Teachers in CTE or the Embedded Credit initiative, ninety-four (23.7%) participated in Enhanced CTE (SREB), and three hundred fifty-five (89.4%) participated in the Portfolio / Capstone assessment initiative.

Table 3

Participating CTE Teacher – Educational Initiatives

Initiatives / Special Programs	n*	%
Tech Centers That Work (TCTW)	162	40.8
High Schools That Work (HSTW)	90	22.7
Simulated Workplace (SWP)	353	88.9
Embedded Credit / Academic Teachers in CTE	192	48.4
Enhanced CTE (SREB)	94	23.7
Portfolio Capstone Process	355	89.4

N = 397 * Duplicated Count

Using a scale of 1 – 5 (1 = Least Effective to 5 = Most Effective), respondents were asked to indicate participation rate and perceived effectiveness of nine training programs related to formative student assessment available to West Virginia teachers. A summary of these responses is provided in Table 4.

Three hundred twenty-eight (82.6%) respondents indicated participation in a school-based professional learning community. The mean effectiveness of school-based professional learning communities was 3.49 (SD = 1.13). Three hundred thirty (83.1%) respondents reported participating in a school level mentoring program with a mean effectiveness of 3.41 (SD = 1.21). Three hundred eighty-six (97.2%) respondents indicated participating in school or county professional development related to formative student assessment. The mean effectiveness for these programs was 3.54 (SD = 1.05).

Three hundred thirty-three (83.9%) respondents reported participating in WVDE professional development programs with a mean effectiveness scale of 3.49

(SD = 1.07). Two hundred eighty-eight (72.5%) respondents reported participating in training associated with WVU-Tech coursework or workshops. WVU-Tech coursework / workshop had a training effectiveness mean score of 3.56 (SD = 1.12). Two hundred ninety-four (74.1%) respondents reported involvement with professional development associated with private vendors. The mean effectiveness score of private vendor training was 3.74 (SD = 1.09).

Three hundred forty-seven (87.4%) respondents indicated utilizing the WVDE website for formative assessment training. The WVDE website had a mean effectiveness score of 3.31 (SD = 1.11). Three hundred fifty-five (89.4%) respondents indicated accessing formative assessment training via online or other resources. The mean effectiveness score for this training was 4.03 (SD = .94). Two-hundred forty-two (61.0%) respondents reported formative assessment training associated with the West Virginia Center for Professional Development. The mean effectiveness score for this training was 3.32 (SD = 1.09). Refer to Table 4 for teacher participation and effectiveness scores for the selected professional development sources.

Table 4

Teacher Participation and Perception of Effectiveness of Selected Professional Development Sources

	Participation		Effectiveness	
Professional Development Source	n*	%	M	SD
School-Based PLC	328	82.6	3.49	1.13
School-Level Mentoring	330	83.1	3.41	1.21
School / County Level PD	386	97.2	3.54	1.05
WVDE Prof. Dev.	333	83.8	3.49	1.07
WVU-Tech Training	288	72.5	3.56	1.12
Private Vendor PD	294	74.1	3.74	1.09
WVDE Website	347	87.4	3.31	1.11
Online / Other Resources	355	89.4	4.03	.94
WVCPD	242	61.0	3.32	1.09

N = 397 *Duplicated Count
Effectiveness Scale: 1 = Least, 3 = Moderately, 5 = Most

Major Findings

Major findings presented and discussed within this section are organized around the eight research questions investigated during the study. A second section provides data on the reliability of the survey instrument. A final section provides a chapter summary.

Teachers' Level of Knowledge

Twenty formative student assessment practices were listed in Part B of the survey. In the Column A, participating teachers were asked to use a scale of 1 – 5, with 1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = exceptional, to rate their perceived level of knowledge about each practice. A one-sample t-test, comparing the sample mean for each practice to the mean score (M = 3.0) from a hypothetical normal distribution, was conducted on each of the 20 practices.

A total level of knowledge score was calculated by summing the responses to each of the 20 practices. A one-sample t-test, comparing the sample total mean score to the mean score (M = 50.5) from a hypothetical normal distribution, was conducted.

An analysis of respondent mean scores for the 20 individual formative assessment practices revealed three levels of response: three practices had mean scores equal to or less than 2.99. Mean scores for 11 practices fell between 3.31 and 3.98, and six practices had mean scores between 4.0 and 4.13. Those practices with mean knowledge level scores equal to or less than 2.99 included individual student responders (M = 2.99, SD = 1.26), think-pair-share / gallery walks / similar strategies (M = 2.74, SD = 1.35), and student led conferences (M = 2.97, SD = 1.19).

Those formative assessment practices with mean knowledge level scores between 3.31 and 3.98 included reflective / learning logs (M = 3.31, SD = 1.06), graphic organizers / visuals (M = 3.58, SD = 1.03), peer / self-assessments (M = 3.58, SD = .91), literacy / numeracy assessments (M = 3.35, SD = 1.08), constructive quizzes (M = 3.64, SD = 1.02), student portfolio (M = 3.92, SD = .97), small group collaborative (M = 3.98, SD = .91), daily checklist (M = 3.64, SD = 1.08), rubrics (M = 3.80, SD = 1.05), bell ringers / exit slips (M = 3.55, SD = 1.21), and team / individual roles (M = 3.82, SD = 1.06). Those formative assessment practices with mean knowledge level scores between 4.0 and 4.3 included observations (M = 4.13, SD = .78), questioning (M = 4.09, SD = .71), discussions (M = 4.19, SD = .74), student presentations / teach backs (M = 4.08, SD = .85), project-based units (M = 4.14, SD = .88), and job / workplace simulations / cases (M = 4.08, SD = 1.06).

When compared to the mean score (M = 3.0) from a hypothetical normal distribution, one-sample t – test results indicated the difference in sample mean scores for 18 of the 20 formative practices were statistically significant at $p < .05$. The two practices that were not found to be statistically significant were individual student responder and student led conferences. Data for the 20 individual formative student assessment practices are presented in Table 5.

The total knowledge levels for program groups were as follows: Group 1: M = 75.73, SD = 13.83; Group 2: M = 75.20, SD = 11.82; Group 3: M = 73.11, SD = 12.51; Group 4: M = 72.17, SD = 11.76; and Group 5: M = 74.81, SD = 11.89. Total knowledge levels were not significantly different across program groups (p = .299).

Table 5

Overall *Knowledge Levels of CTE Teachers Relative to Formative Student Assessment Practices*

Assessment Practice	M	SD	t-value
Observation	4.13	.78	28.84*
Questioning	4.09	.71	30.51*
Discussions	4.19	.74	31.99*
Reflection/Learning Logs	3.31	1.06	5.87*
Graphic Organizers/Visuals	3.58	1.03	11.13*
Peer/Self Assessments	3.58	.91	12.77*
Student Presentations/Teach backs	4.08	.85	25.34*
Individual Student Responses	2.99	1.26	- .16
Literacy/Numeracy Assessments	3.35	1.08	6.43*
Constructive Quizzes	3.64	1.02	12.59*
Project based units	4.14	.88	25.64*
Job/Workplace simulations/cases	4.03	1.06	19.33*
Student Portfolio	3.92	.97	18.94*
Small-group Collaborative	3.98	.91	21.44*
Daily Checklist	3.64	1.08	11.71*
Rubrics	3.80	1.05	15.18*
Bell Ringers/Exit Slips	3.55	1.21	9.03*
Think-Pair-Share/Gallery Walk	2.74	1.35	- 3.80*
Student-led Conference	2.97	1.19	- .51
Team/Individual Roles	3.82	1.06	15.31*

*p < .05 N = 397 Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional CM = 3

Teachers' Level of Use

In the second column in Part B of the survey, participating teachers were asked to use a scale of 1 – 5, with 1 = seldom, 2 = sometimes, 3 = regularly, 4 = frequently, and 5 = very frequently, to rate their perceived level of use of each of the 20 formative student assessment practices. A one-sample t-test, comparing the sample mean for each practice to the mean score (M = 3) from a hypothetical normal distribution, was conducted on each of the 20 practices.

A total level of use score was calculated by summing the responses to each of the 20 practices. A one-sample t-test, comparing the sample total mean score to the mean score (M = 50.5) from the hypothetical normal distribution, was conducted.

An analysis of respondent mean scores for the 20 individual formative assessment practices revealed three levels of response: Six practices had a mean less than 2.99. Mean scores for nine practices fell between 3.0 and 3.99, and five practices had a mean score between 4.0 and 4.5. Those practices with mean scores less than 2.99 included reflective learning logs (M = 2.92, SD = 1.26), individual student responders (M = 2.46, SD = 1.26), literacy / numeracy assessments (M = 2.95, SD = 1.19), bell ringers / exit slips (M = 2.83, SD = 1.36), think-pair-share / gallery walk / similar strategies (M = 2.27, SD = 1.25), and student led conferences (M = 2.97, ST = 1.19).

Those assessment practices with mean scores between 3.0 and 3.99 included graphic organizers / visuals (M = 3.26, SD = 1.20), peer / self assessments (M = 3.15, SD = 1.16), student presentations / teach backs (M = 3.84, SD = 1.05), constructive quizzes (M = 3.34, SD = 1.10), student portfolio (M = 3.78, SD = 1.20), small group collaborative (M = 3.81, SD = 1.06), daily checklist (M = 3.24, SD = 1.29), rubrics (M = 3.39, SD = 1.17), and team /

individual roles (M = 3.69, SD = 1.19). The five assessment practices with mean scores between 4.0 and 4.5 included observations (M = 4.26, SD = .87), questioning (M = 4.20, SD = .79), discussions (M = 4.24, SD = .82), project-based units (M = 4.00, SD = 1.07), and job / workplace simulations / cases (M = 4.06, SD = 1.18).

When compared to the mean score (M = 3.0) from the hypothetical normal distribution, one sample t-test results indicated the differences in sample and hypothetical distribution mean scores for eighteen of the twenty formative assessment practices were significant at $p < .05$. The two assessment practices that were not significant at $p < .05$ were reflection / learning logs ($p = .20$) and literacy / numeracy assessments ($p = .44$). Data for the 20 individual practices are presented in Table 6.

The total use level for program groups were as follows: Group 1: M = 68.53, SD = 13.08; Group 2: M = 70.69, SD = 12.60; Group 3: M = 68.91, SD = 13.44; Group 4: M = 67.85, SD = 11.84; and Group 5: M = 66.67, SD = 12.07. Total use for program groups was not found to have a significant difference ($p = .467$).

Table 6

Use Levels of CTE Teachers Relative to Formative Student Assessment Practices across Program Areas

Assessment Practice	M	SD	t-value
Observations	4.26	.87	28.87*
Questioning	4.20	.79	30.00*
Discussions	4.24	.82	29.91*
Reflection/Learning Logs	2.92	1.26	-1.28
Graphic Organizers/Visuals	3.26	1.20	4.28*
Peer/Self Assessments	3.15	1.16	2.48*
Student Presentations/Teach backs	3.84	1.05	15.96*
Individual Student Responders	2.46	1.35	- 7.88*
Literacy/Numeracy Assessments	2.95	1.19	- .77
Constructive Quizzes	3.34	1.10	6.11*
Project based units	4.00	1.07	18.58*
Job/Workplace Simulations/Cases	4.06	1.18	17.81*
Student Portfolio	3.78	1.20	12.87*
Small-Group Collaborative	3.81	1.06	15.15*
Daily Checklist	3.24	1.29	3.76*
Rubrics	3.39	1.17	6.61*
Bell Ringers/Exit Slips	3.83	1.36	-2.50*
Think-Pair-Share/Gallery Walk	2.27	1.25	-11.62*
Student-Led Conference	2.60	1.26	- 6.23*
Team/Individual Roles	3.69	1.19	11.57*

*$p < .05$ N = 397 Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional CM = 3

Knowledge Levels Based on Demographic and Attribute Variables

This study also investigated the difference in levels of teacher knowledge of formative student assessment practices based on program area, years of teaching experience in career and technical education only, years of total teaching experience, the type of school or facility in which the teachers taught, and whether the teacher taught at primarily the secondary or post-secondary level. Independent sample t-test and one-way analysis of variance (ANOVA) were used to determine if any significant difference exited. These findings, organized by independent variable, are presented and discussed related to research question three.

Program Groups

Table 7 presents a comparison of teacher knowledge levels of formative student assessment practices among five groups of related program areas. The sixteen national career clusters, along with the designation of these sixteen national career clusters into five program cluster groups can be found in Appendix D. The five groups of related program areas are as follows: Group One consists of the four program clusters that fall under the umbrella of "business." Group Two consists of the three program clusters that fall under the umbrella of "welfare and workforce." Group Three consists of the two program clusters that fall under the umbrella of "health and safety." Group Four consists of the four program clusters that fall under the umbrella of "building trades, industrial, and agriculture." Group Five consist of the three program clusters that fall under the umbrella of "information, technology, and inquiry. A one-way analysis of variance (ANOVA) was conducted to compare levels of knowledge of the twenty formative assessment practices by program cluster groups. Significant differences were found in all groups for levels of knowledge for reflection and learning logs; student presentations and teach backs; project based units; and rubrics. No significant differences

were found for observations; questioning; discussions; graphic organizers/visuals; peer/self assessments; constructive quizzes; job/workplace simulation; student portfolio; small group collaborative; daily checklist; bell ringers/exit slips; think, pair, share/gallery walks; student led conference; and teams/individual roles. See table 7 for these results.

Sample mean scores for each of the program groups were statistically significant at $p < .05$ when compared to the mean from a hypothetical normal distribution.

Teaching Experience in CTE

Table 8 presents a comparison of teacher knowledge levels of formative student assessment practices among teacher groups by years of teaching experience in career and technical education. The groups are as follows: Group 1: 1 -2 years; Group 2: 3 – 6 years; Group 3: 7 – 12 yeas; Group 4: 13+ years. A one-way analysis of variance (ANOVA) was conducted to compare levels of knowledge of the twenty formative assessment practices by years of teaching experience in career and technical education.

Significant differences were found for levels of knowledge for observations (Group 1: M = 3.95, SD = .82; Group 2: M = 4.01, SD = .82; Group 3: M = 4.27, SD = .71; and Group 4: M = 4.30, SD = .67), and questioning (Group 1: M = 3.90, SD = .79; Group 2: M = 4.02, SD = .73; Group 3: M = 4.22, SD = .71; and Group 4: M = 4.22, SD = .56), and discussions (Group 1: M = 4.11, SD = .84; Group 2: M = 4.08, SD = .77; Group 3: M = 4.27, SD = .66; and Group 4: M = 4.33, SD = .65), and use of project based units (Group 1: M = 3.90, SD = .86; Group 2: M = 4.19, SD = .85; Group 3: M = 4.28, SD = .88; and Group 4: M = 4.20, SD = .91). Significant differences were also found for levels of knowledge for student portfolio (Group 1: M = 3.59, SD = 1.13; Group 2: M = 3.93, SD = .94; Group 3: M = 4.12, SD = .85; and Group 4: M = 4.09, SD = .87), small group collaborative (Group 1: M = 3.76, SD = 1.03; Group 2: M = 3.96, SD = .81; Group 3: M = 4.14, SD = .85; and Group 4: M = 4.09, SD =

.92), daily checklists (Group 1: M = 3.49, SD = 1.13; Group 2: M = 3.49, SD = 1.01; Group 3: M = 3.85, SD = .99; and Group 4: M = 3.80, SD = 1.16), and use of rubrics (Group 1: M = 3.54, SD = 1.14; Group 2: M = 3.83, SD = 1.00; Group 3: M = 4.09, SD = .92; and Group 4: M = 3.76, SD = 1.10). No other assessment practice reflected significant differences in knowledge levels based on years of CTE teaching experience.

Mean scores for total knowledge based on teaching experience in CTE were as follows: Group 1: M = 71.66, SD = 13.03; Group 2: M = 73.35, SD = 11.89; Group 3: M = 74.47, SD = 11.38; and Group 4: M = 75.31, SD = 12.24. The total knowledge levels based on years of teaching experience in CTE were not significantly different.

Total Years of Teaching Experience

Table 9 presents a comparison of teacher knowledge levels of formative student assessment practices among teacher groups by total years of teaching experience. The groups are as follows: Group 1: 1 - 2 years; Group 2: 3 - 6 years; Group 3; 7 - 12 years; Group 4; 13+ years. A one-way analysis of variance (ANOVA) was conducted to compare levels of knowledge of the twenty formative assessment practices by total years of teaching experience.

Significant differences ($p < .05$) were found for levels of knowledge for observations (Group 1: M = 3.94, SD = .75; Group 2: M = 4.12, SD = .78; Group 3: M = 4.16, SD = .87; and Group 4: M = 4.29, SD = .67), and questioning (Group 1: M = 3.88, SD = .71; Group 2: M = 4.12, SD = .76; Group 3: M = 4.16, SD = .70; and Group 4: M = 4.19, SD = .63), and project based units (Group 1: M = 4.00, SD = .85; Group 2: M = 4.38, SD = .77; Group 3: M = 4.08, SD = .96; and Group 4: M = 4.13, SD = .91). Significant differences were also found for levels of knowledge for use of student portfolio (Group 1: M = 3.55, SD = 1.08; Group 2: M = 4.14, SD = .84; Group 3: M = 4.03, SD = .93; and Group 4: M = 4.02, SD = .90), and

rubrics (Group 1: M = 3.50, SD = 1.13; Group 2: M = 3.99, SD = 1.05; Group 3: M = 3.93, SD = .95; and Group 4: M = 3.80, SD = 1.03). No other assessment practice reflected significant differences in knowledge levels based on years of total years of teaching experience.

Total knowledge for total years of teaching experience were as follows: Group 1: M = 72.15, SD = 12.37; Group 2: M = 74.47, SD = 11.28; Group 3: M = 73.15, SD = 12.97; and Group 4: M = 74.79, SD = 12.09. Total knowledge levels based on total years of teaching experience ($p = .404$) were not significantly different at $p < .05$.

Type of Facility

Table 10 presents a comparison of teacher knowledge levels of formative student assessment practices among teacher groups by type of educational facility in which he or she teaches. The groups are as follows: Group 1: Comprehensive High School; Group 2: County Career and Technical Center; Group 3: Multi-County Career and Technical Center. A one-way analysis of variance (ANOVA) was conducted to compare levels of knowledge of the twenty formative assessment practices by type of educational facility.

Significant differences ($p < .05$) were found for levels of knowledge for job and workplace simulations and cases (Group 1: M = 3.82, SD = 1.08; Group 2: M = 4.19, SD = .99; and Group 3: M = 4.03, SD = 1.15). No other formative assessment practice resulted in significant differences in knowledge levels based on type of educational facility in which the instructor teaches. The data are provided in Table 10.

The total knowledge levels based on type of facility were: Group 1: M = 71.79, SD = 12.43; Group 2: M = 74.83, SD = 12.18; and Group 3: M = 73.36, SD = 11.42. Total

knowledge levels based on type of facility were not found to be significantly different ($p = .095$).

Secondary / Post-Secondary Level

An independent samples t-test was applied to compare teacher knowledge levels of formative student assessment practices based on the program level (grade level) taught. Significant differences ($p < .05$) were found for levels of knowledge for think – pair – share and gallery walks between secondary ($M = 2.80$, $SD = 1.36$) and post-secondary ($M = 2.42$, $SD = 1.29$), $t = 2.052$. No other formative assessment practice resulted in significant differences in knowledge levels based on program / grade level. Table 11 presents the findings from the comparison of teacher knowledge levels of formative student assessment practices by program / grade level taught.

Total knowledge levels mean scores for the comparison between secondary and post-secondary levels were: Secondary ($M = 73.85$, $SD = 12.33$) and post-secondary ($M = 72.23$, $SD = 11.44$) $t = .942$. The total knowledge levels for the comparison between secondary and post secondary levels were not significantly different ($p = .347$).

Table 7
Comparison of Knowledge Levels by Program Groups

	Gp 1 (n=38)		Gp 2 (n =63)		Gp 3 (n=79)		Gp 4 (n=149)		Gp 5 (n=65)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	M	SD	F
1. Observations	4.29	.77	4.08	.83	4.25	.69	4.05	.77	4.08	.84	1.46
2. Questioning	4.24	.79	4.11	.68	4.08	.62	4.02	.73	4.12	.76	.81
3. Discussions	4.26	.80	4.19	.69	4.23	.64	4.11	.77	4.26	.80	.75
4. Reflection/Learning Logs	3.45	1.22	3.56	.98	3.34	1.07	3.12	1.07	3.45	.97	2.54*
5. Graphic Organizers/Visuals	3.71	1.23	3.76	1.01	3.56	.98	3.49	1.05	3.62	.90	.98
6. Peer/Self Assessments	3.68	.90	3.63	.96	3.51	.95	3.59	.86	3.65	.86	.37
7. Student Presentations/Teach backs	4.34	.75	4.06	.76	4.23	.86	3.87	.88	4.22	.82	4.28*
8. Individual Student Responders	2.92	1.44	3.06	1.18	2.87	1.29	2.94	1.26	3.27	1.23	1.07
9. Literacy/Numeracy Assessments	3.47	1.22	3.39	1.15	3.18	1.04	3.35	1.03	3.48	1.11	.86
10. Constructive Quizzes	3.76	1.00	3.57	1.06	3.77	.91	3.66	.99	3.46	1.16	1.06

*p < .05 N = 397 Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 7
Comparison of Knowledge Levels by Program Groups (cont'd)

	Gp 1 (n=38)		Gp 2 (n =63)		Gp 3 (n=79)		Gp 4 (n=149)		Gp 5 (n=65)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	M	SD	F
11. Project based units	4.13	1.07	4.05	.86	3.87	.98	4.23	.83	4.34	.74	3.22*
12. Job/Workplace simulations/cases	3.95	1.14	3.87	1.14	3.92	1.17	4.18	.89	4.02	1.18	1.35
13. Student Portfolio	4.11	1.13	4.06	.95	3.85	.98	3.83	.97	4.00	.88	1.26
14. Small-group Collaboratives	4.03	1.03	4.08	.81	3.96	.91	3.91	.94	4.03	.85	.48
15. Daily Checklist	3.82	1.11	3.76	1.07	3.58	1.17	3.61	1.01	3.52	1.11	.72
16. Rubrics	4.05	1.01	3.95	.94	3.78	1.03	3.57	1.16	4.02	.86	3.34*
17. Bell Ringers/Exit Slips	3.79	1.26	3.70	1.23	3.63	1.12	3.45	1.23	3.44	1.23	1.09
18. Think-Pair-Share/Gallery Walk	2.92	1.58	3.11	1.30	2.66	1.33	2.62	1.30	2.71	1.39	1.74
19. Student-led Conference	2.76	1.28	3.25	1.14	2.78	1.29	2.97	1.09	3.11	1.21	1.93
20. Team/Individual Roles	4.08	.94	3.70	1.15	3.81	1.10	3.83	1.00	3.86	1.07	.80

*$p < .05$ N = 397 Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 8.

Comparison of Knowledge Levels by Years of Teaching Experience in Career Technical Education.

	Gp 1 (n=91)		Gp 2 (n=114)		Gp 3 (n=85)		Gp 4 (n=101)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	F
1. Observations	3.95	.82	4.01	.83	4.27	.71	4.30	.67	5.31*
2. Questioning	3.90	.79	4.02	.73	4.22	.71	4.22	.56	4.76*
3. Discussions	4.11	.84	4.08	.77	4.27	.66	4.33	.65	2.74*
4. Reflection/Learning Logs	3.20	1.17	3.34	.99	3.30	1.13	3.43	1.00	.75
5. Graphic Organizers/Visuals	3.54	1.03	3.58	.95	3.54	1.08	3.66	1.11	.31
6. Peer/Self Assessments	3.60	.92	3.49	.93	3.64	.91	3.64	.89	.68
7. Student Presentations/Teach backs	3.96	.86	4.09	.84	4.22	.81	4.10	.87	1.48
8. Individual Student Responders	2.86	1.22	2.96	1.29	3.05	1.23	3.13	1.31	.83
9. Literacy/Numeracy Assessments	3.38	1.03	3.33	1.10	3.29	1.10	3.41	1.12	.22
10. Constructive Quizzes	3.47	.97	3.60	1.01	3.72	1.05	3.81	1.03	2.02
11. Project based units	3.90	.86	4.19	.85	4.28	.88	4.20	.91	3.29*

$p < .05$ N = 397 Group 1 (1 – 2 yrs.), Group 2 (3 - 6 years), Group 3 (7 – 12 years), Group 4 (13+ yrs.)

Table 8.
Comparison of Knowledge by Years Teaching Experience in Career Technical Education (cont'd)

	Gp 1 (n=91)		Gp 2 (n=114)		Gp 3 (n=85)		Gp 4 (n=101)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	F
12. Job/Workplace simulations/cases	3.82	1.18	4.01	1.10	4.07	1.01	4.23	.94	2.37
13. Student Portfolio	3.59	1.13	3.93	.94	4.12	.85	4.09	.87	5.84*
14. Small-group Collaboratives	3.76	1.03	3.96	.81	4.14	.85	4.09	.92	3.25*
15. Daily Checklist	3.49	1.13	3.49	1.01	3.85	.99	3.80	1.16	3.13*
16. Rubrics	3.54	1.14	3.83	1.00	4.09	.92	3.76	1.10	4.24*
17. Bell Ringers/Exit Slips	3.67	1.19	3.62	1.14	3.42	1.26	3.55	1.25	.73
18. Think-Pair-Share/Gallery Walk	3.01	1.29	2.77	1.42	2.54	1.44	2.68	1.24	1.93
19. Student-led Conference	2.96	1.19	2.97	1.21	3.02	1.31	2.96	1.09	.06
20. Team/Individual Roles	3.66	1.08	3.86	1.06	4.06	.90	3.73	1.17	2.41

*$p < .05$ N = 397 Group 1 (1 – 2 yrs.), Group 2 (3 – 6 yrs.), Group 3 (7 – 12 yrs.), Group 4 (13+ yrs.)

Table 9

Comparison of Knowledge Levels by Total Years of Teaching Experience

	Gp 1 (1-2)		Gp 2 (3-6)		Gp 3 (7-12)		Gp 4 (13)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	F
1. Observations	3.94	.75	4.12	.78	4.16	.87	4.29	.67	3.56*
2. Questioning	3.88	.71	4.12	.76	4.16	.70	4.19	.63	4.06*
3. Discussions	4.10	.77	4.17	.77	4.23	.71	4.27	.69	1.01
4. Reflection/Learning Logs	3.20	1.15	3.20	1.02	3.36	1.02	3.51	1.05	1.97
5. Graphic Organizers/Visuals	3.50	1.00	3.58	.97	3.54	1.09	3.70	1.09	.66
6. Peer/Self Assessments	3.60	.93	3.58	.83	3.49	1.00	3.66	.89	.58
7. Student Presentations/Teach backs	4.03	.83	4.20	.77	4.02	.91	4.10	.86	.95
8. Individual Student Responders	2.90	1.20	2.89	1.30	2.97	1.28	3.22	1.26	1.52
9. Literacy/Numeracy Assessments	3.41	.94	3.45	1.08	3.22	1.15	3.32	1.17	.84
10. Constructive Quizzes	3.54	.93	3.67	.99	3.67	1.13	3.69	1.04	.43

*$p < .05$ N = 397 Group 1 (1 – 2 yrs.), Group 2 (3 – 6 yrs.), Group 3 (9 – 12 yrs.), Group 4 (13+ yrs.)

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 9.
Comparison of Knowledge by Total Years Teaching Experience (cont'd)

	Gp 1 (n=101)		Gp 2 (n=100)		Gp 3 (n=92)		Gp 4 (100)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	F
11. Project based units	4.00	.85	4.38	.77	4.08	.96	4.13	.91	3.59*
12. Job/Workplace simulations/cases	3.88	1.15	4.16	1.02	4.08	1.07	4.03	1.01	1.21
13. Student Portfolio	3.55	1.08	4.14	.84	4.03	.93	4.02	.90	7.66*
14. Small-group Collaboratives	3.80	.99	4.02	.83	4.07	.90	4.05	.90	1.83
15. Daily Checklist	3.58	1.05	3.58	1.02	3.67	1.15	3.74	1.13	.52
16. Rubrics	3.50	1.13	3.99	1.05	3.93	.95	3.80	1.03	4.32*
17. Bell Ringers/Exit Slips	3.64	1.16	3.45	1.26	3.55	1.18	3.61	1.23	.46
18. Think-Pair-Share/Gallery Walk	3.02	1.25	2.69	1.42	2.55	1.42	2.70	1.30	2.10
19. Student-led Conference	2.99	1.12	3.07	1.19	2.87	1.37	2.95	1.10	.472
20. Team/Individual Roles	3.79	.99	3.93	1.07	3.82	1.09	3.74	1.13	.554

*$p < .05$ N = 397 Group 1 (1 – 2 yrs.), Group 2 (3 – 6 yrs.), Group 3 (9 – 12 yrs.), Group 4 (13+ yrs.)

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 10
Comparison of Knowledge Levels by Type of Facility

	Gp 1 (n=131)		Gp 2 (n=187)		Gp 3 (n=79)		
Assessment Practice	M	D	M	SD	M	SD	F
1. Observations	4.00	.75	4.20	.76	4.15	.83	2.71
2. Questioning	4.01	.75	4.16	.66	4.05	.75	1.79
3. Discussions	4.11	.78	4.26	.70	4.14	.76	1.91
4. Rfl/Lrn Logs	3.29	1.11	3.34	1.09	3.30	.93	.08
5. Graphic Organizers/Visual	3.44	1.12	3.70	.98	3.51	.99	2.61
6. Peer/Self Assessments	3.47	.93	3.63	.93	3.65	.80	1.46
7. Student Pres./Teach backs	4.05	.86	4.10	.86	4.06	.81	.139
8. Ind. Stud. Responders	2.98	1.22	2.99	1.29	3.00	1.28	.01
9. Literacy/Num. Assess	3.26	1.12	3.34	1.08	3.53	1.02	1.48
10. Constructive Quizzes	3.56	1.05	3.71	1.00	3.62	1.00	.76
11. Project based units	4.08	.89	4.15	.92	4.22	.80	.57
12. Job/Wkpl sim./cases	3.82	1.08	4.19	.99	4.03	1.15	4.78*
13. Student Portfolio	3.86	.98	3.97	.99	3.90	.91	.53
14. Small-group Collab.	3.89	.95	4.04	.90	3.96	.87	1.06
15. Daily Checklist	3.45	1.16	3.75	1.06	3.68	.97	3.04
16. Rubrics	3.72	1.06	3.81	1.08	3.92	.96	.95
17. Bell Ringers/Exit Slips	3.50	1.22	3.62	1.23	3.48	1.15	.55
18. Think-Pair-Share/Gall.Wlk	2.66	1.33	2.83	1.38	2.65	1.32	.81
19. Student-led Conference	2.83	1.16	3.08	1.18	2.94	1.24	1.73
20. Team/Individual Roles	3.70	1.11	3.89	1.04	3.85	1.03	1.21

*$p < .05$ N = 397 High School= Gp 1, County Career Center = Gp 2, Multi-County Career Center = Gp 3

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 11

Comparison of Knowledge Levels by Program/Student Level Taught

Assessment Practice	Gp 1 Secondary M	SD	Gp 2 Post-Secondary M	SD	t-value
1. Observations	4.10	.79	4.31	.70	-2.002
2. Questioning	4.07	.72	4.18	.65	-1.123
3. Discussions	4.20	.74	4.16	.73	.303
4. Reflection/Learning Logs	3.33	1.07	3.21	1.07	.802
5. Graphic Organizers/Visuals	3.62	1.04	3.39	.99	1.557
6. Peer/Self Assessments	3.59	.91	3.57	.92	.131
7. Student Presentations/Teach backs	4.06	.85	4.13	.85	- .576
8. Individual Student Responders	2.98	1.25	3.07	1.35	-.458
9. Literacy/Numeracy Assessments	3.36	1.08	3.32	1.13	.282
10. Constructive Quizzes	3.62	1.01	3.80	1.05	-1.323
11. Project based units	4.18	.86	3.97	.97	1.720
12. Job/Workplace simulations/cases	4.02	1.06	4.08	1.09	-.409
13. Student Portfolio	3.96	.96	3.70	1.02	1.919
14. Small-group Collaboratives	4.00	.90	3.85	.98	1.188
15. Daily Checklist	3.60	1.08	3.84	1.08	-1.550
16. Rubrics	3.79	1.04	3.85	1.12	-.411
17. Bell Ringers/Exit Slips	3.57	1.22	3.44	1.19	.751
18. Think-Pair-Share/Gallery Walk	2.80	1.36	2.42	1.29	2.052*
19. Student-led Conference	3.00	1.18	2.82	1.21	1.117
20. Team/Individual Roles	3.86	1.04	3.61	1.17	1.746

*$p < .05$ N = 397

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Use Levels Based on Demographics and Attribute Variables

This study also investigated the difference in levels of teacher use of formative student assessment practices based on program area, years of teaching experience in career and technical education only, years of total teaching experience, the type of school or facility in which the teachers taught, and whether the teacher taught at primarily the secondary or post-secondary level. Independent sample t-test and one-way analysis of variance (ANOVA) were used to determine if any significant difference exited. These findings, organized by independent variable, are presented and discussed related to research question four.

Program Groups

Table 12 presents a comparison of teacher use levels of formative student assessment practices among five groups of related program areas. The sixteen national career clusters, along with the designation of these sixteen national career clusters into five program cluster groups can be found in Appendix D. The five groups of related program areas are as follows: Group One consists of the four program clusters that fall under the umbrella of "business." Group Two consists of the three program clusters that fall under the umbrella of "welfare and workforce." Group Three consists of the two program clusters that fall under the umbrella of "health and safety." Group Four consists of the four program clusters that fall under the umbrella of "building trades, industrial, and agriculture." Group Five consist of the three program clusters that fall under the umbrella of "information, technology, and inquiry. A one-way analysis of variance (ANOVA) was conducted to compare levels of use of the twenty formative assessment practices by program cluster groups.

Significant differences were found in all groups for levels of use for observations; reflection/learning logs; and project based units. No significant differences were found for

questioning; discussions; graphic organizers/visuals; peer/self assessments; student presentations/teach backs; individual student responders; literacy/numeracy assessments; constructive quizzes; job/workplace simulation; student portfolio; small group collaborative; daily checklist; rubrics; bell ringers/exit slips; think, pair, share/gallery walk; student led conference; and teams/individual roles in the cluster groups. See Table 12 for these results.

Sample mean scores for each of the program groups were statistically significant at $p < .05$ when compared to the mean from a hypothetical normal distribution.

Teaching Experience in CTE

Table 13 presents a comparison of teacher use levels of formative student assessment practices among teacher groups by years of teaching experience in career and technical education. The groups are as follows: Group 1: 1 -2 years; Group 2: 3 – 6 years; Group 3: 7 – 12 yeas; Group 4: 13+ years. A one-way analysis of variance (ANOVA) was conducted to compare levels of use of the twenty formative assessment practices by years of teaching experience in career and technical education.

Significant differences ($p < .05$) were found for levels of use for individual student responders (Group 1: M = 2.39, SD = 1.26; Group 2: M = 2.51, SD = 1.41; Group 3: M = 2.12, SD = 1.25; and Group 4: M = 2.75, SD = 1.43), and literacy and numeracy assessments (Group 1: M = 3.00, SD = 1.18; Group 2: M = 3.09, SD = 1.19; Group 3: M = 2.60, SD = 1.11; and Group 4: M = 3.08, SD = 1.21), and bell ringers and exit slips (Group 1: M = 3.14, SD = 1.40; Group 2: M = 2.94, SD = 1.31; Group 3: M = 2.38, SD = 1.25; and Group 4: M = 2.87, SD = 1.38), and think-pair-share and gallery walks (Group 1: M = 2.48, SD = 1.16; Group 2: M = 2.37, SD = 1.34; Group 3: M = 1.98, SD = 1.23; and Group 4: M = 2.23, SD = 1.22). No other assessment practice reflected significant differences in use levels based on years of CTE teaching experience.

Mean total use scores based on teaching experience in CTE were as follows: Group 1: M = 67.00, SD = 13.05; Group 2: M = 69.16, SD = 12.36; Group 3: M = 66.69, SD = 11.79; and Group 4: M = 70.55, SD = 12.28. The total use levels based on years of teaching experience in CTE were not significantly different ($p = .117$).

Total Years of Teaching Experience

Table 9 presents a comparison of teacher use levels of formative student assessment practices among teacher groups by total years of teaching experience. The groups are as follows: Group 1: 1 - 2 years; Group 2: 3 - 6 years; Group 3; 7 - 12 years; Group 4; 13+ years. A one-way analysis of variance (ANOVA) was conducted to compare levels of use of the twenty formative assessment practices by total years of teaching experience.

Significant differences ($p < .05$) were found for levels of use for individual student responders (Group 1: M = 2.59, SD = 1.32; Group 2: M = 2.26, SD = 1.29; Group 3: M = 2.26, SD = 1.35; and Group 4: M = 2.71, SD = 1.43), and student portfolio (Group 1: M = 3.49, SD = 1.32; Group 2: M = 4.01, SD = .96; Group 3: M = 3.75, SD = 1.28; and Group 4: M = 3.92, SD = 1.16), and bell ringers and exit slips (Group 1: M = 3.18, SD = 1.37; Group 2: M = 2.59, SD = 1.29; Group 3: M = 2.73, SD = 1.23; and Group 4: M = 2.85, SD = 1.47), and think – pair – share and gallery walk (Group 1: M = 2.58, SD = 1.24; Group 2: M = 2.20, SD = 1.30; Group 3: M = 2.00, SD = 1.11; and Group 4: M = 2.27, SD = 1.28). No other assessment practice reflected significant differences in use levels based on total years of teaching experience.

Total use for total years of teaching experience were as follows: Group 1: M = 68.26, SD = 13.22; Group 2: M = 68.94, SD = 11.52; Group 3: M = 66.69, SD = 12.23; and Group 4: M = 69.76, SD = 12.62. Total use levels based on total years of teaching experience were not significantly different ($p = .390$).

Type of Facility

Table 15 presents a comparison of teacher use levels of formative student assessment practices among teacher groups by type of educational facility in which he or she teaches. The groups are as follows: Group 1: Comprehensive High School; Group 2: County Career and Technical Center; Group 3: Multi-County Career and Technical Center. A one-way analysis of variance (ANOVA) was conducted to compare levels of use of the twenty formative assessment practices by type of educational facility.

Significant differences ($p < .05$) were found for levels of use for daily checklist (Group 1: M = 2.95, SD = 1.31; Group 2: M = 4.44, SD = 1.24; and Group 3: M = 3.27, SD = 1.31), and rubrics (Group 1: M = 3.17, SD = 1.18; Group 2: M = 3.46, SD = 1.18; Group 3: M = 3.59, SD = 1.12), and bell ringers and exit slips (Group 1: M = 2.62, SD = 1.28; Group 2: M = 3.08, SD = 1.38; Group 3: M = 2.57, SD = 1.35). No other formative assessment practice resulted in significant differences in use levels based on type of educational facility in which the instructor teaches.

The total use levels based on type of facility were: Group 1: M = 66.17, SD = 12.22; Group 2: M = 70.07, SD = 12.24; and Group 3: M = 67.78, SD = 12.78. Total use levels based on type of facility were found to be significantly different ($p = .023$).

Secondary / Post-Secondary Level

An independent samples t-test was applied to compare teacher use levels of formative student assessment practices based on the program level (grade level) taught. Significant differences ($p < .05$) were found for levels of use for project based units between secondary (M = 4.09, SD = 1.01) and post-secondary (M = 3.57, SD = 1.26), $t = 3.487$. Significant differences ($p < .05$) were found for levels of use for student portfolio between secondary (M

= 3.87, SD = 1.13 and post-secondary (M = 3.30, SD = 1.42), t = 3.455, and team and individual roles between secondary (M = 3.75, SD = 1.15) and post-secondary (M = 3.41, SD = 1.33), t = 2.061. No other formative assessment practice resulted in significant differences in use levels based on program / grade level. Table 16 presents the findings from the comparison of teacher use levels of formative student assessment practices by program / grade level taught.

Total use level means scores for the comparison between secondary and post-secondary levels were: Secondary (M = 68.51, SD = 12.42) and post-secondary (M = 67.33, SD = 11.44) t = .942. The total use levels for secondary and post secondary levels were not significantly different (p = .512).

Table 12

Comparison of Use Levels by Program Groups

	Gp 1 (n=38)		Gp 2 (n =62)		Gp 3 (n=79)		Gp 4 (n=149)		Gp 5 (n=64)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	M	SD	F
1. Observations	4.45	.92	4.13	.91	4.57	.57	4.22	.86	3.94	.97	5.87*
2. Questioning	4.24	.85	4.16	.75	4.37	.62	4.13	.84	4.10	.84	1.46
3. Discussions	4.29	.90	4.24	.76	4.42	.59	4.14	.89	4.17	.91	1.60
4. Reflection/Learning Logs	2.74	1.37	3.27	1.12	3.14	1.37	2.77	1.19	2.75	1.26	2.91*
5. Graphic Organizers/Visuals	3.29	1.27	3.53	1.11	3.30	1.15	3.20	1.26	3.06	1.13	1.35
6. Peer/Self Assessments	3.08	1.02	3.23	1.11	3.06	1.17	3.22	1.20	3.08	1.15	.42
7. Student Presentations/Teach backs	3.92	1.08	3.77	1.05	4.08	1.06	3.66	1.08	3.95	.92	2.37
8. Individual Student Responders	2.24	1.46	2.61	1.33	2.47	1.48	2.52	1.31	2.33	1.26	.65
9. Literacy/Numeracy Assessments	3.08	1.26	3.10	1.27	2.90	1.22	2.98	1.13	2.81	1.17	.61
10. Constructive Quizzes	3.29	.96	3.32	1.07	3.57	1.11	3.38	1.13	3.05	1.11	2.08

*p < .05 N = 397 Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Group 1 = business; Group 2 = welfare & workforce; Group 3 = health & safety;

Group 4 = building trades, industrial, and agriculture; Group 5 = information, technology, and inquiry

Table 12

Comparison of Use Levels by Program Groups (cont'd)

	Gp 1 (n=38)		Gp 2 (n =62)		Gp 3 (n=79)		Gp 4 (n=149)		Gp 5 (n=64)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	M	SD	F
11. Project based units	4.05	1.21	3.77	1.12	3.58	1.20	4.19	.90	4.23	.96	6.02*
12. Job/Workplace simulations/cases	3.87	1.44	4.00	1.11	3.90	1.42	4.26	.95	3.92	1.20	2.00
13. Student Portfolio	4.05	1.29	3.85	1.24	3.65	1.37	3.67	1.14	3.97	.96	1.48
14. Small-group Collaboratives	4.00	1.16	3.85	.94	3.71	1.12	3.85	.98	3.73	1.16	.66
15. Daily Checklist	3.26	1.27	3.56	1.25	3.22	1.45	3.26	1.20	2.98	1.27	1.59
16. Rubrics	3.61	1.18	3.55	1.18	3.48	1.20	3.17	1.16	3.44	1.11	2.09
17. Bell Ringers/Exit Slips	2.87	1.40	3.03	1.43	2.95	1.36	2.75	1.30	2.69	1.39	.79
18. Think-Pair-Share/Gallery Walk	2.18	1.27	2.56	1.36	2.35	1.36	2.20	1.17	2.16	1.14	1.24
19. Student-led Conference	2.32	1.34	2.85	1.23	2.53	1.38	2.66	1.21	2.58	1.21	1.25
20. Team/Individual Roles	3.71	1.27	3.66	1.19	3.76	1.22	3.80	1.14	3.53	1.13	.63

*$p < .05$ N = 397 Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Group 1 = business; Group 2 = welfare & workforce; Group 3 = health & safety;

Group 4 = building trades, industrial, and agriculture; Group 5 = information, technology, and inquiry

Table 13

Comparison of Use Levels by Years of Teaching Experience in Career Technical Education.

	Gp 1 (n=91)		Gp 2 (n=114)		Gp 3 (n=85)		Gp 4 (n=101)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	F
1. Observations	4.15	1.00	4.18	.88	4.36	.72	4.36	.84	1.61
2. Questioning	4.04	.84	4.18	.82	4.26	.81	4.29	.67	1.84
3. Discussions	4.15	.87	4.19	.86	4.25	.81	4.37	.72	1.35
4. Reflection/Learning Logs	2.91	1.26	2.92	1.32	2.85	1.29	2.99	1.16	.20
5. Graphic Organizers/Visuals	3.25	1.24	3.30	1.13	3.10	1.26	3.34	1.20	.73
6. Peer/Self Assessments	3.09	1.12	3.09	1.22	3.05	1.12	3.36	1.13	1.55
7. Student Presentations/Teach backs	3.66	.97	3.96	1.04	3.89	1.11	3.85	1.08	1.51
8. Individual Student Responders	2.39	1.26	2.51	1.41	2.12	1.25	2.75	1.43	3.46*
9. Literacy/Numeracy Assessments	3.00	1.18	3.09	1.19	2.60	1.11	3.08	1.21	3.43*
10. Constructive Quizzes	3.19	1.11	3.35	1.06	3.24	1.18	3.58	1.07	2.42

p < .05 N = 397 Group 1 (1 – 2 yrs.), Group 2 (3-6 years), Group 3 (9 – 12 years), Group 4 (13+ yrs.)

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 13

Comparison of Use by Years Teaching Experience in Career Technical Education (cont'd)

	Gp 1 (n=91)		Gp 2 (n=114)		Gp 3 (n=85)		Gp 4 (n=101)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	F
11. Project based units	3.76	1.08	4.05	1.00	4.00	1.16	4.16	1.02	2.32
12. Job/Workplace simulations/cases	3.83	1.35	4.10	1.04	4.08	1.28	4.21	1.05	1.73
13. Student Portfolio	3.52	1.29	3.81	1.15	3.82	1.23	3.99	1.11	2.54
14. Small-group Collaboratives	3.66	1.08	3.87	1.03	3.86	1.09	3.93	.99	1.19
15. Daily Checklist	3.20	1.27	3.11	1.28	3.30	1.18	3.44	1.40	1.27
16. Rubrics	3.20	1.12	3.48	1.14	3.46	1.20	3.39	1.25	1.13
17. Bell Ringers/Exit Slips	3.14	1.40	2.94	1.31	2.38	1.25	2.87	1.38	5.09*
18. Think-Pair-Share/Gallery Walk	2.48	1.16	2.37	1.34	1.98	1.23	2.23	1.22	2.72*
19. Student-led Conference	2.66	1.26	2.64	1.29	2.52	1.34	2.60	1.21	.20
20. Team/Individual Roles	3.65	1.10	3.75	1.20	3.77	1.17	3.66	1.27	.27

*$p < .05$ N = 397 Group 1 (1 – 2 yrs.), Group 2 (3 – 6 yrs.), Group 3 (9 – 12 yrs.), Group 4 (13+ yrs.)

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 14

Comparison of Use Levels by Total Years of Teaching Experience

	Gp 1 (1-2)		Gp 2 (3-6)		Gp 3 (7-12)		Gp 4 (13)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	F
1. Observations	4.14	.94	4.27	.82	4.32	.83	4.31	.87	.92
2. Questioning	4.03	.79	4.21	.84	4.23	.82	4.31	.70	2.31
3. Discussions	4.07	.85	4.28	.85	4.29	.78	4.34	.77	2.20
4. Reflection/Learning Logs	2.88	1.30	2.74	1.27	2.96	1.16	3.09	1.29	1.30
5. Graphic Organizers/Visuals	3.30	1.25	3.30	1.14	3.14	1.23	3.29	1.20	.37
6. Peer/Self Assessments	3.27	1.14	2.96	1.17	3.04	1.16	3.30	1.15	2.08
7. Student Presentations/Teach backs	3.76	1.00	4.06	1.00	3.75	1.10	3.83	1.08	1.88
8. Individual Student Responders	2.59	1.32	2.26	1.29	2.26	1.35	2.71	1.43	2.75*
9. Literacy/Numeracy Assessments	3.05	1.06	3.05	1.21	2.78	1.19	2.94	1.29	1.09
10. Constructive Quizzes	3.26	1.04	3.30	1.16	3.37	1.17	3.43	1.09	.47

*$p < .05$ N = 397 Group 1 (1 – 2 yrs.), Group 2 (3 – 6 yrs.), Group 3 (9 – 12 yrs.), Group 4 (13+ yrs.)

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 14
Comparison of Use *by Total Years Teaching Experience (cont'd)*

	Gp 1 (n=101)		Gp 2 (n=100)		Gp 3 (n=92)		Gp 4 (100)		
Assessment Practice	M	SD	M	SD	M	SD	M	SD	F
11. Project based units	3.94	.99	4.16	.96	3.88	1.15	4.04	1.15	1.31
12. Job/Workplace simulations/cases	3.88	1.27	4.25	.99	3.91	1.36	4.20	1.04	2.67
13. Student Portfolio	3.49	1.32	4.01	.96	3.75	1.28	3.92	1.16	3.69*
14. Small-group Collaboratives	3.71	1.08	3.96	.99	3.75	1.09	3.88	1.04	1.19
15. Daily Checklist	3.24	1.23	3.21	1.25	3.15	1.31	3.38	1.39	.55
16. Rubrics	3.24	1.12	3.55	1.18	3.38	1.17	3.40	1.24	1.18
17. Bell Ringers/Exit Slips	3.18	1.37	2.59	1.29	2.73	1.23	2.85	1.47	3.47*
18. Think-Pair-Share/Gallery Walk	2.58	1.24	2.20	1.30	2.00	1.11	2.27	1.28	3.72*
19. Student-led Conference	2.72	1.26	2.70	1.33	2.35	1.23	2.62	1.23	1.70
20. Team/Individual Roles	3.77	1.10	3.82	1.19	3.65	1.21	3.57	1.26	.89

*$p < .05$ N = 397 Group 1 (1 – 2 yrs.), Group 2 (3 – 6 yrs.), Group 3 (9 – 12 yrs.), Group 4 (13+ yrs.)

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 15
Comparison of Use Levels by Type of Facility

	Gp 1 (n=131)		Gp 2 (n=187)		Gp 3 (n=79)		
Assessment Practice	M	SD	M	SD	M	SD	F
1. Observations	4.19	.84	4.31	.85	4.24	.95	.75
2. Questioning	4.15	.78	4.27	.75	4.10	.91	1.60
3. Discussions	4.15	.89	4.33	.75	4.18	.85	2.14
4. Reflection/Learning Logs	2.86	1.25	2.96	1.30	2.91	1.19	.25
5. Graphic Organizers/Visuals	3.06	1.21	3.32	1.19	3.45	1.19	3.03
6. Peer/Self Assessments	3.00	1.18	3.25	1.17	3.13	1.08	1.83
7. Student Pres./Teach backs	3.78	1.06	3.92	1.02	3.76	1.11	.94
8. Ind. Stud. Responders	2.39	1.31	2.55	1.42	2.34	1.27	.88
9. Literacy/Num. Assess.	2.75	1.18	3.02	1.19	3.14	1.18	3.11*
10. Constructive Quizzes	3.15	1.02	3.46	1.14	3.37	1.13	2.94
11. Project based units	3.95	1.05	4.03	1.06	4.01	1.11	.26
12. Job/Wrkpl. Sim./cases	3.93	1.21	4.17	1.14	4.01	1.20	1.63
13. Student Portfolio	3.74	1.23	3.82	1.22	3.77	1.12	.18
14. Small-group Collab.	3.75	1.14	3.85	1.03	3.80	1.03	.35
15. Daily Checklist	2.95	1.31	3.44	1.24	3.27	1.31	5.53*
16. Rubrics	3.17	1.18	3.46	1.18	3.59	1.12	3.83*
17. Bell Ringers/Exit Slips	2.62	1.28	3.08	1.38	2.57	1.35	6.29*
18. Think-Pair-Share/Gallery	2.20	1.21	2.34	1.30	2.21	1.19	.59
19. Student-led Conference	2.42	1.24	2.75	1.25	2.55	1.30	2.73
20. Team/Individual Roles	3.62	1.18	3.79	1.19	3.58	1.19	1.22

*$p < .05$ N = 397 High School = Gp 1, County Career Center = Gp 2, Multi-County Career Center = Gp 3

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Table 16
Comparison of Use Levels by Program / Student Level Taught

Assessment Practice	Gp 1 Secondary M	SD	Gp 2 Post-Secondary M	SD	t-value
1. Observations	4.23	.89	4.39	.71	1.335
2. Questioning	4.17	.81	4.33	.68	1.484
3. Discussions	4.23	.84	4.27	.69	.295
4. Reflection/Learning Logs	2.91	1.23	2.97	1.40	.343
5. Graphic Organizers/Visuals	3.27	1.21	3.17	1.17	.627
6. Peer/Self Assessments	3.15	1.15	3.12	1.26	.195
7. Student Presentations/Teach backs	3.81	1.04	4.02	1.09	1.413
8. Individual Student Responders	2.45	1.35	2.49	1.41	.204
9. Literacy/Numeracy Assessments	2.93	1.18	3.10	1.24	1.004
10. Constructive Quizzes	3.30	1.10	3.57	1.15	1.804
11. Project based units	4.09	1.01	3.57	1.26	3.487*
12. Job/Workplace simulations/cases	4.08	1.14	3.93	1.39	.899
13. Student Portfolio	3.87	1.13	3.69	1.15	.983
15. Daily Checklist	3.20	1.29	3.49	1.31	1.637
16. Rubrics	3.38	1.16	3.44	1.23	.373
17. Bell Ringers/Exit Slips	2.88	1.36	2.54	1.30	1.792
18. Think-Pair-Share/Gallery Walk	2.30	1.27	2.10	1.13	1.149
19. Student-led Conferences	2.62	1.26	2.55	1.31	.366
20. Team/Individual Roles	3.75	1.15	3.41	1.33	2.061*

*$p < .05$ N = 397

Scale: 1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, 5 = Exceptional

Teacher Support and Barriers

Teacher Identified Supports

Emergent category analysis of the teacher identified supports for formative assessment, resulted in the identification of ten categories from a total of 184 usable responses. Teachers were asked to identify factors they perceived as being either supports or barriers to their efforts to implement formative student assessment practices in their classrooms. Emergent category analysis showed the following results for the prompt requesting teachers to identify support factors (Appendix K). Of 184 narrative responses, 22% (n = 40) identified WVDE/CTE initiative factors. One respondent indicated, "The Simulated Workplace initiative implemented by the West Virginia Department of Education has provided perfect opportunities for the encouragement of formative assessment in CTE program areas." A second respondent indicated, "The emphasis on Project Based Learning and Enhanced CTE through the collaborative with the Southern Regional Education Board (SREB) and Technical Centers that Work (TCTW) has established a platform for the consistent use of formative assessment."

Twenty percent (n = 37) identified administrative and peer teacher support factors. One respondent indicated, "Support from my administrator has been a key to my increased use of formative assessment as my administrator has encouraged a consistent use of formative assessment strategies." A second respondent reported, "Being able to plan collaboratively with other CTE teacher has increased my use of formative assessment as a planned and intended instructional practice."

Eleven percent (n = 21) identified technology or online resource related factors. One respondent indicated, "The availability of technology in my classroom

has led to his increased use of formative assessment practices involving the use of technology as part of the formative process." A second respondent reported, "The on-line recourses provided for by the West Virginia Department of Education (WVDE) has increased my use of formative assessment as formative assessment is built in to the structure of the on-line program."

Ten percent (n=19) identified teacher training or professional development factors. One respondent indicated, "Without additional professional development related specifically to formative assessment provided by my county, I would not have a clear understanding of the difference between the different types of student assessment." Another respondent indicated, "Training as part of both state and county initiatives has increased both my knowledge and use of formative assessment.

Ten percent (n=18) identified lab, shop or clinical factors. One respondent reported, "CTE in nature, because of the emphasis on 'hands-on' learning, lends well to the use of formative assessment." A second respondent indicated, "Specifically CTE programs in the 'high-wall' lab areas utilize formative assessment very frequently as part of providing instruction and teacher feedback."

Eight percent (n=14) identified student effort, student attitude or student collaboration factors. One respondent indicated, "Students respond well to formative assessment in CTE because the students have an interest and see relevance to the program he or she has selected." A second respondent commented, "The student collaborative nature that CTE fosters allows frequent use of formative assessment strategies." Seven percent (n=13) identified curricula support factors. One respondent indicated, "The role of CTE reinforcing academic skills as the academic skill is applied to a 'real-life' setting creates opportunities for an increased use of formative

assessment." A second respondent reported, "The emphasis on earning program specific work-place credentials and competing at both local and state level Career and Technical Student Organizations (CTSO) lead to opportunities to apply formative assessment concepts."

Five percent (n=9) identified portfolio and capstone factors, as the portfolio and capstone initiative's primary purpose is for Federal Perkins accountability which promotes a variety of opportunities for formative assessment. Four percent (n=7) identified industry support factors. Industry has identified as part of advisory committees that formative assessment is essential in assessing individual student's master of specific program area skill sets. Three percent (n=6) identified funding or resource factors as current funding is driven by priorities established by state level initiatives. The WVDE continues to promote initiatives with a formative assessment emphasis.

Table 17

Teacher Identified Categories of Support	n*	%
WVDE/CTE Initiatives	40	21.7
Administrative & Peer Teacher Support	37	20.1
Technology / On-Line Resources	21	11.4
Teacher Training / Professional Development	19	10.3
Lab/Shop/ Clinical	18	9.8
Student Effort / Attitude / Collaboration	14	7.6
Curricula Supports	13	7.0
Portfolio / Capstone	9	4.9
Industry Supports	7	3.8
Funding / Resources	6	3.3

N = 397 n* = 184 Usable Teacher Responses – Duplicated Count

Teacher Identified Barriers

Emergent category analysis of the teacher identified barriers for formative assessment resulted in the identification of nine categories from a total of 207 usable responses. Emergent category analysis showed the following results for the prompt requesting teachers to identify barrier factors (Appendix L). Of the 207 narrative responses, twenty-four percent (n=50) identified time factors. Of the 50 responses related to "time", thirty-eight indicated not enough time to implement and six indicated not enough time to plan for formative assessment. One respondent indicated, "Formative assessment is a waste of time." A seconded respondent reported, "With all the paperwork requirements related to teaching, there is not sufficient time to plan for formative assessment within the scope of lesson planning." Eighteen percent (n=38) identified student factors. One respondent reported, "Due to a lack of motivation from many of my students, formative assessment is not a successful strategy with my students." A second respondent indicated, "Poor attendance patterns from a number of my students prevent me from consistently being able to utilize formative assessment strategies."

Sixteen percent (n=34) identified structure factors. One respondent reported, "Periods of instruction that are less than 90 minutes in length do not allow adequate time to incorporate formative assessment." A second respondent indicated, "My class sizes are not limited which usually results in having too many students to implement formative assessment effectively." Eleven percent (n=23) identified professional development factors. One respondents indicated, "I have never received specific training related to formative assessment which prevents me from utilizing formative

assessment strategies in my program area." A second respondent reported, "An overall lack of knowledge has prevented me from using formative assessment in my classroom, and because I do not have a basic understanding, I do not have the confidence to incorporate with my classes within my program."

Eight percent (n=17) identified curriculum factors. One respondent indicated, "I have enough trouble covering my program skill sets without adding formative assessment. Since formative assessment is not included in my skill sets, I do not have time to implement." A second respondent indicated, "CTE does not lend itself naturally to the use of formative assessment and that incorporating formative assessment would require me to reduce the number of hands-on learning experiences that is the critical component and strength of CTE." Eight percent (n=16) identified funding factors. One respondent indicated, "A lack of funding specifically for formative assessment as a barrier to use." A second respondent reported, "The county has not provided any resources to assist with the planning and use of formative assessment with my students."

Eight percent (n=16) identified administrative factors. One respondent indicated, "The WVDE currently has too many initiatives in place to add formative assessment as yet, another initiative on top of all the other ongoing initiatives." A second respondent indicated, "My administrator does not encourage the use of formative assessment within the school." Five percent (n=10) identified technology factors. One respondent reported, "Due to a lack of computers in my classroom, I cannot successfully implement formative assessment strategies." A second respondent indicated, "Because many of my students do not have internet capabilities at home, I cannot successfully implement formative assessment strategies.

Table 18

Teacher Identified Categories of Barriers

	n*	%
Time	50	24.2
Student	38	18.4
Structure	34	16.4
Professional Development	23	11.1
Curriculum	17	8.2
Funding	16	7.7
Administrative	16	7.7
Technology	10	4.8
Other	3	1.4

N = 397 Total Teacher Responses n* = 207 Usable Teacher Responses – Duplicated Count

Administrator Perceptions of Teacher Knowledge

Fifteen West Virginia CTE Administrators were asked, via phone interview, to report on his or her perception of the teachers under his or her direct supervision. The administrators were asked specifically to report on the perceived level of knowledge of formative student assessment practices. Six administrators reported that his or her perception of teachers' knowledge was "fair," eight administrators reported "good," and one administrator reported "very good." One administrator reported, "I have been working two years to assist teachers in knowing the difference between summative and formative assessments." Another administrator reported, "The teachers coming directly out of industry into teaching were struggling more with understanding the types of assessment as this group had not had the extensive training

and supervised practice compared to teachers who have graduated from a teachers' education program." A third administrator commented, "Our teachers were having difficulty understanding the overall purpose of formative assessment and being able to adjust instruction based upon information gained from formative assessment."

Of the fifteen administrator ratings, using a five-point scale, 53% of responses fell in the middle level of the scale (good). Forty percent fell in the "fair" category and only one response (7%) fell in the "very good" level of the scale. All but one of the administrators' perception ratings fell in the "fair" to "good" levels. The administrators interviewed were reluctant to rate their faculty as "very good" and "exceptional" because each administrator reported their faculty were not where they needed to be in relation to "knowledge" and the overall thinking was that a knowledge level of formative assessment was a work in progress. Many of the administrators who ranked their faculty knowledge as "fair" typically identified that as administrators he or she needed to do a better job providing guidance, providing professional development or monitoring the process.

Administrator Perceptions of Teacher Use Levels

Fifteen West Virginia CTE Administrators were asked, via phone interview, to report on his or her perception of the teachers under his or her direct supervision. The administrators were asked specifically to report on the perceived level of use of formative student assessment practices. A five point scale ranging from "Seldom" to "Very Frequently" was used to record responses. One (7%) administrator reported "Seldom," three (20%) administrators reported "Sometimes," ten (67%) administrators reported "Regularly" and one (7%) administrator reported "Frequently."

Related to use, CTE administrators were asked to provide examples of formative assessment practices that the administrator observed teachers utilizing. Eight administrators observed "observation," five administrators observed "checking for understanding," four observed "questioning," two observed "use of rubrics," two observed "use of exit slips," one reported "asking to summarize," one reported "written or oral reflection," one reported "analysis of own work," one reported "demonstration," one reported "peer assessment," and one reported "use of a parking lot."

Administrators were asked to report the formative student assessment practices being used most frequently. Responses were redirecting or providing feedback based upon observation or checking for understanding; multiple choice questions; modules built into on-line curriculum; hands-on demonstrations; and observation. One administrator did not respond to the question related to levels of use. Eight of the fifteen administrators reported summative assessment practices as examples of formative assessment practices observed being used by teachers.

Administrators were asked to report on whether he or she observed differences in the levels of use of formative assessment practices based on CTE clusters, and to indicate which cluster he or she observed the most frequent or least frequent levels of use. The health science cluster was reported as the highest among the most frequent with eight responses. Hospitality and Tourism had six responses; Architecture and Construction had four responses; Manufacturing, Human Services, Information Technology, Law & Public Safety, and Transportation & Distribution had two responses each; and Agriculture & Natural Resources had one response. Five responses did not fit into a single cluster area, but multiple cluster areas: "shop area / hands-on labs" (3), "low wall programs" (1), and "technical and industrial" (1).

Cluster areas reported by administrators as seeing the least frequent use were Human Services, Information Technology, and Transportation & Distribution each receiving two responses. Manufacturing, Architecture & Construction, and Health Science each receiving one response. Three responses did not fit into a single cluster area, but multiple cluster areas: “shop and trade classes” (2) and “high wall classes” (1). One administrator responded, “Weaker teachers use less and stronger teachers use more.” A second administrator responded she did not believe use was influenced by the cluster, but by the individual teacher. Levels of use are determined by the knowledge and skill of the individual teacher as this administrator saw different levels of use in all of her teachers. Other than one or two strong teachers, she saw equal levels of use in all cluster areas.”

Administrator Supports and Barriers

A total of 15 phone interviews were conducted with career and technical education administrators representing county career centers, comprehensive high schools, and multi-county career centers. Interview Question #5 asked administrators to identify factors supportive to their teachers’ implementation of formative student assessment (Appendix M & N). Administrators interviewed identified 26 factors which fell into five categories (see Table 19). Professional development factors comprised 46% (n = 12) of the total number of factors identified. One administrator stated, “The new instructors are doing better because the new training through WVU-Tech is doing a better job exposing new instructors to formative assessment, which in turn makes these new instructors willing to try, it also increases understanding for intentional or planned use.” A second administrator indicated professional

development offers, “A better understanding of what formative assessment is and strategies to use in implementation.”

Time factors comprised 23% (n = 6) of the responses. One administrator indicated a support factor was, “…support from CTE folks at the WVDE; involvement in craft committees, the more active craft committees are willing to assist the teachers in judging or grading student work/projects,” thereby leaving more time for teachers to utilize formative assessment strategies. Another administrator pointed to, “Time to develop, plan, and master formative assessment strategies incorporated into daily teaching time.” Support from local administrators, the West Virginia Department of Education (WVDE), and local program specific advisory committees (CRAFT) comprised 15% (n=4) of the total number of factors identified. One administrator stated, “The administrator is providing support and the walk-through process and professional development is critical.” A second administrator indicated, “Providing monetary support and setting up webinars” was supportive to teacher implementation of formative assessment.

The improved WVU-Tech process comprised 7% (n=2) of the total number of factors identified. One administrator indicated, “WVU-Tech, in the last three to four years, has a better handle on formative assessment; some of the more experienced instructors are doing a good job with formative assessment, but not sure they are aware they are using it.” Another administrator indicated, “Professional development needs to show teachers how and make them comfortable using formative assessment.” The Tech Centers that Work (TCTW) process comprised 7% (n = 2) of the total number of factors identified. One comment was that the administrator, “Used TCTW as a professional development platform.” Another administrator indicated, “Certain

initiatives such as TCTW / SREB focus to train CTE faculty with skills more familiar to the academic setting.

Table 19
Administrator Identified Categories of Support

	n*	%
Professional Development	12	46.2
Time	6	23.1
Support	4	15.4
Improved WVU-Tech Process	2	7.7
Tech Centers That Work (TCTW)	2	7.7

*n = 26 duplicated count

During the 15 phone interviews conducted with career and technical education administrators representing county career centers, comprehensive high schools, and multi-county career centers, Interview Question #6 asked administrators to identify factors they saw as barriers to their teachers' implementation of formative student assessment (Appendix M & N). Administrators interviewed identified 19 factors which fell into four categories (see Table 20). Factors related to time comprised 47 % (n = 9) of the total number of factors identified. One administrator stated, "Time – enough time to do what is required, little time left to work on learning new strategies." A second administrator pointed to, "Lack of time or staff development."

Teachers' lack of understanding and knowledge was the category comprising 32% (n = 6). One administrator indicated, "Teachers do not have complete knowledge on formative assessments. Teachers don't know what they don't know." A second administrator indicated, "Teachers lack basic knowledge that is gained through professional development. Many of instructors do not have a basis from an

educational program. Most of our instructors are out of industry and come to us without any student teaching experience."

A lack of professional development specific to formative assessment was identified by 16% (n = 3). One administrator stated, "Lack of professional development time to focus on formative assessment strategies." Another administrator said, "We have a tendency to teach as we have been taught or as it has been modeled for us as students over the years. Unfortunately, lots of emphasis on summative (written quizzes and test) and little emphasis on formative assessment." One administrator indicated that "teachers are not willing to implement formative assessment strategies."

Factors identified as both supports and barriers to formative assessment were time and professional development. Time and professional development were identified as both supports and barriers as the number one and number two categories, respectfully.

Table 20
Administrator Identified Categories of Barriers

	n*	%
Time	9	47.4
Teachers' Lack of Understanding & Knowledge	6	31.6
Lack of Specific Professional Development	3	15.8
Teachers not willing to implement	1	5.3

*N = 19 duplicated count

Instrument Reliability

The internal consistency of the *Formative Student Assessment in Career and Technical Education* survey instrument (see Appendix C), Part B, was tested using Cronbach's alpha coefficient. The alpha coefficients for the levels of knowledge and use for each of the 20 formative assessment strategies were calculated providing total levels of knowledge and use alpha coefficients. The internal consistency (r) for the level of knowledge for the total 20 formative assessment strategies was .904 (M = 73.65, SD = 12.17). The internal consistency for the knowledge total suggests a desirable level of reliability (above .8) overall for the knowledge scale. The internal consistency (r) for the level of use for the total 20 formative assessment strategies was .871 (M = 68.40, SD = 12.38). The internal consistency for the use total suggests a desirable level of reliability (above .8) overall for the use scale.

Summary of Findings

The purpose of this section is to summarize findings from a study examining the levels of knowledge and levels of use of formative student assessment practices among teachers in West Virginia career and technical education facilities. The study sought to determine if there were differences in levels of knowledge and use of formative student assessment practices based on selected independent variables. The study also sought to identify factors perceived by teachers and administrators to be either supports or barriers to teacher implementation of formative student assessment, and the perceived teacher knowledge and use of formative student assessment practices by West Virginia career and technical education administrators.

West Virginia CTE teachers described their level of knowledge regarding the 20 formative student assessment practices as good or very good. When asked to describe

their frequency of use of the same 20 formative student assessment practices, teachers most often reported a use level of fair to very good, with good being the most often used indication by the responding teachers. The same patterns were evident when both knowledge and use responses were analyzed by program groups and totals.

Significant differences in knowledge levels were found for 19 separate formative student assessment practices across the five independent variables investigated (program groups, teaching experience in CTE, total years of teaching experience, type of facility, and secondary/post-secondary level). Significant differences in levels of use were found for 18 separate formative student assessment practices across the five independent variables investigated (program groups, teaching experience in CTE, total years of teaching experience, type of facility, and secondary/post-secondary level).

Teachers most often identified WVDE/CTE initiatives and administrative and peer teacher support as factors supporting implementation of formative student assessment practices. Teachers most often identified the lack of time, student initiative, structure or organization, professional development, curriculum direction, funding, administrative support, and technology as the major barriers to implementation. Administrators rated their teachers' knowledge of formative student assessment at a fair to good level and their level of use, between sometimes and regularly. Administrators reported observation, checking for understanding, and questioning as the most frequent types of formative assessment implemented. Health sciences, hospitality and tourism, and architecture were identified as the clusters which were the highest users of formative assessment strategies.

Administrators pointed most frequently to quality professional development, adequate time, and adequate support as the factors supporting implementation of formative assessment strategies. Administrators identified insufficient time, teachers' lack of understanding and knowledge, and lack of professional development specific to formative assessment, as the major barriers to implementation of formative assessment practices.

The *Formative Student Assessment in Career and Technical Education* survey instrument, Part B, was tested for internal consistency for the 20 formative student assessment strategies comprising the knowledge and use scales. Cronbach's alpha coefficient results indicate a desirable level of reliability overall for the internal consistency for both scales.

CHAPTER FIVE: CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

This chapter reviews the purpose of the study, methods, and the demographic data. A summary of the study findings is presented. This chapter ends with a presentation of study conclusions, a discussion and implications section, and recommendations for further research.

Purpose of the Study

The purpose of this study was to investigate career and technical education teachers' level of knowledge and use of formative student assessment practices in the classrooms and laboratories of comprehensive high schools and technical education centers across West Virginia. In addition, this study examined factors identified by teachers as supports or barriers to implementation of formative student assessment. Finally, this study described administrator perspectives on teachers' knowledge and use of formative student assessment practices and explore administrator perspectives on identified supports and barriers to their teachers' implementation of formative student assessment practices. The following research questions guided the study:

1. What is the West Virginia career and technical education teachers' level of knowledge about formative student assessment practices?

2. What is the West Virginia career and technical education teachers' level of use of formative student assessment practices?

3. What differences, if any, are there in the knowledge levels of formative student assessment practices among career and technical education teachers based on selected demographic and attribute variables?

4. What differences, if any, are there in the use levels of formative student assessment practices among career and technical education teachers based on selected demographic attribute variables?

5. What factors, if any, do West Virginia career and technical education teachers identify as supports and / or barriers to implementation of formative student assessment?

6. What is the West Virginia career and technical education administrators' perception of teacher level of knowledge of formative student assessment practices?

7. What is the West Virginia career and technical education administrators' perception of teacher level of use of formative student assessment practices?

8. What factors, if any, do West Virginia career and technical administrators identify as supports and / or barriers to their teachers' capacity to implement formative student assessment?

Data Collection

The population for this study included West Virginia career and technical education (CTE) teachers in the sixteen career and technical program clusters as listed in Appendix B who are teaching in either a county CTE center or a multi-county CTE center. CTE teachers in comprehensive high schools were included for any county whose students do not have the opportunity to attend either a county CTE center or a multi-county CTE center. At the time of this study, the WVDE reported 713 career and technical education teachers in secondary and post-secondary programs who meet the sample criteria for inclusion (WVDE, 2014). Four hundred surveys were returned reflecting a response rate of 56.1%. Of those, 397 surveys were usable, reflecting a usable survey response rate of 55.7%. In addition, a sample of building level

administrators having supervisory responsibility over career and technical educators were interviewed. The administrator sample was stratified by facility type.

This study was completed using a mixed methods design, including use of a participant survey and interviews with administrators. Because the survey data were collected from each group of subjects at one point in time, a one-shot, cross-sectional survey was used (Fink, 2003).

There was one survey instrument for teachers and an interview protocol for administrator interviews. The teacher survey instrument, *Teacher Survey: Formative Student Assessment in Career and Technical Education,* was a researcher-developed questionnaire (see Appendix C) which consisted of three parts. Part A requested demographic and attribute information about respondents. Part B requested respondents to use two five-point scales to indicate their levels of knowledge use of formative student assessment practices. The third section, Part C, contained two open-ended questions requesting respondents to identify factors seen as supporting/facilitating or seen as barriers to implementation of formative student assessment in the career and technical education classroom and laboratory.

One-sample t-tests were used to determine if significant differences existed between levels of knowledge and use among respondents. A one-way analysis of variance and an independent samples t-test were used to determine if significant differences existed in level of knowledge and use of formative assessment practices based upon selected demographic variables. Emergent category analysis was used to analyze open-ended items in the teacher survey and administrator interview data.

An interview protocol, *CTE Formative Assessment Administrator Interview Protocol,* was developed for use in interviews with a sample of administrators who

were in direct supervisory roles over career and technical education teachers in the identified career cluster areas. The administrator sample included administrators representing county career and technical centers, multi-county career and technical centers, and comprehensive high schools where students did not have opportunity to attend classes at a county or multi-county career center. Fifteen administrators, taken from the list of twenty administrators who responded favourably by email to participate in a phone interview, were interviewed by phone. Each administrator was asked the eight questions and the co-principal investigator recorded responses in field notes.

Summary of Findings

In general, West Virginia's CTE teachers described their level of knowledge regarding the individual 20 formative student assessment practices, program groups, and totals as good to very good. When asked to describe their frequency of use of the same individual 20 formative student assessment practices, program groups, and totals; teachers most often reported a use level of fair to very good, with good being the predominant indication by the responding teachers.

There were significant differences in levels of knowledge found in 19 separate formative student assessment practices across the five independent variables consisting of program groups (reflection/learning logs, student presentations/teach backs, project based units, and rubrics), teaching experience in CTE (observation, questioning, discussions, project-based units, student portfolio, small group collaborative, daily checklist, and rubrics), total years of teaching experience (observations, questioning, project-based units, student portfolio, and rubrics), type of

facility (job/workplace simulations/cases), and secondary / post-secondary level(think/ pair/ share/gallery walks).

There were significant differences in levels of use found in 18 separate formative student assessment practices across the five independent variables consisting of program groups (observation, reflection/learning logs, and project-based units), teaching experience in CTE (individual student responders, literacy/numeracy assessments, bell ringers/exit slips, and think/pair/share/gallery walks), total years of teaching experience (individual student responders, student portfolios, bell ringers/exit slips, and think/pair/share/gallery walks), type of facility (literacy/numeracy assessments, daily checklist, rubrics, and bell ringers/exit slips), and secondary / post-secondary level(project-based units, student portfolio, and team individual roles) . Only three assessment practices had significant differences in both knowledge and use in the same variable (reflection / learning logs – program groups; project-based units – program groups; and student portfolio – total years of teaching experience). The total in the use variable of type of facility was found to have a significant difference. All other totals were not found to have a significant difference in each variable category of knowledge and use.

Factors which support the implementation of formative student assessment practices are WVDE / CTE initiatives and administrative and peer teacher support, with other contributing support factors noted to include technology / on-line resources, teacher training / professional development, and lab / shop / clinical opportunities. Factors most often identified as barriers to the implementation of formative assessment practices included those related to lack of sufficient time, lack of student initiative, lack of structure or organization, lack of professional

development, lack of curriculum direction, lack of funding, lack of administrative support, and lack of technology.

Administrators rated their teachers' knowledge of formative student assessment as fair to good. The same administrators rated the level of use as sometimes to regularly. Administrators reported seeing observation, checking for understanding, and questioning as the most frequent types of formative assessment practices being implemented. Health sciences, hospitality and tourism, and architecture and tourism were identified as the program clusters most frequently using formative assessment practices.

Administrators identified factors which support their teachers' implementation of formative student assessment practices as quality professional development, adequate time, and adequate support. When ask to identify barriers to teachers' efforts to implement formative student assessment, administrators identified insufficient time, teachers' lack of understanding and knowledge, and lack of professional development specific to formative assessment.

Conclusions

Data collected as a part of this study were sufficient to support the following conclusions:

Teachers' Level of Knowledge

West Virginia's career and technical education teachers reported a good to very good level of knowledge regarding formative student assessment practices. Career and technical teachers display a belief that, through a variety of resources, they have developed a satisfactory level of knowledge regarding formative student

assessment. An analysis of respondent mean scores for the 20 individual formative assessment practices revealed three levels of response: three practices had mean scores equal to or less than 2.99, 11 practices had mean scores between 3.31 and 3.98, and six practices had mean scores between 4.0 and 4.13. Eighteen of the 20 practices produced mean scores that were significantly different when the means were compared to the mean from a hypothetical normal distribution.

Teachers' Level of Use

West Virginia's career and technical education teachers reported a range of fair to very good level of use of formative student assessment practices. Career and technical teachers display a belief that, through a variety of resources, they have developed a fair to very good level, with good being the predominant level of use regarding formative student assessment practices. An analysis of respondent mean scores for the 20 individual formative assessment practices revealed three levels of response: Six practices had a mean less than 2.99, nine practices had mean scores between 3.0 and 3.99, and five practices had mean scores between 4.0 and 4.5. Eighteen of the 20 practices produced mean scores that were significantly different when the means were compared to the mean from a hypothetical normal distribution.

Knowledge Levels Based on Demographic and Attribute Variables

Overall, program groups, teaching experience in CTE, total years of teaching experience, type of facility where teaching, and level taught (secondary or post-secondary) do not account for significant differences in teachers' levels of knowledge about formative assessment practices. Significant differences in teacher knowledge based on these variables were found in 19 of 100 possible comparisons.

Use Levels Based on Demographic and Attribute Variables

Overall, program cluster groups, teaching experience in CTE, total years of teaching experience, type of facility where teaching, and level taught (secondary or post-secondary) do not account for significant differences in teacher levels of use about formative assessment practices. Significant differences in teacher use of formative assessment practices based on the variables was found in 18 of 100 possible comparisons.

Teacher Supports and Barriers

Factors most supportive of implementation of formative student assessment practices were WVDE / CTE initiatives and administrative and peer teacher support. Other contributing support factors included technology / on-line resources, teacher training / professional development, and lab / shop / clinical opportunities. Barriers to the implementation of formative assessment practices included lack of sufficient time, student initiative, structure or organization, professional development, curriculum direction, funding, administrative support, and technology.

Administrator Perceptions of Teacher Knowledge

Administrators reported their teachers' level of knowledge of formative student assessment practices ranged from "fair" to "good" to "very good" with "good" being reported most often. Administrators expressed concern regarding their teachers' level of knowledge of formative student assessment and indicated a need for additional support to strengthen teachers' knowledge levels.

Administrator Perceptions of Teacher Use Levels

Administrators' reported their teachers' level of use of formative student

assessment practices ranged from “seldom” to “regularly” to “frequently” with regularly” being reported most often.

Administrator Supports and Barriers

Factors most supportive of the implementation of formative student assessment were quality professional development, adequate time, and adequate support. Barriers to the implementation of formative assessment practices included lack of time, teachers’ understanding and knowledge, and professional development specific to formative assessment.

Discussion and Implications

The study findings provide a foundation on which the West Virginia formative student assessment model may be evaluated and the alternative teacher certification process made more relevant for career and technical education teachers. Also, findings will inform state leaders as they develop academies for career and technical education administrators. In addition, the findings will assist in the overall strengthening of the understanding by teachers and administrators of summative and formative assessment leading to balanced assessment which is a part of the teacher evaluation system. Finally, the findings will lead to an increased effort to strengthen professional support structures designed to increase teacher competency and utilization of formative student assessment practices. With an overall response rate to the teacher survey at 56.1%, the themes that emerged from the open-ended teacher survey items, and the themes that emerged from the administrator interview protocol imply an interest in the topic of formative student assessment by teachers and administrators throughout the state of West Virginia.

The number of participating teachers distributed by program clusters identifies the majority of teachers coming from health science; architecture and construction; transportation, distribution and logistics; and education and training (West Virginia Department of Education, 2015). Although this study targeted CTE teachers, it is not known how many "academic" teachers participated in the study. As directors and principals of comprehensive high schools, county career and technical centers, and multi-county career centers consented for their school to participate in the survey which was accompanied by specific directions; it is possible that a number of surveys were completed, for example, by English, mathematics, options pathway and special education teachers. These teachers completed a more traditional teacher preparatory program and likely identified on the survey being associated with a CTE cluster area such as education and training or science, technology, engineering, and mathematics. There was no item on the teacher survey in which teachers were ask to identify their type of teacher preparatory program (see Appendix C).

Findings for both years of teaching experience in CTE and total years of teaching experience found that the more years of teaching experience the higher the self-perception of teachers in both knowledge and use of formative assessments. Study results indicated no significant differences found in the total knowledge or use levels for both years of teaching experience in CTE and total years of teaching experience. Beginning with the 2014 – 2015 WVU-Tech new teacher cohort, formative assessment was emphasized through the utilization of the SREB curricula (Sothern Regional Education Board, 2015). During the same year, the WVDE launched new initiatives consisting of enhanced CTE, revised Highs Schools That Work (HSTW), introduced Tech Centers That Work (TCTW), launched Simulated Workplace, and began the embedded academic credit in CTE programs initiative

(West Virginia Career and Technical Education Administrators, 2013). All of the new initiatives provided extensive professional development for seasoned as well as new teachers. The professional development that accompanied each new initiative came with the directive that related assessments were moving in a more formative direction. Seasoned teachers became familiar with the vocabulary associated with formative assessment and the new teachers returned from the alternative teacher certification trainings with a better grasp of formative assessment strategies and were able to incorporate them into instructional practices and model them for seasoned teachers.

Of the 397 teacher surveys returned, 353 respondents reported participation in the simulated workplace initiative and 355 in the portfolio / capstone initiative. Beginning in 2014, West Virginia CTE began making a transition to a more formative assessment model, breaking ties with the Global 21 Performance Assessment system (WVDE, 2009). The Portfolio / Capstone process (CTE Portfolio, n.d. and CTE Capstone, n.d.) was designed as a formative assessment system to allow benchmarked information to be entered throughout a student's experience in a CTE program of study (West Virginia Career and Technical Administrators, 2013). The use of the portfolio was one of the listed practices in this study. This study looked at the capacity of West Virginia's CTE instructors to successfully transition to portfolio / capstone process based upon their overall knowledge and use of formative assessment strategies. Based upon survey responses, 355 of 397 survey respondents participate in the portfolio / capstone initiative indicating participation in the "more formative" assessment process (see Table 3).

The emphasis of the portfolio / capstone initiative is strongly advocated by Ratzel (2011) citing the value of student understanding of progress. Student investment in developing the body of evidence that shows progress is inherent in the

portfolio /capstone process. Hafer (2013) is cautionary, reminding teachers that portfolio is an ongoing, continuous process that cannot be done quickly or only at the end. The portfolio process needs frequent feedback that can only result from the teacher and student meeting periodically throughout the process.

Teacher respondents reported on a five point scale (1 = minimally effective, 3 = moderately effective, and 5 = very effective) that the professional development sources that were the most effective were online resources with a mean response of 4.03 and private vendor professional development with a mean response of 3.74. Professional development delivered from the school or county level (mean response of 3.54) and from the WVDE (mean response of 3.49) were both reported lower in effectiveness compared to the online resources and the private vendor professional development (See Table 4). Teacher respondents contradicted this order of effectiveness according to their narrative responses to Part C of the teacher survey where the first question asked each teacher to identify supports to the successful implementation of formative student assessment. The highest reported category of support was WVDE / CTE initiatives and administrator and peer teacher support (see Appendix K). To better understand this contradiction, respondents would need to specifically identify the professional development sources referred to regarding online resources and private vendor professional development. It is likely that these sources of professional development are associated with WVDE or county level professional development initiatives.

The comparison between the CTE teachers' overall knowledge and use levels of formative student assessment practices are consistent with each other. On a five-point scale, the assessment practices that respondents reported being the most familiar with were discussions (4.19), project-based units (4.14), observation (4.13),

questioning (4.09), student presentations (4.08), and job / workplace simulations (see Table 5). The assessment practices reported as being used most often were observation (4.26), discussions (4.24), questioning (4.20), job / workplace simulations (4.06) and project-based units (4.0) (see Table 6). These assessment practices lend well to the nature of instruction in career and technical education. Teachers, likely, identify easily with these strategies as methods used regularly in their CTE program areas.

The same comparison between the assessment practices that respondents reported being the least familiar with were think-pair-share / gallery walks (2.74), student led conferences (2.97), and individual student responses (2.99) (see Table 5). The assessment practices reported as being the least often used were think-pair-share / gallery walks (2.27), individual student responders (2.46), student led conferences (2.60), reflections / learning logs (2.92), and literacy / numeracy (2.95) (see Table 6). Knowledge and use are consistent with each other and the assessment strategies reported as least familiar or used are strategies that do not lend easily to CTE without professional development specific to these strategies. In relation to the high number of respondents that fall in the industrial CTE program areas, these are strategies that will likely be regarded as more "academic" in nature. Research findings above (most / least familiar and used) reflects Fullan (2002) and Heritage (2007) who assert the importance of supporting teachers in developing communication and observation skills that allow them to move fluidly between and among assessment strategies.

The two program groups that reported the highest levels of knowledge consistently over the twenty assessment practices were group one (business) and group five (information, technology and inquiry). There was no significant difference found in the total knowledge levels across the program groups. Referring to Appendix

D, it is possible that groups one and five consist of teachers who completed a traditional teaching preparatory program and are least likely to be hired directly from business and industry. The program with the lowest knowledge mean average across the 20 assessment practices was the building trades, industrial, and agriculture. When looking at the highest use levels per the average mean scores reported across the 20 assessment practices, program cluster group two (welfare and workforce) and three (health and safety) reported the highest levels of use. Group one ranked third and group five ranked fifth respectively, in relation to use levels. The group with the least reported use level was group five (information, technology and inquiry).

There is an obvious disconnect between self-reporting of knowledge and use levels. There were no significant differences found in the total knowledge or use levels across the program groups. It is possible that program group two consist of academic teachers such as English, mathematics, special education and options pathway teachers identified with the program cluster group of Education and Training. However; other than Education and Training, it is possible that the majority of teachers from groups two and three were representing alternative certified teachers. Nowhere on the teacher survey instrument were the assessment practices defined or explained. Teachers were basing their understanding of each assessment practice upon prior experiences with the terminology that may not have always been accurate. When identifying with use levels, alternatively certified teachers likely favored assessment practices that they identified with hands-on learning.

Regarding years of teaching experience, the study results as reported for both knowledge and use were as to be expected if teachers develop more skills and knowledge with each passing year of teaching experience. Study results indicated no significant differences found in the total knowledge or use levels for both years of

teaching experience in CTE and total years of teaching experience. There are many factors that would contribute to this, with the delivering of quality professional development over time being the major factor, leading to more frequent use. As reported, there is no evidence to support changing alternative teaching certification models positively influencing teachers with one to two years of experience, but possibly teachers with three to six years of experience.

These findings reinforce the view of Sawchuck (2011) who identifies long term professional development as key to altering teaching practices. His research revealed that teachers need between 30 and 100 hours of sustained training before evidence can be observed that instructional practice has positively changed.

Looking at the levels of knowledge and use based upon facility type, the ranking was the same for both knowledge and use based upon the average mean across the 20 formative assessment practices. The highest knowledge and use levels were reported at county career centers, followed by multi-county career centers. The least was consistently reported at comprehensive high schools. CTE teachers in comprehensive high schools participate in the same professional development as the academic teachers, which historically have been focused on high-stakes summative assessment. Also, a higher percentage of the CTE teachers at the comprehensive high schools are likely to have completed a traditional teacher preparatory program because comprehensive high schools tend to house limited program cluster areas such as business, agriculture, the arts, and stem. County career centers benefit from being able to participate in both county level professional development and trainings specific for the center. Multi-county career centers are generally limited to trainings specific to the center where lack of sufficient time becomes a factor in scheduling quality professional development.

The difference in mean scores between secondary and post-secondary teachers was not significant. The respondent size for the post-secondary group was substantially smaller (61 as opposed to 333) and it is likely that many of the post-secondary teachers represented the health science program cluster group. In regards to knowledge levels, secondary teachers reported a higher mean score for 12 of the 20 assessment practices. Secondary teachers reported a higher mean score for only 10 of the 20 assessment practices.

Teachers reported the initiatives directed from the WVDE and SREB as the highest ranking support for use of formative student assessment in their programs (see Appendix K). Teachers have identified such initiatives as Simulated Workplace and Enhanced CTE as state initiatives that that have encouraged the use of formative assessment practices. Teachers may readily identify the term "formative assessment" with these initiatives because those terms are used during trainings at the state level. Administrative and peer teacher influence was the second leading identified support, which is a key component in the implementation of Simulated Workplace and the Enhanced CTE initiative. Vocabulary such as "project-based learning" is often associated with the Enhanced CTE trainings and the focus of Simulated Workplace and the Portfolio / Capstone assessment has been to lead to a more formative approach of assessing program effectiveness. It is interesting that technology and online resources were identified as the third ranking support as many of the quizzes and checking for understanding embedded into the on-line resources funded through the WVDE, are summative in nature. Dixon and Williams (2001) mused that teachers are not able to distinguish clearly between formative and summative assessments, often mis-identifying which type of assessment they were actually conducting.

Teachers reported the highest barriers to formative student assessment being lack of sufficient time to implement (see Appendix L). The second highest response level was student related, in that students are not receptive to formative assessment. The third highest response level was related to class structure being too short to implement. Lack of specific professional development was the fourth ranking barrier. The number of responses in these categories indicates an overall lack of understanding of teachers regarding the concept of formative student assessment use in relation to summative assessment concepts. Formative assessment practices are strategies utilized by teachers to gain an overall understanding of their students understanding of concepts, knowledge and skills. In many ways, formative assessment is an embedded part of the instructional process. Formative assessment should be ongoing throughout the teaching and learning process regardless of the length of time available during the class period.

This being said, looking at the 20 formative student assessment practices utilized in this study, there are practices that are more natural to the teaching and learning process such as observation, questioning and discussions. There were other practices among the 20 that would require professional development to add to a teacher's skill set and would require specific efforts to plan for implementation. Overall, formative student assessment should be a naturally occurring event in comparison to summative assessment practices.

In order to provide an environment conducive to formative assessment a teacher must have the opportunity to develop the appreciation for embedding assessment into the teaching process, rather than keeping it separate form instruction. Stiggins (2002) described educators as being "unschooled" in assessment principles. Eckstein (2014) believed that today's CTE students need constant feedback and real-

world application of learned skills. Teacher preparation must incorporate sound formative assessment to achieve teacher efficacy and maximized student support.

During the phone interviews, CTE administrators were asked to give examples of formative student assessment practices they observed their teachers using in the classrooms / program areas. Ten of the 15 administrators reported assessment strategies that were summative in nature (see Appendix M). This leads to a conclusion that CTE administrators do not have a good understanding of the differences between summative and formative assessments. Moss, Brookhart, and Long (2013) found that the leadership of administrators was critical to the implementation of formative classroom assessment in their buildings. In order for formative assessment to become regular classroom practice, administrators must understand what formative assessment looks like in a classroom and be able to coach teachers in its effective use. Based upon the administrator sample participating in this study, it is evident that there is a need for continuing professional development for administrators in the area of student assessment. If a school administrator is indeed functioning as an instructional leader, the administrator must have a grasp on formative assessment and be able to effectively coach teachers in its use. Leithwood, Louis, Anderson, and Wahlstrom (2004) promote leadership and classroom instruction as the most important among factors impacting student achievement.

The West Virginia Educator Evaluation System (Teacher, n.d.) currently embeds assessment into Elements 1.3 and 3.3 of the teacher evaluation rubric. Element 1.3 focuses on using a balanced assessment approach to guide student learning. In this element, the teacher is to design and use formative and summative assessments, to communicate assessment criteria, and to share assessment data with students. Element 3.3 focuses on adjusting instruction based on a variety of

assessments and student responses. In 3.3, the teacher is to recognize missed opportunities to modify instruction, monitor student progress using a variety of assessments, examine student data, and use formative assessment to provide whole group interventions. Such a system utilizing both formative and summative assessment is referred to as a "balanced assessment system." In order for educators in West Virginia to implement a balanced assessment system in their schools and classrooms, West Virginia administrators and teachers will need specific professional development geared towards the effective implementation of a balanced assessment system. According to Spoerk (2005), CTE assessments should be authentic, varied, and formative. Spoerk believes accountability demands a multi-faceted assessment process.

A question that was asked of administrators was whether there were any noticeable differences in use levels based on CTE clusters (see Appendix M). There were as many administrators who identified non-industrial programs as there were administrators who identified industrial programs. One administrator indicated he did not see any significant difference and felt all teachers used formative assessment in one form or another. This administrator summed it this way, "Weaker teachers use formative assessment less and stronger teachers use it more." This statement verifies the need as indicated to administrator responses to question five, six and seven that professional development is the main factor needed to support the teachers' efforts to implement formative student assessment in CTE programs. Professional development, along with more contracted time set aside for the offering of training specific to assessment, is critical for building teacher and administrator capacity to effectively deliver a balanced assessment system. Most of the administrators identified that, of the professional development which occurs related to formative assessment, most is

provided at the local level, and is more of the one-and-done type of professional development. Two administrators suggested that it would be beneficial for the WVDE – Office of CTE to return to the practice of offering targeted professional development during summer conferences that focused on instructional and assessment practices and were delivered in small groups per the specific program areas. In addition to professional development on assessment, Boston (2002) advocates for teachers to be afforded time and support necessary to reflect and make changes in their practice.

It was not surprising that a high percentage of respondents (88.9%) reported participating in Simulated Workplace and 89.4% reported participation in the Portfolio / Capstone process (see Table 3). Both of these initiatives have been the focus for training and professional development at the state level during the past five years. Both initiatives have been connected to a more formative approach to assessing program effectiveness. Due to the connection between these initiatives and formative assessment, this would provide support for increasing specific professional development targeted towards specific formative assessment at the state level.

Looking at the perceptions of effectiveness of selected professional development sources (Table 4), 97.2% of the training was reported to occur at the school or county level. This would support the conclusion that professional development at the school or county level needs to be specifically targeted and that administrators need to have a good understanding of formative assessment practices. School-level mentoring (83.1%) and WVU-Tech Training (72.5%) both are critical to the teachers entering teaching from the alternative teacher certification track. This is supportive of developing better coordination between the local CTE administrator and the teacher-educator from WVU-Tech to develop an effective mentoring program

where the two entities work together to target and remediate identified weaknesses. Noyce and Hickey (2011) argued that committed administrator leadership is key to realizing formative assessment goals. The leveraging of resources and collaboration are essential to meaningful assessment.

New, intermediate and seasoned teachers need support in order to develop the knowledge and skills needed to utilize formative student assessment practices effectively with students. Findings from this study, through use of the survey instrument (*Formative Student Assessment in Career and Technical Education)* and the CTE Formative Assessment Administrator Interview Protocol, provide guidance for the development of targeted professional development. This study has identified needed priorities for strengthening the formative assessment capabilities of teachers in career and technical education.

Recommendations for Further Research

This study investigated and provided insight into the levels of knowledge and the levels of use of formative student assessment practices by career and technical education teachers in the state of West Virginia. The purpose of this study was to investigate career and technical education teachers' level of knowledge and use of formative student assessment practices in the classrooms and laboratories of comprehensive high schools and technical education centers across West Virginia. In addition, this study examined factors identified by teachers as supports or barriers to implementation of formative student assessment. Finally, this study described administrator perspectives on teachers' knowledge and use of formative student assessment practices and explored administrator perspectives on identified supports and barriers to their teachers' implementation of formative student assessment practices.

Based on study findings, the following recommendations for further research are provided:

1. This study focused on career and technical education teachers in county career and technical centers, multi-county career and technical centers, and only comprehensive high schools not having access to either a county career and technical center or a multi-county career and technical center. Expanding this study to include the remaining career and technical education teachers at the comprehensive high schools that do have access to a county career and technical center or multi-county career and technical center in the study population may provide additional data that would support general conclusions and implications regarding teacher capacity to implement formative student assessment across the board in career in technical education.
2. This study focused on career and technical education teachers. Extending this study to include secondary academic education teachers or to include academic education teachers across program levels (K – 12) may provide additional data that would support conclusions and implications regarding overall teacher capacity to implement formative student assessment practices in all areas of K – 12 education.
3. Administrators in this study reported on their perceptions of their teachers' knowledge and use of formative student assessment. A study investigating administrators' knowledge and experience levels with respect to formative student assessment practices may reveal current capacity and training needs of administrators to provide support to their teachers in implementing formative student assessment practices.
4. This study utilized a survey instrument with two open-ended items asking respondents to identify factors perceived as supports and barriers to

implementation of formative student assessment practices. Incorporation of additional qualitative research methods (focus groups and field observations) may provide a more detailed understanding of teacher and administrator perceptions related to formative student assessment.

5. This study was conducted one time, with career and technical education teachers ranging in experience from one year to more than 13 years of experience. To track the progress of teachers going through both the alternative teacher certification process and graduating from the traditional teacher preparatory process, benchmark teacher knowledge prior to their first year of teaching and each year after for the first five years of teaching. The administrator could document use during the first five years with walk-though and observation data. Such a study would provide comparative data to document teacher progress in mastering the formative student assessment skill sets, establish formative student assessment practices as a priority for professional development, and strengthen the administrator's leadership role in monitoring and facilitating the mastery of formative student assessment practices.
6. Building on the findings from this study, conduct a mixed-methods study of administrators and teachers from both career and technical education and academic education to determine best practices and issues related to Element 1.3 (the teacher uses a balanced assessment approach to guide student learning) and Element 3.3 (the teacher adjusts instruction based on a variety of assessments and student responses) from the West Virginia Teacher Evaluation Rubric. Such a study would add to the literature and would provide guidance to administrators and teachers in strengthening balanced assessment systems consisting of both formative and summative assessment practices.

Concluding Remarks

Study findings provide a foundation for career and technical education administrators and teacher educators to address formative student assessment practices in teacher induction and professional development programming. West Virginia's career and technical education teachers responding to the survey described their level of knowledge about formative student assessment practices as "good" to "very good", and their levels of use of those practices as "fair" to "good" to "very good." Respondents identified factors which they considered to be supports or barriers to their efforts to implement formative student assessment practices in the classroom.

Administrators rated their teachers' knowledge of formative student assessment as "fair" to "good" and the level of use as "sometimes" and "regularly." Administrators identified factors which were supports and barriers to their teachers' implementation of formative student assessment practices. Findings describe the levels of knowledge and use of formative student assessment practices from a statewide sample of teachers, providing a foundation for administrators to include formative student assessment as a key component to teacher training programs and identified professional development needs.

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APPENDICES

Appendix A: Institutional Review Board Approval Notification

Office of Research Integrity FWA 00002704
Institutional Review Board
One John Marshall Drive IRB1 #00002205
Huntington, WV 25755 IRB2 #00003206

November 11, 2015

Ron Childress, Ed.D.
College of Education and Professional Development

RE: IRBNet ID# 824828-1
At: Marshall University Institutional Review Board #2 (Social/Behavioral)

Dear Dr. Childress:
Protocol Title: [824828-1] Teacher and Administrator Perspectives on Formative Student Assessment in Career and Technical Education: Implications for Professional Development Programming for Career and Technical Teachers and Administrators.

Expiration Date: November 11, 2016
Site Location: MUGC
Submission Type: New Project APPROVED
Review Type: Exempt Review

In accordance with 45CFR46.101(b)(2), the above study and informed consent were granted Exempted approval today by the Marshall University Institutional Review Board #2 (Social/Behavioral) Designee for the period of 12 months. The approval will expire November 11, 2016. A continuing review request for this study must be submitted no later than 30 days prior to the expiration date.

This study is for student Ryan Haught

If you have any questions, please contact the Marshall University Institutional Review Board #2 (Social/Behavioral) Coordinator Bruce Day, ThD, CIP at 304-696-4303 or day50@marshall.edu. Please include your study title and reference number in all correspondence with this office.

Appendix B: West Virginia CTE Clusters

Career Technical Education Clusters	Concentrations
Agriculture, Food, Natural Resources	• Agribusiness Systems • Natural Resources Systems • Plants Systems • Animal Systems • Food, Products, & Processing • Oil and Gas Extraction and Distribution • Forest Industry • Turf and Landscape Systems • Animal Systems-Vet Science • Power, Structural, & Technical Systems
Education & Training	• Careers in Education
Hospitality & Tourism	• Lodging Management • Pro-Start Restaurant Management • Hospitality & Tourism
Manufacturing	• Electronics Technician • Hydraulic and Pneumatic Trouble Shooting • Industrial Electrical Control System • Industrial Technology • Advanced Career • Computer Integrated Manufacturing • Robotics • Automotive Machining • Machine Tool Technology • Metals Technology • Millwork & Cabinetmaking • Welding
Architecture & Construction	• Carpentry • Electrical Technician • Masonry • Plumbing • Applied Design • Drafting

	• Building Maintenance & Operations • HVAC Technician
Finance	• Business Finance
Human Services	• Prevention Support Specialist • Early Childhood Education • Direct Support Professionals • Health and Safety Leadership • Social Services Assistance • Barbering • Cosmetology • Hair Stylist • Nail Technology • Personal Organizers
Marketing	• Marketing Management
Arts, A/V, and Communications	• Broadcast Journalism • Broadcasting Technology • Radio Broadcasting • Performing Arts • Graphic Communications • Graphic Design • Visual Arts
Government & Public Administration	• JROTC • National Guard Youth Challenge
Information Technology	• Informatics • Oracle • Certified Internet Webmaster • Information Management • Microsoft Computer Application Specialist • Simulation and Game Development • CISCO Networking Academies • Computer Systems Repair Technology
Science, Technology, Engineering, and Mathematics	• Aerospace Engineering • Clean Energy • Energy, Power, and Engineered Systems

	• Innovations in Science and Technology • Pre-engineering – Project Lead the Way • STEM
Business Management & Administration	• Career and Work Skills Training • Accounting • Administrative Support • General Management • Entrepreneurship • High School Business
Health Science	• Allied Health Sciences • Diagnostic Services • Therapeutic Services • Support Services • Health Informatics • Biotechnology Research and Development • Medical Office • Animal Systems – Vet Sciences • Personal Fitness & Wellness Training
Law & Public Safety, Corrections and Security	• Emergency and Firefighting Management Services • Industrial Fire Safety • Law and Public Safety
Transportation, Distribution, and Logistics	• Automotive Technology • Collision Repair Technology • Diesel Equipment Technology • Power Equipment Systems • Global Logistics and Supply Chain Management • Transportation Technology

(West Virginia Department of Education, 2015)

Appendix C: Teacher Survey

Appendix C: Survey Instrument

Formative Student Assessment in Career and Technical Education

Part A. Please answer the following questions:

1. **Check only one below representing your <u>primary</u> cluster of instruction: (Check Only One)**

   _____ A. Agriculture, Food, Natural Resources

   _____ B. Education & Training

   _____ C. Hospitality & Tourism

   _____ D. Manufacturing

   _____ E. Architecture & Construction

   _____ F. Finance

   _____ G. Human Services

   _____ H. Marketing

   _____ I. Arts, A / V, and Communications

   _____ J. Government & Public Administration

   _____ K. Information Technology

   _____ L. Science, Technology, Engineering, and Mathematics

   _____ M. Business Management & Administration

   _____ N. Health Science

   _____ O. Law & Public Safety, Corrections and Security

   _____ P. Transportation, Distribution, and Logistics

2. **Years of teaching experience:**

   _____ CTE only

   _____ Other than CTE

3. **Type of facility in which I teach:**

   _____ A. Comprehensive High School

   _____ B. County CTE Center

   _____ C. Multi-county CTE Center

4. Program level in which I teach:

_____ Secondary

_____ Post-secondary (adult)

5. Indicate any WVDE initiative in which your school has participated in the past three years (check all that apply):

_____ Tech Canters That Work (TCTW)

_____ High Schools That Work (HSTW)

_____ Simulated Workplace

_____ Embedded Credit

_____ Enhanced CTE

_____ Portfolio / Capstone Assessment

_____ Other (Please Specify) _____

6. Professional Development – Following is a list of sources that may have provided professional development for you on Formative Assessment strategies after being hired as a CTE instructor. Using a scale from 1 – 5 with 1 BEING LEAST EFFECTIVE, 3 BEING MODERATELY EFFECTIVE, and 5 BEING MOST EFFECTIVE, circle the responses that best describes your experiences with that particular professional development. Please circle NA if you have not received that type of professional development.

Professional Development Source

1 = Least Effective 3 = Moderately Effective 5 = Most Effective

1. School based Professional Learning Communities (PLCs)	**1**	**2**	**3**	**4**	**5**	**NA**
2.School level mentoring program	**1**	**2**	**3**	**4**	**5**	**NA**
3.School or county professional development	**1**	**2**	**3**	**4**	**5**	**NA**
4.WVDE (State Department) professional development	**1**	**2**	**3**	**4**	**5**	**NA**
5.WVU Tech coursework / workshop	**1**	**2**	**3**	**4**	**5**	**NA**
6.Professional development from private vendors	**1**	**2**	**3**	**4**	**5**	**NA**
7.WVDE (State Department) website	**1**	**2**	**3**	**4**	**5**	**NA**
8.Online / other resources I found found on my own	**1**	**2**	**3**	**4**	**5**	**NA**
9.WV Center for Professional Development	**1**	**2**	**3**	**4**	**5**	**NA**

Part B. Levels of Knowledge and Use – Following is a list of formative student assessment practices. Using the scale provided for COLUMN A, circle the response that best describes YOUR LEVEL OF KNOWLEDGE about each formative assessment practice. Next, using the scale provided for COLUMN B, circle the response that best describes the FREQUENCY WITH WHICH YOU USE each formative assessment practice in your CTE classroom and/or lab.

	Column A	***Column B***
	Level of Knowledge	***Level of Use***
	1 = poor	**1 = seldom**
	2 = fair	**2 = sometimes**
	3 = good	**3 = regularly**
	4 = very good	**4 = frequently**
	5 = exceptional	**5 = very frequently**

Formative Assessment Practices

1. Observations ….....1 2 3 4 5 ……..…….....1 2 3 4 5

2. Questioning.....1 2 3 4 5 …….....1 2 3 4 5

3. Discussions.....1 2 3 4 5 …….....1 2 3 4 5

4. Reflection / Learning Logs…….....1 2 3 4 5…….....1 2 3 4 5

5. Graphic Organizers / Visuals….....1 2 3 4 5…….....1 2 3 4 5

6. Peer / Self Assessments…….…...1 2 3 4 5…….....1 2 3 4 5

7. Student Presentations / Teach backs.1 2 3 4 5…….....1 2 3 4 5

8. Individual Student Responders …….1 2 3 4 5 .....1 2 3 4 5

9. Literacy / Numeracy Assessments ….1 2 3 4 5…….....1 2 3 4 5

10. Constructive Quizzes……1 2 3 4 5…….....1 2 3 4 5

11. Project based units….....1 2 3 4 5…….....1 2 3 4 5

12. Job/Workplace simulation……...1 2 3 4 5…….....1 2 3 4 5

13. Student Portfolio …….....1 2 3 4 5…….....1 2 3 4 5

14. Small Group Collaborative…….....1 2 3 4 5…….....1 2 3 4 5

15. Daily Checklist.....….....1 2 3 4 5…….....1 2 3 4 5

16. Rubrics……1 2 3 4 5…….....1 2 3 4 5

17. Bell Ringers / Exit Slips……..1 2 3 4 5…….....1 2 3 4 5

18. Think, Pair, Share / Gallery Walk, etc.1 2 3 4 5…….....1 2 3 4 5

19. Student Led Conference…….....1 2 3 4 5…….....1 2 3 4 5

20. Teams / Individual Roles…….....1 2 3 4 5 …….....1 2 3 4 5

Part C. Teacher Comments:

1. Please list any factors which you view as **supporting and/or facilitating** your efforts to implement formative student assessment in your program:

2. Please list any factors which you view as **barriers** to your efforts to implement formative student assessment in your program:

Thank you. Please return completed survey questionnaire to the designated drop box in the office.

Appendix D: Primary Program Cluster Groups

1. **Agriculture, Food, Natural Resources**
2. **Education and Training**
3. **Hospitality and Tourism**
4. **Manufacturing**
5. **Architecture and Construction**
6. **Finance**
7. **Human Services**
8. **Marketing**
9. **Arts, A/V, and Communications**
10. **Government & Public Administration**
11. **Information Technology**
12. **Science, Technology, Engineering and Math**
13. **Business Management & Administration**
14. **Health Science**
15. **Law & Public Safety, Corrections and Security**
16. **Transportation, Distribution, and Logistics**

PROGRAM CLUSTER GROUP

PC GROUP 1---BUSINESS	**PC GROUP 2--- WELFARE and WORKFORCE**	**PC GROUP 3---HEALTH and SAFETY**
3. Hospitality and Tourism 6. Finance 8. Marketing 13. Business, Management & Administration	2. Education and Training 7. Human Services 10.Government & Public Administration	14. Health Science 15. Law & Public Safety, Corrections and Security

PC GROUP 4---BUILDING TRADES, INDUSTRIAL, and AGRICULTURE	**PC GROUP 5--- INFORMATION, TECHNOLOGY AND INQUIRY**
1. Agriculture, Food, Natural Resources 4. Manufacturing 5. Architecture and Construction 16. Transportation, Distribution, and Logistics	9. Arts, A/V, and Communications 11. Information Technology !2. Science, Technology, Engineering and Math

Appendix E: CTE Formative Assessment Administrator Interview Protocol

1. Select the term that best describes the knowledge level of your teachers regarding formative assessment practices:

   A. Poor B. Fair C. Good D. Very Good E. Exceptional

2. Select the term that best describes the level of use of formative assessment practices by your teachers:

   A. Seldom B. Sometimes C. Regularly D. Frequently E. Very Frequently

3. Give examples of formative student assessment practices you observe your teachers using and which formative student assessment practices do you see being used most frequently?

4. Do you see any differences in the levels of use of formative assessment practices based on CTE clusters? If so, in which clusters do you see the most frequent and least frequent levels of use?

5. What factors do you see as supporting and / or facilitating your teachers' efforts to implement formative student assessment in their classroom or program?

6. What factors do you see as barriers to your teachers' efforts to implement formative student assessment in their classroom or program?

7. To what extent have your teachers participated in professional development related to formative assessment? What source(s) of professional development have been most effective in assisting your teachers in their classroom implementation of formative assessment?

8. Do you have any additional comments regarding your teachers' knowledge and use of formative student assessment practices in your school?

Thank you for your participation.

Appendix F: Expert Panel

1. Brenda Tuckwiller, Ed.D.
   Chair & Teaching Associate Professor
   WVU – Institute of Technology
   Career & Technical Education

2. Kathleen McNally, Ph.D.
   School Improvement Specialist
   Southern Regional Education Board

3. Donna Burge – Tetrick, Ph.D.
   Executive Director
   Office of Career & Technical Education
   West Virginia Department of Education

4. Vicki D. Jenkins, MA
   Former Director of James Rumsey Technical Institute
   Retired educator after 35 years in education / Former "Teacher of the Year" in Morgan County
   Current WV CTE Administrator Mentor
   Ed.D. Candidate - WVU

5. Lori K. Renner, BSN
   Therapeutic Services Instructor
   Mid-Ohio Valley Technical Institute
   Recently completed the first year of the "new" WVU – Tech alternative teaching certification training

Appendix G: Administration Permission Email

TO: West Virginia CTE Administrators [on current e-mail address list]

FROM: rkhaught@k12.wv.us

DATE: January 4, 2016

SUBJECT: CTE Teacher Survey

Dear CTE Director/Administrator,

This is a request for permission to distribute a survey to the teachers in your building.

Career and technical teachers are being invited to participate in a state-wide research survey entitled ***"Formative Student Assessment in Career and Technical Education."*** The survey is being conducted as a part of my doctoral program requirements for Marshall University. Information provided will assist us in developing administrator and teacher preparation and professional development curriculum designed to help West Virginia CTE teachers implement formative student assessment practices.

The 2-page paper questionnaire will take approximately ten (10) minutes to complete. Participation is completely voluntary. Replies will be anonymous. Individual teachers and schools will not be identified. The teacher may choose to withdraw or not participate without penalty or loss. Blank surveys may be returned or discarded. If teachers choose to not answer any question, they may simply leave it blank. **Teachers will be asked to return completed survey questionnaires three weeks following receipt of the instrument and cover letter.** The regional teacher educators from WVU / Tech and the co-investigator will provide for pick-up of completed questionnaires. I look forward to sharing results of the study with you after the study and analysis is complete.

If you have questions, you may contact me by phone at 304-684-2464, or by e-mail at rkhaught@k12.wv.us. If you have questions concerning the rights of teachers participating in this research process, you may contact the Marshall University Office of Research Integrity at (304) 696-4303. Dr. Ron Childress (rchildress@marshall.edu) is the Principal Investigator for the study.

If you do not wish your teachers to participate in this survey, please reply to this email by 3:00 p.m., January 11, 2016, five working days after the mailing date of this message. A reply of "No" indicates that you do not grant permission for me to distribute surveys in your building.

Thank you for your assistance with this survey and for your continued support to our teachers.

Ryan Haught

Appendix H: Teacher Letter of Invitation

Dear Career/Technical Education Teacher:

You are invited to participate in a research survey entitled ***"Formative Student Assessment in Career and Technical Education."*** As a career and technical educator, you are in a unique position to offer insight into the current usage of formative assessment practices in the career and technical classrooms and labs across our state. The information you provide will offer valuable assistance in looking at the certification and professional development curriculum for career and technical education administrators and teachers in West Virginia.

This study is being conducted as a part of doctoral research at Marshall University. The survey is comprised of a two-page (one-page front and back) paper questionnaire which will take approximately ten (10) minutes to complete. Your replies will be anonymous, so do not put your name anywhere on the form. Participation is completely voluntary. If you choose to withdraw or not participate there is no penalty or loss of benefits; you may either return or discard the blank survey. You may choose to not answer any question by simply leaving it blank. All responses will be treated confidentially and no individual will be identified in reporting the results.

Returning the completed survey to the collection site in your school by the end of the third work week following receipt of this letter confirms that you are 18 years of age or older, that you are a career and technical teacher, and gives your consent for use of the answers you supply. There will be a designated location in your school office for collection of completed surveys.

If you have any questions about the study you may contact me by phone at 304-684-2464 during the day, or via e-mail rkhaught@k12.wv.us. If you have questions concerning your rights as a research participant, you may contact the Marshall University Office of Research Integrity at (304) 696-4303. Dr. Ron Childress (rchildress@marshall.edu) is the Principal Investigator for the study.

If you wish to view results of this survey, that information will be made available to teachers following survey collection and analysis. You may wish to keep this letter for your records.

Thank you,

Ryan Haught
Co – Principal Investigator
304-684-2464
rkhaught@k12.wv.u

Appendix I: Administrator Letter of Invitation to Participate in an Interview

Dear Career/Technical Education Administrator:

Thank-you for granting permission to allow surveys to be distributed to the teachers in your building. Soon paper surveys, accompanied by letters of invitation to your teachers, will be delivered to your facility by your regional Teacher Educator from WVU-Tech. A collection box will be delivered to your school and I ask that you place the box in a central location accessible to your teachers. Please encourage your teachers to return the surveys to the collection box within three weeks after delivery.

As a follow up to the teacher surveys, **I would like to request your participation in an interview**, to gain your perspectives on your teachers' knowledge and use of formative assessment strategies based upon your observations of daily classroom and laboratory teaching practices. The **telephone interview** will require 15 – 20 minutes and is based upon eight pre-designed open-ended questions.

Please reply to this email and let me know if you are willing to participate in this study. If you are willing and available to participate, I will respond with suggested time parameters for scheduling the interview.

There are no known risks involved with participating in this study. Your consent and that you are at least 21 years of age are implied by your willingness to be interviewed. Participation is completely voluntary and there are no penalties or loss of benefits if you choose not to participate. You may also choose not to answer any question included in the interview protocol. The information you supply is confidential and no individual or institution will be identified by name or identifying information.

If you have any questions about the study you may contact me by phone at 304-684-2464 during the day, or via e-mail rkhaught@k12.wv.us. If you have questions concerning your rights as a research participant, you may contact the Marshall University Office of Research Integrity at (304) 696-4303. Dr. Ron Childress (rchildress@marshall.edu) is the Principal Investigator for the study.

Thank-you in advance for your willingness to consider participating in this study. My expectation is that the results of this study will influence future teacher preparation programs and indicate current professional development needs. Study findings will be shared with CTE Administrators.

Thank you,

Ryan Haught, Co – Principal Investigator
304-684-2464
rkhaught@k12.wv.

Appendix J: Administrator Request for Phone Interview

A phone call to each administrator in the sample for interview will include the following brief description of the interview purpose. The individual will be given the opportunity to opt out of the interview with no risk.

You are invited to participate in an interview related to your perspectives on your teachers' knowledge and use of formative student assessment. As a career and technical administrator, you are in a unique position to offer insight into the role of the building level administrator in supervising teachers who are facilitating student assessment in West Virginia schools, and, to assess current usage of formative assessment practices in the career and technical classrooms and labs across our state. The information you provide will offer valuable assistance in looking at the preparation and professional development curriculum for career and technical education administrators and teachers in West Virginia.

This study is being conducted as a part of doctoral research at Marshall University. Participation is completely voluntary. If you choose to withdraw or not participate there is no penalty or loss of benefits. You may choose to not answer any question. All responses will be treated confidentially and no individual will be identified in reporting the results.

If you have questions concerning your rights as a research participant, you may contact the Marshall University Office of Research Integrity at (304) 696-4303.

If you wish to view results of this survey, survey conclusions will be made available to administrators following the collection and analysis of the teacher surveys and the administrator interviews.

Thank you,

Ryan Haught
Co-Principal Investigator
304-684-2464
rkhaught@k12.wv.us

Appendix K: Teacher Reported Supports for Formative Assessment
Teacher Survey Part C – Question 1

CATEGORY	n	%
WVDE/CTE Initiatives (26 SWP; 12 Enhanced CTE/HSTW/TCTW/PBL; 2 WVDE)	40	21.7
Administrative & Peer Teacher Support (24 Administrative; 13 Peer Collaboration)	37	20.1
Technology / On-Line Resources (15 Technology; 6 On-Line Resources)	21	11.4
Teacher Training / Professional Dev (Education & Training)	19	10.3
Lab/Shop/ Clinical (Assess through hand-on / applied learning activities)	18	9.8
Student Effort / Attitude / Collaboration	14	7.6
Curricula Supports (Academic Skills; CTE Credentials; CTSOs; Time)	13	7.0
Portfolio / Capstone	9	4.9
Industry Supports (Advisory Councils; Industry; Guest Speakers)	7	3.8
Funding / Resources	6	3.3

394 Responses

184 Usable / Relevant Responses

Appendix L: Teacher Reported Barriers to Formative Assessment

Teacher Survey Part C – Question 2

CATEGORY	n	%
Time (Not enough to implement – 38; FA is waste of time – 3; Not enough planning time – 6; Not enough time for collaborative planning & teaching – 3)	50	24.2
Student (Lack of cooperation; poor attitude; lack of effort; poor behavior – 21; Poor attendance – 9; Below level academic skills – 8)	38	18.4
Structure (Schedule (45 – 90 Minute Periods) are too short – 15; Class size too large – 7; Learning environment not conducive to FA (i.e. too hot, too small) – 7; Too many interruptions – 4; Lack of organization – 1)	34	16.4
Professional Development (Lack of training related specifically to FA or related to use in specific programs; lack of knowledge & experience)	23	11.1
Curriculum (Not in skill sets; too much material to cover; CTE projects do not lend naturally to FA – 10; FA reduces hands-on learning opportunities – 5; FA is not relevant to CTE – 2)	17	8.2
Funding (Lack of funding, equipment, resources, and material for FA)	16	7.7
Administrative (WVDE – too many initiatives / changes – 12; Lack of support by administrators or local board office – 4)	16	7.7
Technology (Lack of technology capabilities either in the classroom / shop or at home (technology limits)	10	4.8
Other (FA goes against advice from CRAFT – 2; Lack of parental involvement – 1)	3	1.4

394 Responses

207 Usable / Relevant Responses

Appendix M: Administrator Interview Responses

Question # 1: Select the term that best describes the knowledge level of your teachers regarding formative assessment practices: A. Poor; B. Fair; C. Good; D. Very Good; E. Exceptional

1. C. Good

   Notes: I have a 62-year-old collision repair instructor who is lacking computer skills; lacking teacher / classroom strategies

2. D. Very Good

3. B. Fair

4. C. Good

5. B. Fair

Notes: Have been working on during the past two years. Trying to help teachers see that there is a difference between formative and summative, and to know what the term formative assessment means. Working to get teachers comfortable with getting away from textbooks and the strategies specifically listed in the teacher's edition of textbooks.

6. B. Fair

Notes: Not very good for group of teachers who have come out of industry. Have not had the extensive training and supervised practice as teachers who have graduated from a teacher's education program.

7. C. Good

8. C. Good

9. C. Good

10. B. Fair

11. C. Good

12. C. Good

13. C. Good

14. B. Fair

15. B. Fair

Notes: especially the formal use – using to adjust instruction.

Question # 2: Select the term that best describes the level of use of formative assessment practices by your teachers: A. Seldom; B. Sometimes; C. Regularly; D. Frequently; E. Very Frequently

1. C. Regularly

   Notes: Split between "C. Regularly" and "D. Frequently" - will air on the side of "regularly." Spend time working with mediocre instructors.

2. C. Regularly
3. B. Sometimes
4. C. Regularly
5. C. Regularly

   Notes: Grade Book should look like program; 50% classroom and academic grades - 50% shop or performance grades.

6. B. Sometimes

   Notes: checklist / rubric, questioning / checking for understanding in health programs

7. C. Regularly
8. D. Frequently
9. C. Regularly
10. C. Regularly
11. C. Regularly
12. C. Regularly
13. C. Regularly
14. A. Seldom
15. B. Sometimes

    Notes: Academic teachers are more regular; CTE teachers use more in shop areas than in the classroom.

Question #3: Give examples of formative student assessment practices you observe your teachers using and which formative student assessment practices do you see being used most frequently?

1. Carpentry – Develop blueprints first, if incorrect, reteach, make sure students understand, concepts are chunked – becomes important to check for understanding during the process; directing, checking for understanding, observing, guiding, questioning

2. Group projects – built around an end project – using rubrics for feedback.

3. "Did not have time to formally observe for this question."

4. Checking for understanding and asking to summarize. Teachers ask for both written and oral synopses / reflection. Determine level of understanding for the class. Quiz students orally to determine the "pulse" of learning. Critiquing of own work and using rubrics for projects.

5. Written grades that are easy to grade; matching and fill-in-the-blank; I encourage more oral and written grades; many of my teachers are not comfortable with their own grammar and developing their own assessments, developing their own assessments puts my teachers out of their comfort zone.

6. Shop classes – observing quality of work; have re-do following corrective feedback

   Low Bay programs – Questioning and checking for understanding, use of quizzes to check for understanding

7. A lot of staff use on-line curriculums like I-Car and Tooling-U where regular assessments are built into modules. Masonry will lay up a corner which the instructor monitors in progress and provides feedback along the way, repeated hands on practice; in welding, the students are constantly making welds that the instructor looks at and has an informal conversation.

8. Paper and pencil test from textbooks; hands on test in shop areas; 50% performance and 50% paper-pencil

9. Teacher made test; anything to do with credentialing like NCCER, OSHA, and welding; online curriculums like Tooling-U, CDX, Test-Out, and Pierson; demonstration of hands-on activities and designated labs

10. Redirecting while teaching a lesson; observing; reinforce, redirect, re-teaching. The most frequent is redirecting.

11. Multiple choice is used the most frequent. Essay is the least frequent used across the board, but most frequently used in health. Fill-in-the-blank is used frequently in law & public safety.

12. Hands on demonstrations; have students demonstrate back; majority is hands-on or written test.

13. Combination occurring usually at the end between written and performance. The EDGE process and the testing associated with it. Mix of written and performance assessments. Performance assessments – students peer assessing each other based upon what he or she should know at the end of the skill lesson.

14. Most frequently is observation. Checking for understanding, exit slips, the parking lot, and analyzing of the essential question.

15. Diverse when comparing all programs. Direct feedback, exit tickets, bell ringers (testing knowledge retained from the day before), quizzes that are more frequent.

Question #4: Do you see any differences in the levels of use of formative assessment practices based on CTE clusters? If so, in which clusters do you see the most frequent and least frequent levels of use?

1. All clusters, but different types of formative assessment per cluster. In health occupations – lots of checking for understanding based upon oral and written responses; carpentry utilizes observation more as students work on an assigned project or task. Some programs are more academic in nature where other are based upon engagement in an activity.

2. Yes – with carpentry the instructor is looking at the final project; in a program like Business – instructors are monitoring productivity as students are completing smaller projects such as signs and banners which require less hands-on activity; the Business program also uses electronic resource programs such as Quizlet which has formative assessment components built into the program; I have observed the Business instructor using exit slips with the students in the program

3. "More so in hands-on labs."

4. Yes – see the most use in - Law & Public Safety, Health Occupations, and Pro-Start. See the least use in the shop or trades classes. Auto, collision repair, and carpentry.

5. Therapeutic Services is the strongest – I observe the use of rubrics a lot; Early Childhood, Pro-Start, and Law & Public Safety are strong in the use. The "trades" use a lot of multiple choice and true / false.

6. The health program assesses across the board; the folks in the shop areas use a lot of observation, guided practice, and re-doing of hands-on assignments following feedback from the instructor.

7. See a lot of use in manufacturing, health, architecture and construction. Not as much use in information technology and transportation. See little use in programs such as cosmetology and human services.

8. Don't see a lot of difference – all teachers use some sort of assessments; Weaker teachers use less and stronger teachers use more.

9. See the most use in programs like health occupations / therapeutic services just because of the nature of it; I feel as if all my programs use in some form or another; the program that uses the least is the business program – again because of the nature of it

10. The most use occurs in the hall-wall lab areas like transportation, ag-ed, pro-start, and construction. See a lot of redirection – easy to see if the student doesn't get it. The least use is in an area like health science.

11. Different programs use different strategies for assessment. Some use written short answer; some do oral testing and have students explain answers orally. When involving an IEP – assessments are modified to comply with the IEP.

12. Technical & Industrial programs use formative assessment the most frequent; the program with the least use is business; the health programs and pro-start also utilize frequently.

13. Yes, health occupations, pro-start, cosmetology and robotics utilize daily. Least is the welding instructor. "He is not getting things done this year and is sucking on a lemon."

14. Yes, see more use and an increased variety in the low wall programs; seldom use in the high wall program areas; more observation, less checking for understanding in the high wall program areas.

15. In my building the strongest instructor is the pro-start instructor. I don't believe it is because of the cluster, but because of the teacher. Depends on the knowledge and skill of the individual teacher as I see different levels of use in all of my teachers. Other than one or two strong teachers, I see an equal levels of use in all cluster areas.

Question #5: What factors do you see as supporting and / or facilitating your teachers' efforts to implement formative student assessment in their classroom or program?

1. Simulated Workplace – more opportunity to facilitate and to stand back and observe. The foramen (and other SW positions) are also helping in classroom or shop area by observing – providing "more eyes" to observe the process.

2. ____ County is implementing APL professional development with all instructors; as part of the APL training – the administrator is providing support and the walkthrough process; professional development is critical.

3. "Incorporating training strategies into the Simulated Workplace Initiative."

4. Staff development / professional development. Need to show teachers how and make them comfortable utilizing formative assessment. The new programs or the new instructors are doing better because the new training through WVU-Tech is doing a better job exposing new instructors to formative assessment, which in turn makes these new instructors willing to try, it also increases understanding for intentional or planned use.

5. Professional Development encourages to use different types. Lack of professional development usually limits the teacher to using one or two types. We have training that has occurred through the local RESA, which has included mixing of assessment strategies through reading and writing activities.

6. More professional development opportunities that occur outside the facility.

7. Professional Development; WVU-Tech in the last 3 – 4 years has had a better handle on formative assessment; some of the more experienced instructors are doing a good job with formative assessment, not sure they are aware they are using; in Adult programs like LPN – see a lot of summative assessment, but not a lot of formative assessment. Occasionally see feedback on responses to exam questions, but limited formative assessment other than that.

8. Time – in order to do everything required; support from CTE folks at the WVDE; involvement in CRAFT Committees, the more active CRAFT Committees are willing to assist in judging or grading student work / projects

9. On-going and sustained professional development that we do weekly; Tuesdays and Wednesdays we do professional development on topics; use TCTW as a professional development platform; level of student determines the level of use; work to increase the rigor of teacher made test; project assessment through SREB – project led assessments

10. Professional development. A better understanding of what formative assessment is and strategies to use in implementation. Knowing the difference between assessment "of learning" and assessment "for learning." A better awareness that practices such as conferencing, supporting, supplying resources are strategies of formative assessment.

11. Working and collaborating with other teachers. Professional development supports an increased use of formative assessment. Classes differ – strengths

and weaknesses differ from year to year; more explanation, drawing conclusions, more visual types of assessments.

12. Professional development. Certain initiatives like TCTW / SREB focus to train CTE faculty with skills more familiar to the academic settings; teachers' knowledge in CTE is directly related to skills needed in the work setting.

13. Freedom to try new things that are outside the box. Providing monetary support for in-service and setting up webinars.

14. Initiatives such as requiring an essential question on lesson plans; having teachers think about assessment (both formative and summative) during lesson planning and curriculum map development; professional development by looking at the WVDE site on assessment which provides information and resources for formative assessment; strategies taught during the Tech Tuesdays.

15. What we decide to place an emphasis on. What gets monitored gets done. As administrators, we need to get out of the office and observe, when we back off – whatever we are targeting to place an emphasis on will not get done.

Question #6: What factors do you see as barriers to your teachers' efforts to implement formative student assessment in their classroom or program?

1. Lack of understanding on the part of the teachers regarding what formative assessment actually is or is not. Many teachers are utilizing formative assessment techniques but do not realize he or she is actually doing a type of assessment.

2. Time – time to develop, plan, and master formative assessment strategies into daily teaching; time to offer professional development related to a better understanding of formative assessment and implement into daily practice.

3. "The same as other initiatives… lack of time for staff development."

4. Lack of Professional Development or lack of needed professional development time to focus on formative assessment strategies.

5. The teachers who have completed the recent WVU-Tech process are stronger. The cohort who completed the Tech on-line are the weakest. The number one barrier is "time" – time for more professional development.

6. Lack of basic knowledge that is gained through professional development. Many of our instructors do not have a basis from an educational program. Most of our instructors are out of industry and come to us without any student teaching experience.

7. Teachers' knowledge of formative assessment; how comfortable the teacher is in using; what teacher preparation program the instructor went through; experience; past professional practices.

8. Time – increasing requirements and less time to complete the requirements. An example is OSHA 10.

9. Teachers do not have complete knowledge on formative assessments. If they do not have the knowledge and skills – will limit the application or put into practice. "Teachers don't know what they don't know" which means little planning will go in to multiple strategies of assessment.

10. Time; not enough time for professional development and to provide and train with resources / strategies.

11. Busy schedule; not enough time for professional development.

12. Time – enough time to do what is required, little time left to work on learning new strategies.

13. Lack of willingness to go outside the mold; with "safety" it is cut and dry; teachers willing to do things differently leads to high engagement – leading to a sparkle to get students involved.

14. Fear of or the lack of not understanding formative assessment; it is easier to go back to what you know, what you feel comfortable with such as observation or another form of a quick check; "We have a tendency to teach as we have been taught or as it has been modelled for us as students over the years." Unfortunately, lots of emphasis on summative (written quizzes and test) and little emphasis on formative assessment.

15. Lack of knowledge; time; time for professional development – we do not value enough because of a lack of professional development.

Question #7: To what extent have your teachers participated in professional development related to formative assessment? What source(s) of professional development have been most effective in assisting your teachers in their classroom implementation of formative assessment?

1. School based professional development; the CTE Administrator has provided living examples. There have been discussions of the importance of the use of formative assessment as part of the assessment system.

2. Each month we have two hours of professional development and collaboration. Teachers engage in leadership meetings and then collaborative training. Teachers conduct hands-on training followed by role modelling.

3. “Limited county wide staff development.”

4. The teachers who have been recently hired and have attended the recent WVU-Tech classes; teachers involved in the HSTW / TCTW initiative have been exposed to formative assessment strategies; the new hires involved in the new WVU-Tech training have been the most effective.

5. Professional development with the local RESA reading specialist. Marzano – Fundamentals of Classroom Management; APL Associates training that has focused on knowing how you have written a good test.

6. Professional development that they hear from their administrator; once introduced – have to encourage to use and monitor use.

7. One module in a year’s time; talk about grading practices; discussions – how to better grade students; the end result – good reflection of true mastery level; sources – involvement with TCTW / WREB Simulated Workplace Trainings

8. Experience with WVU-Tech. WVDE Conferences; assessment is not emphasized unless included as part of WVU-Tech or state level training

9. SREB, TCTW, local professional development based upon opportunities

10. “Canned” programs which have a limited or lack of relevance for CTE teachers; participated with academic teachers – this type of training is not relevant and relevance is an important thing; observation and providing feedback; RESA; WVCPD; Observation & Evaluation process which includes walk-through and feedback.

11. None in the last couple of years. We have no new teachers.

12. CTE Conferences; where instructors can attend to discuss issues, brainstorm, and work increase teaching skills. Some professional development is local when the county chooses to focus on a skill and includes the CTE instructors; Professional development that is delivered by an educational consultant or company that the county purchases and includes our teachers in the associated training.

13. Involved with county-wide presentations; a couple of paid sessions for county-wide professional development during the summer; purchased The Master Teacher for professional development and use it twice per month during time set aside for professional development; one strand of The Master Teacher was focused on assessment.

14. A few opportunities for small amounts of professional development at the local level during the opening of school professional development and Technology Tuesdays. This has most likely helped in clarifying what

formative assessment is and not focusing on introducing strategies that teachers can use. Our new CTE instructors seem to be getting a better grasp from the new WVU-Tech process.

15. Built into other instructional strategies that our CTE teachers have focused on in the past; Our instructors are lacking the knowledge to use because they missed out and were not included when the academic teachers at the county level were trained; using as instructional assessments such as bell ringers and exit tickets – are teachers really looking at such techniques and making instructional adjustments?

Question #8: Do you have any additional comments regarding your teachers' knowledge and use of formative student assessment practices in your school?

1. The Simulated Workplace Summit – it would be nice if professional development on topics such as formative assessment was included for instructors as part of the agenda in the state CTE conference(s). Assessment is a component of the new teacher evaluation system – teachers should be utilizing a balanced assessment system which includes uses of summative and formative assessment. In order to have a balanced assessment system – need to have an understanding of both types and how each type supports each other. As professional development is occurring for instructors on the topic of formative assessment – CTE administrators need to be encouraged to "sit in" or participate with the training.

2. Assessment is necessary for every student to succeed. Assessment is a critical component of the teaching and learning process. What gets monitored gets done – important for the administrator to follow-up with teachers and monitor the use / implementation of assessment practices.

3. "Sixty percent of our staff use formative assessment while 40% are substantive."

4. New hires – Law & Public Safety, Health, and Pro-Start are the best in having the knowledge and using formative assessment.

5. Grading for a purpose other than giving a reward or consequence; grading can often be seen as punitive; need to make assessment more reflective to teaching and learning; what is tested should relate back to what was taught.

6. For CTE Centers – it would be nice to get back to a true summer conference where instructors break into program areas and are taught teaching strategies that specifically apply to their program area. We hire folks out of industry who need lots of professional development and not the professional development that is conducted by the folks out of "academics" – our folks see no relevance or relation; and the folks in "academics" have no reality of context to connect professional development for our folks

7. Teachers that use Formative Assessment (whether they realize they are using or not) have a better handle on students' knowledge and skill level. Then student grades are more reflective of knowledge and skill level.

8. Instructors are doing a better job compared to ten years ago. If teachers are going to continue to improve – it will only happen with additional professional development specific to formative assessment. CTE also has to fight the stereotype that our instructors are not as receptive to using varied assessment strategies and the students who are typically drawn to CTE programs are not as receptive to responding to varied assessment strategies.

9. There is always room for improvement. The WVU-Tech process is better.

10. In CTE, our teachers do it without realizing they are doing it. A barrier is getting the instructor to understand what he or she is doing; Need a greater emphasize on formative assessment and assessment in general – "assessing with a purpose."

11. Important for teachers to attend trainings that are specific to their Craft or program area.

12. "I need to do a better job of monitoring and assisting." "As a school, we are doing well here – if it isn't broke, don't fix it."

13. Assessment is not a trick; need to monitor the process. Use assessment as a guidance tool – if the students are not making progress- the teacher needs to use the information from the assessment to change something in the instruction; look at the group as a whole or break into smaller groups for re-teach; "Assessment is not a gotcha tool."

14. I have observed very specific strategies like the parking lot and exit slips in a few program areas. We have to make a concentrative effort to improve and need to make assessment a focus for next school year. It will help us plan better (daily lesson plans and curriculum maps) and it will help us be stronger regarding the new Teacher Evaluation process. A "Balanced Assessment System" is referenced on several standards within the new Teacher Evaluation process.

15. "If you find a golden bullet – please share with me." Increasing the knowledge and use of our teachers' knowledge and use of formative assessment is a work in progress.

Appendix N: Administrator Interview Responses Emergent Category Analysis

Question # 1: Select the term that best describes the knowledge level of your teachers regarding formative assessment practices: A. Poor; B. Fair; C. Good; D. Very Good; E. Exceptional

Question # 1	Poor	Fair	Good	Very Good	Exceptional
Knowledge Level	0	6	8	1	

Question # 2: Select the term that best describes the level of use of formative assessment practices by your teachers: A. Seldom; B. Sometimes; C. Regularly; D. Frequently; E. Very Frequently

Question # 2	Seldom	Sometimes	Regularly	Frequently	Very Frequently
Use Level	1	3	10	1	0

Question #3: Give examples of formative student assessment practices you observe your teachers using and which formative student assessment practices do you see being used most frequently?

Examples of Formative Assessment Practices	Number of Administrators Reporting
Observation	8
Check for Understanding	5
Questioning	4
Rubrics	2
Exit Slips	2
Written / Oral Reflection	1
Analysis of Own Work	1
Demonstration	1
Peer Assessment	1

Asking to Summarize	**1**
Parking Lot	**1**

- **Administrators reported eight (8) assessment strategies that are summative as responses to this question.**
- **One (1) administrator did not respond to this question.**

Most Frequent (as reported by administrators)
Redirecting (as a result or following the utilization of a formative assessment strategy)
Multiple Choice
Modules built into on-line curriculum
Hands-on demonstrations
Observations

Question #4: Do you see any differences in the levels of use of formative assessment practices based on CTE clusters? If so, in which clusters do you see the most frequent and least frequent levels of use?

CTE Cluster	**Most**	**As reported by Administrators (Most)**	**Least**	**As reported by Administrators (Least)**
Ag., Food, & Natural Resources	1	Ag. Ed.	0	
Education & Training	0		0	
Hospitality & Tourism	6	Pro-Start	0	
Manufacturing	2	Manufacturing; Robotics	1	Welding
Architecture & Construction	4	Carpentry; Architecture &	1	Carpentry;

		Construction		
Finance	0		0	
Human Services	2	Early Childhood; Cosmetology	2	Cosmetology; Human Services
Marketing	0		0	
Arts, A/V Technology & Communications	0		0	
Government & Public Administration	0		0	
Information Technology	2	Business	2	Business
Science, Technology, Engineering & Mathematics	0		0	
Business Management & Administration	1		0	
Health Science	8	Health Occupations	1	Health
Law, Public Safety, Corrections & Security	2	Law & Public Safety	0	
Transportation, Distribution & Logistics	2	Transportation	2	Auto; Collision

- Administrator responses that were not placed with "MOST" – "Technical & Industrial"; "Low Wall programs"; "Shop Area"; Hands-on Labs"
- Administrator responses that were not placed with "LEAST" - "Shop & Trades Classes"; High Wall programs"

Question #5: What factors do you see as supporting and / or facilitating your teachers' efforts to implement formative student assessment in their classroom or program?

Factor – Supporting and Facilitating	Number of Times Reported
Professional Development	12
Time (for teachers to observe; for teachers to collaborate; for teachers to plan; for teachers to reflect)	6
Support (Administrators, WVDE, CRAFT Committee)	4
Improved WVU-Tech Process	2
Tech Centers That Work (TCTW)	2

Question #6: What factors do you see as barriers to your teachers' efforts to implement formative student assessment in their classroom or program?

Factors – Barriers	Number of Times Reported
Time (for teachers to plan; for teachers to participate in Professional Development specific to Formative Assessment)	9
Teachers' Lack of Understanding & Knowledge	6
Lack of Professional Development specific to Formative Assessment	3
Teachers not willing to implement	1

Question #7: To what extent have your teachers participated in professional development related to formative assessment? What source(s) of professional development have been most effective in assisting your teachers in their classroom implementation of formative assessment?

Source of Professional Development	Number of Administrator Responses
School – Based	7

County – Based	5
SREB / TCTW	4
WVU-Tech	3
WVDE	2
RESA	1
WVCPD	1

Question #8: Do you have any additional comments regarding your teachers' knowledge and use of formative student assessment practices in your school?

Summary of Administrator Reponses for Question # 8
1. Increase Professional Development at WVDE meetings; A Balanced Assessment System consisting of Formative Assessment is part of the new teacher evaluation system; CTE Administrators need to "sit through" the Professional Development with his or her teachers
2. Formative Assessment is needed; Administrators need to monitor the use
3. 60% of faculty use Formative Assessment
4. "New Hires" are the best with knowledge and use
5. Need to make assessment more reflective to the teaching & learning process
6. Get back to focusing on using the summer conference for professional development specific to CTE folks; school or county professional development focuses on the folks out of academics and often not relevant to CTE folks
7. Teachers who utilize formative assessment the best – have the best understanding of his or her students' knowledge and skill level
8. CTE teachers are doing a better job with assessment, compared to ten years ago. Need to continue to offer specific professional development.
9. Room to improve. WVU-Tech process has improved.
10. CTE instructors need a better understanding of the assessment process. Need a greater emphasis on understanding assessment.
11. Instructors need to attend training specific to his or her program area.

12. As a CTE administrator – need to do a better job monitoring and providing assistance.
13. Need to monitor the process. Teachers need to understand how to use the results from assessment to make instructional decisions that will lead to positive learning gains.
14. Need to increase focus on assessment in the planning process. Need to develop a better understanding of a Balanced Assessment system.
15. Increasing both knowledge and use of formative assessment will continue to be a work in process.

VITA

Education

2018	Doctor in Education (Ed. D) Educational Leadership (Public School) Emphasis – C& I	Marshall University
1996	Masters of Art, Educational Leadership	West Virginia University
1991	Bachelors of Art, Education	Glenville State College

Experience

2011 – Present Director, Mid-Ohio Valley Technical Institute, St. Marys, WV

2006 – 2011 Assistant Director, Mid-Ohio Valley Technical Institute, St. Marys, WV

2003 – 2006 Principal, Creed Collins Elementary School, Pennsboro, WV

2002 – 2003 Assistant Principal, Lubeck Elementary School, Lubeck, WV

2001 – 2002 Middle School Teacher (Social Studies), Ritchie County Middle School, Ellenboro, WV

1994 – 2001 High School Teacher (LD), Ritchie County High School, Ellenboro, WV

1993 – 1994 Elementary School Teacher (3rd Gr.), Smithville Elementary School, Smithville, WV

Professional Presentations & Memberships

- National Presentation, Detroit, MI (June 2010) – National Council on Student Assessment: The Council of Chief State School Officers – "*Pioneering the Next Generation of Measurement: Developing West Virginia's Performance Assessments*"
- National Presentation, Las Vegas, NV (December 2012) – Association of Career & Technical Education National Convention – "*Performance Assessment in Career & Technical Education: West Virginia's Model for Authentic Student Assessment*
- The Association of Supervision and Curriculum
- The Association of Career and Technical Education