2017

Effective Use of Formative Assessment by High School Teachers

Melanie Brink

David E. Bartz

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Practical Assessment, Research & Evaluation

Effective Use of Formative Assessment
by High School Teachers

Melanie Brink, *Centralia High School*
David E. Bartz, *Eastern Illinois University*

The purpose of this mixed-methods study was to gain insights and understandings of high school teachers' perceptions and use of formative assessment to enhance their planning, individualization of instruction, and adjustment of course content to improve student learning. The study was conducted over two years in a midwestern high school of approximately 1,000 students. Crucial to the three project teachers' understanding of formative assessment was developing and using preset curriculum road maps that tightly aligned course goals, learning objectives, activities, instructional methods, and assessment. The in-depth case studies of the sample's three teachers revealed that, when provided with specific information about formative assessment through staff development, they became more positive toward such assessment, and their implementation skills were greatly improved. The staff development had an especially positive impact on the teachers' understanding and skill sets for individualizing instructional practices. The personalization of the staff development proved to be the most beneficial when it tailored the content to the varying levels of initial proficiency of the three sample teachers. Support for formative assessment by the administrative team members was essential to creating a cultural shift from summative to formative assessment.

Context and Purpose

The purpose of this mixed-methods study was to gain an understanding of high school teachers' perceptions of the formative assessment process and its impact on classroom instruction, modifications to curriculum planning, and student learning. The focus was on obtaining information about how high school teachers' perceptions of formative assessment impacted the instructional practices they used. The study also sought to determine whether high school teachers' perceived understanding of formative assessment changed over time when they were given specific information about such assessment, staff development, and support for its use. The support which teachers need to effectively implement formative assessment was also studied.

Teachers at the high school where the sample teachers worked were often perceived by administrators as focusing solely on summative classroom assessment through end of unit and semester examinations. The major purpose of these summative assessments was to provide a basis for determining grades on quarter and semester report cards. The researcher of the study assumed that high school teachers often did not use the results of these summative tests to determine what needed to be retaught for students to master the content that was measured by the assessments.

The preparation of high school teachers has focused more on content knowledge rather than instructional methodologies (Wong, Chong, Choy, Wong, & Goh, 2008). The importance of mastery of academic content was highlighted under No Child Left

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Behind through the "highly qualified teacher" designation. This designation meant that high school teachers had sufficient academic preparation for the content field(s) in which they taught courses.

A premise of this study was that high school teachers needed to use formative assessment to adjust content presented to each student and match this with the best instructional strategies and teaching methods. The following operational definition used for formative assessment was based on a review of the literature and research (e.g., Popham, 2014; McMillan, 2014; & Cizek, 2010), as well as input from the school's staff that included the three sample teachers: *Formative assessment is an ongoing process that collects evidence of student learning from both informal and formal methods, and provides information to both the teacher and the student. It involves two-way communication between the student and teacher, and encourages modification of the teacher's practices to meet the needs of the student. The student uses the information to self-assess and utilize available tools to improve learning.*

For comparison purposes, the definition of summative assessment used was that it is a means to an end of determining if students had sufficiently met competency for understanding through course content after a designated time period.

Research Questions

The research questions were:

1. How do high school teachers' perceptions of their understanding of formative assessment affect their instructional practices?

2. How do high school teachers' perceptions of their understanding of formative assessment evolve over time when provided with specific information about formative assessment?

3. What support exists to help high school teachers implement formative assessment?

Brief Review of the

Literature and Research

Assessment should be viewed as an ongoing process, with students being given more than one opportunity to demonstrate what they know. Assessment should be about collecting and interpreting evidence pertaining to student progress for making informed decisions about learning (Moss, 2013). In addition, formative assessment should be concerned with "providing teachers and/or students feedback information, which they need to interpret when answering the three feedback questions: "Where am I going?, How am I going to get there?, and Where to next?" (Hattie, 2003, p. 2).

By using formative information, high school teachers can identify individual learning needs of students and tailor instruction to meet them (Black & William, 2007). With the appropriate use of formative assessment, learning becomes a continuous loop of knowledge and processing. Shephard (2000) noted that the successful teacher is able to ask the right questions at the right time, anticipate conceptual pitfalls, and have a ready repertoire of instructional tasks that will help students take the next steps that require deep knowledge of the subject matter.

In a benchmark study, Black and William (1998) reviewed 578 publications about the role of formative assessment in the learning process. They concluded that teachers did not consistently engage in purposeful reflections regarding the content and results from the assessments. Teachers must understand that formative assessment is a vital part of the instructional process and whole-heartedly embrace that assessment in order for it to result in effective instruction.

Assessment results should not be secretive. Weurlander, Soderberg, Scheja, Hult, and Wernerson (2012) found that when students received feedback from several formative assessments during a course, they studied more effectively. Students cannot be asked to hit a target if they do not know what constitutes that target. Assessment should be concerned about helping students master content (Filsecker & Kerress, 2012). Assessment results should belong to the students. If students take ownership of the assessment results, those results are likely to promote student learning and achievement. When students' needs are at the heart of an assessment program, they will have the opportunity to take actions for learning based on personal evidence of assessment results (Black & William, 1998).

Black and William (1998) stated that assessment results should be used to adapt teaching for the purpose of meeting students' needs. In terms of assessment, learning should be examined as prospective versus retrospective—looking forward instead of looking backward. When developing a lesson, teachers should plan the right questions and anticipate different levels of

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student needs. Shephard (2000) believed that teachers should possess a toolbox of varying instructional approaches in order to effectively meet the needs of students. Assessment should be used to determine students' skill levels and to plan for individualized instruction. Assessment should include, not only identifying skill deficits for each student, but also student strengths. (Hosp & Ardoin, 2008).

It should be noted that an assessment is formative when it is used to adapt or change teaching strategies, curriculum, or both to meet the needs of the students. This allows students to make decisions for themselves which, in turn, helps them to meet their learning goals. Nicol and Macfarlane-Dick (2006) stated, "Self-regulated learning is an active constructive process whereby learners set goals for their learning and monitor, regulate, and control their cognition, motivation, and behavior…" (p. 204). In order to self-regulate, students must know and understand where they are and what they can do to improve.

Bloom's (1976) approach to mastery learning used formative assessment as a key component. Bloom's (1984) feedback-correction-processing model (which is a key element of mastery learning) relied on formative assessment results to identify, student-by-student, who mastered which skills after a segment of instruction. Students who did not demonstrate mastery were recycled for focused instruction tailored specifically to the skill content not mastered.

While some researchers advocate more clarity for the definition of terms associated with formative assessment (e.g., Dunn & Mulvenon, 2009), the general trend supports formative assessment and suggests that its appropriate use can positively influence how students learn and achieve. Multiple sources confirm that formative assessment significantly impacts student learning when delivered using feedback, questioning, and peer-to-peer assessment; and when such formative assessment is an embedded element of a teacher's everyday practice (Black & William, 1998; Shephard, 2000; Hattie, 2003; William & Leahy, 2015). Feedback must be timely in nature and offer additional insight into how a student can improve performance (Hattie, 2003). Feedback must be specific, given quickly, and offer an opportunity for students to make corrections and learn from their mistakes. If there is no opportunity to improve, there is little reason for students to review assessment results.

Sample, Data Collection, and Data Analysis

Sample

This mixed-methods study utilized the responses of three high school teachers who volunteered to be the sample. All participating teachers understood that they could be personally identified by the information presented in this study and consented to it. Table 1 presents a description of the demographics for the three participants.

Table 1. Description and Demographics of Participants

Participant	Subject Taught	Leadership Experience	Years of Teaching Experience
1	Mathematics	Department Chair	30
2	Physical Education	No Formal	9
3	Foreign Language	Department Chair, Private Workforce	12

Participant 1 was one of ten mathematics teachers and had taught that subject for 30 years. She had a master's degree in mathematics and was one of the most tenured professionals in the school. Besides teaching mathematics, she was the department chair. By participating in this study, she hoped to improve the learning of her students and to aid in providing meaningful assistance to members of her department.

Participant 2 was one of six physical education teachers. He had nine years of experience and recently completed a master's degree in educational leadership. With new mandates and challenges facing him, he volunteered to gain a better understanding of formative assessment and how to more effectively implement it in his classroom.

Participant 3 was in his twelfth year as a foreign language teacher. He was one of six teachers in the department and also served as department chair. Teaching was his second career after he had initially worked in the private sector. He volunteered to be a part of this study to gain insight and information so he could

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provide improved support to the members of his department in their utilization of formative assessment.

The high school of the participating teachers had about 1,000 students. Fifty percent of the students were eligible for free or reduced lunch, 16% received special education services, and 4% were homeless. The student body was 53% white, 32% African American, 8% Hispanic/Latino, 4% Asian, and 3% two or more races. The graduation rate was 94%, and the mean ACT score was 21. There were 90 professional (certified) staff and 18 support staff (non-certified) serving the students. Students were served by four school counselors, one curriculum and assessment coordinator, and one social worker. The administrative team was composed of the principal, three assistant principals, a student service coordinator, a curriculum director, and an athletic director.

Data Collection

A mixed-methods approach was used in the context of a constructivist framework that advocated teachers developing their understanding of content based on the world around them; it included previous experiences, prior knowledge, and interpretation of new information in a manner that was meaningful to them (Brooks & Brooks, 1999). A major emphasis was placed on how the perceptions of the three sample teachers changed over time regarding: (a) their understanding of formative assessment, (b) how formative assessment impacted their instruction, and (c) what support existed in their building for effective implementation of formative assessment.

Table 2 presents an overview of the five sources for data collection and when the data were collected in the 16-month time period of the study. The collection of data included a quantitative survey entitled the Teacher Formative Assessment Perception. Qualitative data collected used: (a) one unstructured individual interview, (b) field notes from eight informational conversations between the three sample teachers and researcher, (c) two classroom observations by outside observers (professors from a local university), and (d) two focus groups. The Teacher Formative Assessment Perception Survey—quantitative measure—utilized criteria from the previously reviewed research and literature. Input was also obtained from school staff, including teachers, counselors, department chairs, and administrators. The survey was a 25-question instrument that used the

following rating scale: strongly disagree, disagree, agree, and strongly agree. Examples of sample items were:

- Assessment is a tool used only by teachers.

- Students need opportunities to re-evaluate their understanding of content.

- I pre-assess skill level or knowledge before beginning a unit or chapter.

- Use a varied approach to questioning as a part of the formative assessment process.

Table 2. Schematic for Data Collection Processes

Data Collection Method	When Administered in the 16 Month Study's Time Period
The Teacher Formative Assessment Survey (Quantitative)	Pretest: Month 1 Posttest: Month 16
One unstructured individual interview by the researcher with the three sample teachers	Month 1
Field notes from eight informational conversations between three sample teachers and researcher	Spaced throughout the day
Two classroom observations by outside observers (professors from local university)	Month 6 and 10
Two focus groups	First focus group: Month 2 Second focus group: Month 16

The three participating teachers took the survey twice (pretest and posttest), about 16 months apart. The pretest scores were used to provide feedback to the three project teachers and served as the basis for discussion with the curriculum director (researcher) for collaboratively identifying formative assessment skill areas of improvement for each teacher. The differences between the pre-scores and post-scores were used for feedback to the three participating teachers and analysis for addressing the project's results. The 25 survey questions were based on five themes: (1) the accountability of teachers in the formative assessment process, (2) the accountability of students in the formative assessment process, (3) student learning as a basis for use of formative assessment, (4) types of

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instructional planning and methods, and (5) overall teacher competencies pertaining to formative assessment.

The unstructured interview was used to collect information from each of the three project teachers about their perceptions of factors related to formative assessment. The interview schedule was composed of seven questions, with several sub-questions. The interview results were used to individualize staff development. The questions were obtained from information reviewed in the literature and research section. The interviews occurred near the start of the study. Examples of questions are:

- What are your initial perceptions regarding the value of formative assessment?

- Are you currently tracking individual student progress, and revisiting the data on an ongoing basis to determine progress?

The eight informal conversations took place throughout the study and were analyzed to identify general trends and changes over time. These informal conversations also collected information regarding the three teachers' understanding of formative assessment and how to utilize instructional practices based on the assessment results. Further, information was collected on their perceptions of the extent to which support existed and resources were available to effectively implement formative assessment, and the administrative team's leadership support. The notes from the eight informal conversations served as a major data collection source for answering the three research questions.

The two 45-minute classroom observations for each of the participating teachers were completed by professors from a local university and focused on obtaining observable first-hand accounts of how the teachers used formative assessment results to individualize instruction for students. Scripting was used for data collection based on the rubric for giving feedback in accordance with the Danielson Teacher Evaluation Framework. This framework divides the professional practice of teachers into four domains: (1) planning and preparation, (2) the classroom environment, (3) instruction, and (4) professional responsibilities (Danielson, 2007). After each observation the professor and teacher met to discuss the lesson and the perceptions of each regarding what took place. Collaboratively, the professor and teacher

identified actions for the teacher to take to improve the implementation of formative assessment.

The two focus groups used 10 probes developed from the literature and research reviewed. Each focus group lasted about 50 minutes, with the first taking place early in the study and the last about three-quarters of the way through the study. The probes focused on ideas for effectively using formative assessment, staff development needs, how participants perceptions changed over time, and support needed—and given—to effectively implement formative assessment. Examples of the probes are:

- What do you see as the driving force behind assessment?

- What would assist teachers the most with implementation of formative assessment?

- How has implementation of formative assessment affected planning and preparations?

Data Analysis

The analysis of the data collected was anchored in the study approach used by the researcher and focused on understanding and interpreting the meaning of the experiences of the three sample teachers. To avoid bias, the researcher explored her possible preconceived notions related to the data collected and doggedly guarded against them interfering with analysis and interpretation. For a contextual understanding, the researcher focused on "seeing and feeling" what the three sample teachers were experiencing. Triangulation between the data and information generated for the three participants was used to consolidate the results. The data and information were gathered by the researcher and analyzed using Merriam's (2009) references as "category construction" (p. 178). Qualitative data for the sample teachers were initially reviewed to identify major categories. Then each piece of data was coded to a category linked to the research questions.

Results

The results are based on information from these data collection sources: (a) quantitative survey, (b) one unstructured individual interview by the researcher with each of the three sample teachers by the researcher, (c) field notes from eight informational conversations between the three sample teachers and the researcher,

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(d) two classroom observations by outside observers (professors from a local university), and (e) two focus groups. Each result integrated available data and information from the sources that were germane to the study.

Research Question 1: How do high school teachers' perceptions of their understanding of formative assessment affect their instructional practices?

Perceptions of the three sample teachers reflected positive change about formative assessment over time, especially for adjusting their instructional methods to meet the individual needs of students. These positive perceptual changes were prompted by:

- Knowing how to track students' attainment of learning objectives through the data gleaned from formative assessment. Example: A sample teacher developed a behavior classification checklist from a rubric and shared the checklist with students prior to instruction to communicate expectations for the learning objective and then collected observational data for each student to track attainment.

- Providing each student with specific formative assessment feedback on strengths and weaknesses, utilizing rubrics developed from course objectives. Example: A sample teacher used the collected data from a checklist built from a rubric to provide each student with performance feedback for the learning objective.

- Adjusting instructional methodologies on a student-by-student basis. Example: Based on the performance feedback for the learning objective that indicated a need to improve (weakness), a sample teacher individualized instruction based on each student's needs to aid her/him in mastering the objective.

- Using preset curriculum road maps that tightly align course goals, objectives, activities, instructional methods, and assessments. Example: The road map identified specific learning objectives through the sample teacher's planning and preparation for the unit resulting in the preset curriculum for the unit's learning objectives. Formative assessment measures linked to the learning objectives were developed. The instructional method, with delineated learning activities, was linked to each learning objective.

- Understanding clearly the accountability responsibilities of the teacher and students regarding the roles each play in the effective use of formative assessment for improved student learning. Example: During a classroom observation of a sample teacher by a university professor, the professor observed student-to-student feedback for a learning objective and saw students assisting each other to improve understanding and give moral support. In a focus group, the three sample teachers indicated they outlined their roles, and the roles of students, in the use of the formative assessment process.

- Generating synergy by the interactions between the three sample teachers and curriculum director which motivated a desire to change. Example: Field notes by the researcher, who was the curriculum director, revealed the three sample teachers' feelings of positiveness generated by the ongoing interactions. These positive interactions creating synergy were revealed during the second focus group by the three sample teachers.

Research Question 2: How do high school teachers' perceptions of their understanding of formative assessment evolve over time when provided with specific information about formative assessment?

The perceptions of the three sample teachers changed over time based on the following:

- Individualized professional development was aligned to the specific knowledge and skills needs associated with the effective use of formative assessment. Example: Before individualized professional development, a sample teacher used whole group instruction most of the time. Through targeted individualized professional development, the sample teacher realized the need for the use of differentiated and individualized instructional methods because they better fit with the formative assessment process and began to make better use of such methods.

- Coaching from the curriculum director caused the teachers to better understand formative

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assessment and how to utilize it over time. (Developing professional relationships between the three sample teachers and curriculum director were paramount for establishing a culture of mutual trust and respect needed for effective coaching.) Example: A sample teacher stated, "If we all work together and are supported from our leadership and in our departments, we can make it through change and implementation of formative assessment in the classroom."

- The teachers observed students' achievement improving because formative assessment was used and wanted to continue its use in the future for even greater success with students mastering course content. Example: A sample teacher noted in a focus group that being more attentive on students' growth caused student learning to improve. This was supported by another sample teacher who indicated students' mastery of learning objectives improved as a function of the formative assessment process.

- The sample teachers realized that formative assessment training did not always translate smoothly into classroom application, but with practice and coaching skills quickly improved. Example: A sample teacher indicated, that at the start of the project's ongoing professional development, he viewed summative assessment solely as the source of data for judging student performance. Through the ongoing professional development, he changed his opinion and behaviors reflective of formative assessment as being a "fairer" way to assess students' performance.

- All of the necessary ingredients came together effectively as time progressed resulting in successful formative assessment and improved student learning. Example: In a focus group a sample teacher indicated that the formative assessment process prompted ongoing student engagement, the instructional adjustments he needed to make for student mastery of a learning objective, and reduced classroom management issues.

- When discussing and working with other staff, the sample teachers increasingly realized the potential for formative assessment to improve student learning. Example: A sample teacher reported a paradigm shift for a desire to involve students much more in assessment through the formative process than was the case with the previously used summative assessment.

- The sample teachers observed students "buying in" to the use of the formative assessment feedback and peer-to-peer feedback to improve performance. Example: Through classroom observations of the three sample teachers the local university professors documented multiple situations in which students provided performance feedback to each other and coached one another regarding how to master content for a learning objective.

- The sample teachers observed students' willingness to be accountable for their role in the use of formative assessment to improve learning. Example: During the classroom observation of a sample teacher, the university professor observed that students took the initiative to assist each other and work together based on assessment feedback to fulfill their roles in the formative assessment process.

Research Question 3: What support exists to help high school teachers implement formative assessment?

The following represent the major support mechanisms needed for sample teachers to effectively implement formative assessment:

- Support from the school's administrative team through commitment to formative assessment, making it a priority, and furnishing technical support for effective implementation. Example: Through informal conversations with the researcher, all three sample teachers indicated through informal conversations with the researcher that administrators offered multiple levels of support that helped with the implementation of the formative assessment process. Sample teachers were afforded opportunities to attend workshops and share obtained skills and knowledge. The sample teachers had the curriculum director (researcher), department chairs, and administrators available to assist and support them in implementing the formative assessment process.

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- Ongoing individual and group staff development representing state-of-the-art content and delivery based on evidence of best practices. (This included individualized professional development goals that specifically identified knowledge and skills needed to use formative assessment more effectively in meeting the instructional needs of each student.) Example: A sample teacher collaborated with the curriculum director (researcher) and a university professor to develop a system to track real-time formative assessment data. Through results from the Teacher Formative Assessment Survey, and her own self-reflections, she realized the need to find a way to effectively use data on an on-going basis for feedback to students and adjust her instruction. Another sample teacher indicated that, through staff development, he was able to determine an easy and effective way to track student mastery of student learning objectives.

- Resources for modifying curriculum materials to better meet students' needs when formative assessment data demonstrate a necessity to re-teach and enrich content. Example: Through an informal conversation with the researcher, a sample teacher indicated that developing a curriculum road map for content unit learning objectives allowed him to more effectively determine where and how to meet students' achievement needs. He stated that "Not all students learn the same way." He also indicated that a variety of curriculum materials equipped him to better meet each student's needs and improve mastery of learning objectives.

- An environment that encourages teachers to place more emphasis on students truly mastering content by using formative assessment rather than solely using summative assessment for giving grades. (This empowered teachers to make decisions for effective classroom use of formative assessment on a day-to-day basis.) Example: A sample teacher stated, "Once I had my course curriculum road map in place, I felt it was easy to adjust my instruction based on what my students needed. I had clear and specific goals and objectives and was able to show why I was doing what I was doing. Setting a clear learning target was an important piece of planning I was missing before."

- Support of teachers through staff development focusing on continuous improvement based on an understanding that there may be a wide variation in the starting points for teachers' knowledge and skills in the effective use of formative assessment is important. Example: A sample teacher noted that he needed professional development structured to his current knowledge and skills regarding the formative assessment process. As he stated, "Initially the district offered more global professional development, but there comes a time where you have to know where teachers are in their understanding and offer professional development there." Using the Teacher Formative Assessment Survey results, the researcher was able to target professional development individually for each of the three sample teachers.

- Ongoing feedback from the curriculum director and self-reflections prompted through information flowing from the Teacher Formative Assessment Perception Survey. (This helped target individualized professional development.) Example: A sample teacher and the curriculum director (researcher) met on several occasions to reflect on how the teacher's system of tracking students' attainment of learning objectives using formative assessment was working. The curriculum director (researcher) observed the teacher on several occasions, discussed her observations with the teacher, and offered suggestions for improvement. The sample teacher stated, "Knowing from the Teacher Formative Assessment Survey results the areas I needed to target helped me to know how to prioritize. Sometimes it is just knowing where to start that is the hardest."

Recommendations

The recommendations are based on holistically what the researcher perceived to be salient points learned from the study applicable to those interested in (or responsible for) effective utilization of the formative assessment process in high schools. This includes

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information from the results in addition to knowledge and insights the researcher acquired from the study.

Student learning will be enhanced if high school teachers effectively use formative assessment to provide feedback to students, and they individualize instruction based on the assessment feedback. In many instances, this will require a paradigm shift in the minds and practices of high school teachers away from their approach of assessment being summative for giving grades, to formative for adjusting instruction based on assessment feedback. High school teachers need to view expertise in instructional methodologies for individualization of students' learning being at least equally important compared to their knowledge of course content.

A high school's culture must embrace formative assessment as standard operating procedure in all classrooms. This means that the building's administrative team consistently emphasizes the importance of formative assessment, and its members behave in a manner that supports it. Inclusion of crucial elements of formative assessment should be a part of a school's formal teacher evaluation system.

A school-wide operational definition of formative assessment is needed, with accompanying examples, including examples specific to each academic department's content. Both faculty and students need to be involved in identifying the types of formative assessment that are most useful based on the content of specific courses. To maximize learning, students need to understand their accountability role in formative assessment. Further, ongoing feedback must be solicited from students to obtain insights regarding what methodologies for individualizing instruction work best for them and why.

A comprehensive staff development program focusing on formative assessment and how to individualize instruction is essential. Part of this staff development program must be personalized to the needs of each teacher. In addition, the staff development program should furnish specific examples of state-of-the-art use of formative assessment on a department-by-department basis.

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Citation:

Brink, Melanie & Bartz, David E. (2017). Effective Use of Formative Assessment by High School Teachers. *Practical Assessment, Research & Evaluation*, 22(8). Available online: http://pareonline.net/getvn.asp?v=22&n=8

Corresponding Author

David E. Bartz
Department of Educational Leadership
Eastern Illinois University
600 Lincoln Avenue
Charleston, IL 61920

email: debartz [at] eiu.edu