

USING SITUATED LEARNING, COMMUNITY OF PRACTICE AND GUIDED ONLINE  
DISCOURSE IN HEALTHCARE EDUCATION FOR LEARNING EFFECTIVE  
INTERPROFESSIONAL COMMUNICATION AND PRACTICE  
IN THE ELECTRONIC HEALTH RECORD  
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The problem exists that there are no education initiatives focused on teaching and taking into practice the skills of effective interprofessional discourse in this online, asynchronous, professional environment. The purpose of this study was to examine whether it is possible for students in the health professions to learn to practice effective, interprofessional online discourse in an electronic health record. This was a mixed methods study that included both quantitative and qualitative inquiry underpinned by post-positivism and used a method triangulation research design model. Both quantitative and qualitative data were collected and analyzed from an educational intervention and simulated electronic health record exercise. The students' perceptions of their practice in an electronic health record did not necessarily match their knowledge and skills in this group of students. Emergent themes from the study pointed in the possible direction of perceived value of the exercise, prior experience in an electronic health record, and logistical barriers to the activity. A perceived time constraint was a particularly strong concern of the students. The emergent themes might be valuable considerations for other interprofessional programs looking to implement similar activities concerning the electronic health record.

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## TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS .....	iii
LIST OF TABLES .....	iv
LIST OF FIGURES .....	x
CHAPTER 1 INTRODUCTION .....	1
1.1 Problem Statement .....	2
1.2 Purpose of Study .....	2
1.3 Research Question .....	3
1.4 Significance .....	4
1.5 Methods .....	4
1.5.1 Phases 1 and 2: Historical Data .....	6
1.5.2 Qualitative Triangulation .....	6
1.6 Assumptions and Limitations of the Study .....	7
1.7 Summary .....	8
CHAPTER 2 LITERATURE REVIEW .....	10
2.1 The Importance of Situated Learning in a Community of Practice.....	10
2.2 Online Discourse in a Community of Practice .....	12
2.3 Integrating EHR in the Educational Environment .....	14
2.4 A Call for Mixed Methods Research in Medical Education .....	16
2.4.1 Mixed Methods Research Design Models .....	16

2.4.2 Triangulation Research Design Model .....	17
2.5 Post-Positivist Paradigm for Mixed Methods Research .....	18
2.6 Initial Exploratory Study .....	19
2.6.1 Method .....	19
2.6.2 Results .....	20
2.7 Electronic Health Record Exercise in the IDEAL Course .....	21
2.8 Discussion of the Literature .....	32
2.9 Summary .....	33
CHAPTER 3 METHODS, DATA COLLECTION AND ANALYSIS .....	36
3.1 Research Question .....	36
3.2 Triangulation Design Research Model .....	37
3.3 Research Setting .....	37
3.4 Methods .....	38
3.4.1 Phases 1 and 2: Historical Data .....	39
3.4.2 Phase 3: Quantitative Triangulation .....	39
3.4.3 Data Collection .....	40
3.4.3.1 Phase 1 .....	42
3.4.3.2 Phase 2 .....	42
3.4.4 Data Analysis .....	43
3.4.4.1 Stage A .....	44
3.4.4.2 Stage B .....	44

3.4.4.3 Stage C .....	44
3.4.4.3.1 Scale Reliability.....	45
3.4.4.3.2 Analysis.....	46
3.4.4.4 Stage D .....	47
3.4.4.5 Stage E .....	47
3.4.4.6 Stage F – Triangulation .....	48
3.5 Rigor and Trustworthiness .....	49
3.5 Summary .....	52
CHAPTER 4 RESULTS .....	53
4.1 Participant Demographics .....	53
4.2 Stage A: Knowledge Gains .....	55
4.3 Stage B: Practice Skills (Rubric Scores) .....	56
4.4 Stage C: Stratified Purposive Sample .....	59
4.5 Stage D: Self-Assessment .....	61
4.6 Stage E: Qualitative Assessment of Open-ended Comments .....	64
4.6.1 Initial Structured Codes .....	69
4.6.2 First Round Coding .....	71
4.6.3 First Round Results .....	72
4.6.4 Second Round Coding .....	77
4.6.5 Second Round Coding Results .....	79
4.7 Data Triangulation for Stratified Subgroups .....	82

4.7.1 Average student profile .....	85
4.7.2 Data Triangulation Within Subgroups .....	87
4.7.2.1 Subgroup 1 .....	88
4.7.2.2 Subgroup 2 .....	94
4.7.2.3 Subgroup 3 .....	102
4.7.2.4 Subgroup 4 .....	107
4.8 Summary .....	111
CHAPTER 5 DISCUSSION .....	113
5.1 Research Question 1. Can students learn the concepts for effective online discourse through an online educational module .....	114
5.2 Research Question 2. Will students take into practice, in a situated online learning environment, what they have learned? .....	114
5.3 Research Question 3. Will students' perceptions of their learning match their practice in the electronic health record? .....	115
5.4 Do students' perceptions of their practice in an electronic health record match their knowledge and skills? .....	115
5.5 Emergent Themes .....	116
5.5.1 Value of Exercise .....	117
5.5.2 Logistics.....	117
5.5.3 Prior Experience.....	121
5.6 Limitations .....	121
5.7 Implications .....	122
5.8 Areas for Future Research .....	123



5.9 Conclusion .....	124
APPENDIX. CODING MANUAL.....	127
BIBLIOGRAPHY .....	146

LIST OF TABLES

	Page
Table.2.1 Interprofessional EHR Communication Rubric .....	23
Table. 3.1 Stratified Purposeful Sampling Subgroups .....	47
Table 4.1 Participant Demographics .....	55
Table 4.2 Wilcoxon Test Descriptive Statistics .....	56
Table 4.3 Descriptive Statistics for Rubric Scores .....	57
Table 4. 4 Stratified Sample of Subgroups .....	59
Table 4.5 Professional Written Communication Scale .....	62
Table 4.6. Attribute Coding .....	66
Table 4.7 Open-ended Comments .....	66
Table 4.8. Initial Structured a priori Codes .....	70
Table 4.9 Initial Structured <i>a priori</i> codes and Emergent Codes .....	70
Table 4.10 Overarching Categories for First Round Coding .....	76
Table 4.11 Triangulation Data Table of Stratified Subgroups .....	83
Table 4.12 Average Student Profile .....	85
Table 4.13. Subgroup 1: High knowledge Gains/ High Rubric Scores .....	87
Table 4.14. Subgroup 2: High knowledge Gains/ Low Rubric Scores .....	93
Table 4.15 Subgroup 3: Low knowledge Gains/ High Rubric Scores .....	101
Table 4.16 Subgroup 4: Low knowledge Gains/ Low Rubric Scores .....	106

## LIST OF FIGURES

	Page
Figure 1.1 Phases of Research .....	5
Figure 2.1 Achieving Interprofessional Education Competencies .....	21
Figure 2.2 Pre assessment .....	24-27
Figure 2.2 Post assessment .....	28-31
Figure 3.1 Phases of Research .....	38
Figure 3.2 Data Collection and Analysis .....	41
Figure 4.1 Rubric Score Distribution .....	58
Figure 4.2 Appended Scatter Plot of Rubric Scores and Knowledge Gains .....	61
Figure 4.3 Example from First Round of Coding .....	71
Figure 4.4 Example from Second Round of Coding .....	78
Figure 4.5 Appended Rubric/Knowledge Gains Correlation Plot .....	86
Figure 4.6 Self –assessment Bar Graph for Special Sauce .....	89
Figure 4.7 Self –assessment Bar Graph for Katherine .....	90
Figure 4.8 Self –assessment Bar Graph for bublgumblonde .....	91
Figure 4.9 Self –assessment Bar Graph for Dragoneye .....	92
Figure 4.10 Self –assessment Bar Graph for Olsen Twin .....	95
Figure 4.11 Self –assessment Bar Graph for The Mountain .....	96
Figure 4.12 Self –assessment Bar Graph for Chester .....	97
Figure 4.13 Self –assessment Bar Graph for Johnny Football .....	98

Figure 4.14 Self –assessment Bar Graph for The Girl Next Door .....	99
Figure 4.15 Self –assessment Bar Graph for Janelle .....	100
Figure 4.16 Self –assessment Bar Graph for Cricket .....	103
Figure 4.17 Self –assessment Bar Graph for Ginger Spice .....	104
Figure 4.18 Self –assessment Bar Graph for maddie lou .....	105
Figure 4.19 Self –assessment Bar Graph for Wayne Rogers .....	108
Figure 4.20 Self –assessment Bar Graph for Grandma .....	109
Figure 4.21 Self –assessment Bar Graph for nannabannana .....	110
Figure 4.22 Self –assessment Bar Graph for Faith Hill .....	111

## CHAPTER 1

### INTRODUCTION

Medical and healthcare education report nominal attempts to prepare students to practice in the online environment of an electronic health record (EHR) (Borycki, Griffith, Riedm Kushniruk, & Kuo, 2013; Mintz, Navarte, O'Brien, Papp & Durning, 2009; Morrow & Dobbie, 2010; Society of Teachers of Family Medicine, 2013; Stephens, Gimbel & Pangaro, 2011; Lea, Pearson, Clamp, Johnson, Jones, 2008). Most educational efforts focused solely on the technical aspects of software use and navigation within the electronic health record environment (Stephens, Gimbel & Pangaro, 2011). This is relevant since federal legislation of the American Recovery and Reinvestment Act of 2009 (ARRA) mandated that all public and private healthcare providers must be able to show they are using electronic health records (EHR), and do so in a meaningful way starting on January 1, 2014,. If they do not, they will lose their existing Medicaid and Medicare reimbursement (American Recovery and Reinvestment Act, 2009).

A primary factor for the adoption of electronic health records is the potential improvement in patient safety (Buntin, Burke, Hoaglin, Blumenthal, 2009) as well as quality and efficiency of care (Chaudhry, Wang, Wu, Maglione, Mojic , Roth, Morton, Shekelle, 2006). Additionally, electronic health records are increasingly the primary form of communication for patient care between healthcare team members and with patients (Institute of Medicine, 2003). Using an electronic health record effectively can

result in improved communication and teamwork (Bates, Ebell, Gotlieb, Zapp & Mullins, 2003; Mintz et al., 2009).

### 1.1 Problem Statement

Many of the current students in healthcare education have experience in online environments such as Facebook or Twitter (Mudry & Strong, 2013; Stommel & Meijman, 2011), however this does not mean that they can use an electronic health record without instruction and guidance (Borycki et al 2013; Ellaway et al., 2013; Elliot et al., 2011; Han & Lopp, 2013; Joe, Borycki, Armstrong, Otto & Ho, 2009). Nor can students intuitively determine what characterizes effective communication with other health professionals in the electronic health record environment (Nelson & Staggers, 2014). Educational efforts exist to teach students how to use electronic health record online systems (Stephens, et al, 2011; Milano, et al, 2014; Stephenson, Gorsuch, Hersh, Mohan, Gold, 2014); however, there are no education initiatives focused on teaching and taking into practice the skills of effective interprofessional discourse in this online, asynchronous, professional environment (Ellaway, Graves & Peters, 2013).

### 1.2 Purpose of Study

The purpose of this study was to examine whether it is possible for students in the health professions to learn to practice effective, interprofessional online discourse in an electronic health record.

A review of the literature supports (a) the importance of situated learning in a community of practice as it relates to the electronic health record; (b) the teachability of online discourse (i.e. written interaction), and potential improvement, for more clear and relevant communication within the community of practice of health professionals in an electronic health record; (c) the integration of situated learning, as it relates to the electronic health record, into higher education for health profession students.

### 1.3 Research Question

Based on a review of literature and findings from a pilot study (Hoggatt Krumwiede, Gupta, Simpkins, Hocking, Latson, 2014), this study looked to answer the following question: Do students' perceptions of their practice in an electronic health record (EHR) match their knowledge and skills?

To answer this overarching question, I used a mixed methods approach to attempt to answer the following sub-questions:

- Research Question 1. Can students learn the concepts for effective online discourse through an online educational module?
- Research Question 2. Will students take into practice, in a situated online learning environment, what they have learned?
- Research Question 3. Will students' perceptions of their learning match their practice in the electronic health record?

#### 1.4 Significance

It is important to have healthcare students and trainees learn to practice effective, interprofessional online discourse in the electronic health record (Pageler, 2013; Tierney, Pageler, Kahana, Pantaleoni, Longhurst, 2013; Association of Departments of Family Medicine, 2014). This is significant since effective and efficient communication in the electronic health record environment could decrease miscommunications, potential errors, and inefficient care in professional practice that could have a negative and potentially fatal impact on patient care (Bates et al., 2003; Mintz et al., 2009; Stephenson et al., 2014).

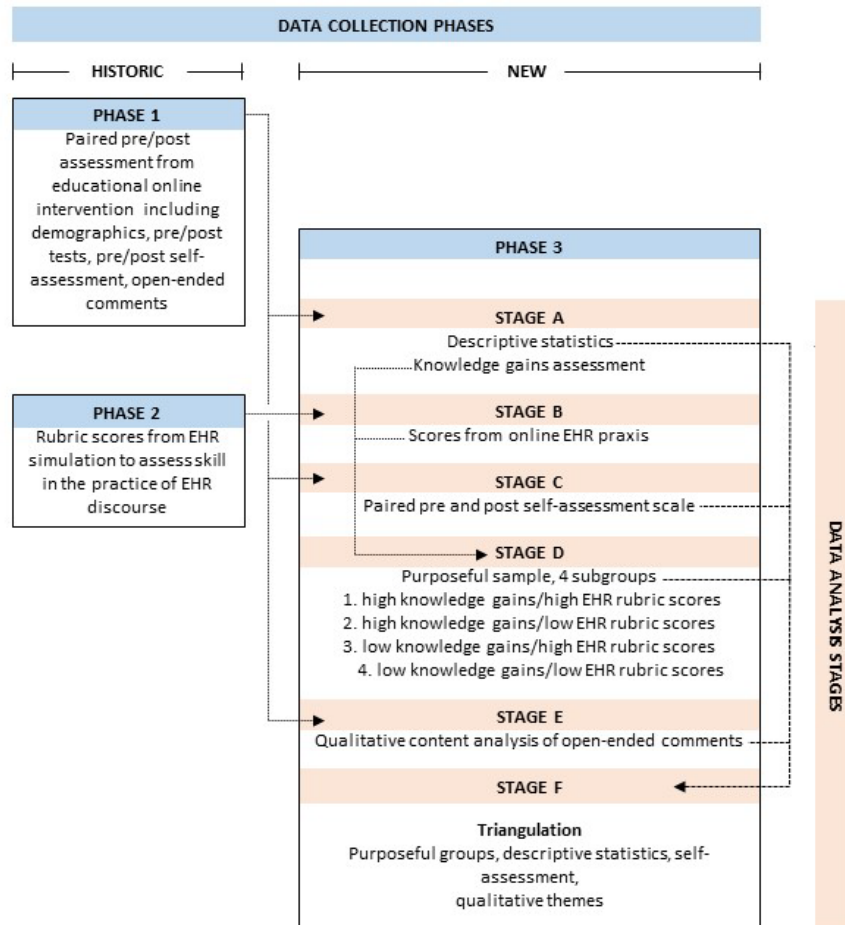
#### 1.5 Methods

Non-positivistic mixed methods research is increasingly used in educational technology research (Randolph, 2008), but incorporation of mixed methods is slower in medical education research (Schifferdecker, 2007). Mixed methods research should be used in medical education research when educators are interested in both the quantitative, measurable account of whether or not something happened, but also the qualitative insight as to the reasons why it happened (Schifferdecker & Reed, 2009). This research study adapted a single paradigm stance, post-positivist, for mixed methods research (Hall, 2013; Creswell, 2013). A post-positivist paradigm was the underpinning for this mixed methods research utilizing the triangulation of methods for validation and increased understanding (Hall, 2013; Trochim, 2006; Denzin, 1970).



The research for this study took place at a top tier medical center in the Southwest including a school of health professions offering a course in interprofessional education for students from different academic programs in healthcare. The research is derived from two previous research studies used as historical data and combined with a new third phase that provided depth under the non-positivistic paradigm. Figure 1.1 shows the triangulation of data collection.

Figure 1.1 Phases of Research



### 1.5.1 Phases 1 and 2: Historical Data

Phase 1 was a quantitative research method that examined paired, pre and post knowledge assessments of an online educational intervention including concepts on effective online discourse in an electronic health record. The comparison of paired, pre and post data determined the existence, if any, of knowledge gains. Phase 2 was a quantitative research method that assessed students' skill at practicing effective online discourse in an electronic health record environment. Students interfaced with a standardized interprofessional case study within an electronic health record, a situated online learning environment in a community of practice, to communicate with other health professions and the patient. Scoring these specific written professional communications utilized a rubric developed during a prior pilot study (Hoggatt Krumwiede, Gupta, Simpkins, Hocking, Latson, 2014).

### 1.5.2 Phase 3: Qualitative Triangulation

Phase 3 was designed to analyze the existing historic data including the paired scores from the knowledge gains assessment (phase 1) and the rubric scores from online electronic health record praxis (phase 2) to create a purposeful sample from which to select individuals for four subgroups of students to provide insight on the phenomenon of interest (Patton, 1990; Creswell and Plano Clark, 2011, Palinkas, et al, 2015).

Sub-groups of students were selected and invited to participate in semi-structured interviews to collect qualitative data for phase 3 of the research. The purpose of the interviews was to identify whether the student's perception of their practice in the electronic health record matched their demonstrated knowledge and skills in an electronic health record. Unfortunately, none of the students from the previous studies agreed to participate in Phase 3. This was not foreseen in the design and review of the study. Possible reasons for this are discussed in Chapter 3. Offering incentives for research participation was not permitted by the internal review board (IRB) at the location of the study. Due to the lack of students to interview, an alternate approach examining the open-ended comments on post assessment and evaluations that students reflected on the electronic health record activity and experience was suggested and approved.

#### 1.6 Assumptions and Limitations of the Study

Assumptions in the study included the de-identification of data for quantitative and qualitative data analysis by self-anonymizing pseudonyms selected by the students. The pseudonyms allowed for paring of pre and post data, rubric scores, self-assessments and open-ended responses. The study was limited to the students who selected to leave post assessment comments during their first year health professions class in 2014-2015. The quantitative data were limited to data collected as part of an assignment in a course that had been completed and graded. Qualitative data were limited to data collected as

part of assessment and evaluation for the course. As mentioned, the lack of participation of students involved in the first two phases limits the holistic understanding of their perceptions.

### 1.7 Summary

This chapter provided a brief introduction to the use of the electronic health record in healthcare and the nominal attempts in medical and healthcare education to prepare students to practice in this online environment. The problem exists that there are no education initiatives focused on teaching and taking into practice the skills of effective interprofessional discourse in this online, asynchronous, professional environment. This study examined whether it is possible for students in the health professions to learn to practice effective, interprofessional online discourse in an electronic health record. Students who learn to practice effective, interprofessional online discourse in the electronic health record could have a positive impact on patient care, safety, and outcomes. This research included a mixed methods design with a post-positivist underpinning in order to address the main research question. Additionally, a list was included of assumptions and limitations for the study.

The next chapter, Literature Review, explores the literature related to (a) the importance of situated learning in a community of practice as it relates to the electronic health record; (b) the idea that online discourse (i.e. written interaction) can be taught, and potentially improved, for more clear and relevant communication within the

community of practice of health professionals in an electronic health record; (c) the integration of situated learning, as it relates to the electronic health record, into higher education for health profession students. There is also a brief review of mixed methods research models used in medical education.

## CHAPTER 2

### LITERATURE REVIEW

A review of the literature included three significant areas (1) the importance of situated learning in a community of practice as it relates to the electronic health record; (2) the idea that online discourse (i.e. written interaction) can be taught, and potentially improved, for more clear and relevant communication within the community of practice of health professionals in an electronic health record and 3) the integration of situated learning, as it relates to the electronic health record, into higher education for health profession students. Additionally, there is a brief review of mixed methods research in medical education including some of the more commonly used research design models.

#### 2.1 The Importance of Situated Learning in a Community of Practice

Electronic health records will become ubiquitous in the healthcare environment by mandate of The American Recovery and Reinvestment Act of 2009 (ARRA). After health profession students complete their training they will transition to professional environments that utilize an electronic health record as part of the patient care workflow. These students will have to know how to use these online environments to document patient information and communicate with patients and other health professionals. Situated learning could offer an educational environment where students could learn and develop skills and master competencies for a professional electronic

health record environment (Ericsson, Krampe & Tesch-Römer, 1993; Stephenson, et al, 2014).

There are a number of articles in the literature that support situated learning for medical and health profession students in an electronic health record system. Mintz, et al. (2009) declare “Just as medical schools currently teach proper documentation as part of good critical care in a paper-based world, they should be similarly obligated to teach students proper use of an EMR [EHR] in an increasingly electronic world.” (p. 1699)

Others expressed the importance situated learning in the electronic health record for students to learn skills in patient documentation and making decisions (Borycki et al., 2013; Ellaway, et al., 2013; Elliott, Judd & McGoll, 2011; Hammoud,, Dalymple, Christner, Stewart, Fisher, Margo, Ali, Brisco & Pangaro, 2012; Keenan, Nguyen & Srinivasan, 2006; Stephens et al., 2011; Milano, Hardman, Plesiu, Rdesinski, Biagioli, 2014). Stephenson and colleagues (2014) demonstrated that residents who participated in electronic health record simulation improved their identification of patient safety issues. The Society of Teachers in Family Medicine includes situated learning in the electronic health record in “Position Statement on Medical Student use of Electronic Health Records” (2013). Another article discusses the use of the Reporter/Interpreter/Manager/Educator (RIME) scheme as a model for situated learning in the electronic health record environment (Stephens et al., 2011).

Some obstacles to situated learning within the electronic health record were mentioned in the literature. One obstacle hindering authentic situated learning in the

actual electronic health record is the billing issues it creates since students are not able to bill for their time (Mintz, 2009). Another obstacle is potential problems with workflow and learner/teacher interaction (Schenarts, P. & Schenarts, K., 2012). Additionally, because a learner is functioning in the situated learning environment in a community of practice does not necessarily mean the individual feels or is competent in online discourse skills, such as online reading and writing, that are important to effectively communicate in this environment (Curan, Kirby, Parsons & Lockyer, 2003; Han & Lopp, 2013; Tierne, et al, 2013).

## 2.2 Online Discourse in a Community of Practice

In the recent past, articles incorporating on online discourse in the medical arena focused mostly on patients communicating in forums, blogs and social network environments (Mudry & Strong, 2013; Stommel & Meijman, 2011). Articles that included health professionals dealt mostly with online communication in web conferencing (Curran et al., 2003).

Only recently have there been examples in the literature addressing the need to teach specific skills such as online writing and reading for effective online discourse within the community of practice in the electronic health record (Borycki et al 2013; Ellaway et al., 2013; Elliot et al., 2011; Han & Lopp, 2013; Joe, Borycki, Armstrong, Otto & Ho, 2009). Schenartz and Schenartz (2012) hold a strong stance that in order for students to acquire and master written communication skills in the electronic health



record it is important for them to receive guided instruction in these skills, practice the skills in the situated learning environment, and also receive feedback from facilitators.

The report on Core Competencies for Interprofessional Collaborative Practice (2011) identified interprofessional communication as one of the competency domains for effective interprofessional practice amongst healthcare professionals. Health professionals need to know how to communicate a readiness to work together as a team. They also need to reduce the amount of specialized professional jargon they use so they don't confuse or create miscommunication with other health professionals. Learning to use a common language assists efficient and effective communication in a team. Also, team members need to learn to address conflict within a team in a "firm but respectful way when they have concerns about the quality or safety of care" (p. 22). Healthcare professionals also must be sure all team members understand the information has been conveyed effectively to all.

The report Health Professions Education: A Bridge to Quality from the Institute of Medicine (IOM) (2003), addressed the need for healthcare providers to be able to communicate effectively and clearly using shared, team oriented language. This is especially important when team members are not in the same physical location, or they are communicating using technology.

The IOM report also addressed the need to teach health profession students how to communicate with patients. Healthcare professionals must also communicate with patients through use of the electronic health record and it is important that they

know how to communicate clearly with patients especially regarding important considerations such as race, culture and disability. Effective communication between the healthcare provider and the patient has the potential to improve patient satisfaction and outcomes (p. 76). This is especially important in face-to-face and electronic communication including email and other online technologies such as an electronic health record.

Stephens et al. (2011) point out that in current teaching environments for utilizing electronic health records, the emphasis is on entering accurate clinical data, not on effective online discourse and communication skills. Their observation points to the need for concerted, purposeful integration of the electronic health record and online discourse skills in health professions education environment.

### 2.3 Integrating the Electronic Health Record in the Educational Environment

The literature recognizes the need to include situated learning in an electronic health record within a community of practice (Ellaway et al., 2013). Elliot et al. (2011) call for early integration of the electronic health record in a student's training along with a need for specific guided instruction and practice of online discourse skills in reading and writing and clear communication.

There are also calls in the literature for strategies and models for implementing the electronic health record in medical and health profession education. Elliott et al. cite the need for clear learning objectives and outcomes associated with student learning

activities in the electronic health record. Stephens et al. (2011) suggest integrating the RIME model because it supports situated learning in a community of practice and would work well in the electronic health record environment.

The Alliance for Clinical Education (ACE) has put forth practice guidelines for student practice in the electronic health record. The guidelines call for students to be involved in situated learning in an electronic health record during training. Also, electronic health record competencies must be mastered by students in order to graduate into clinical practice (Hammoud et al., 2012).

In the “Position Statement on Medical Student Use of Electronic Health Records” by The Society of Teachers of Family Medicine (2013), key strategies and policy changes are proposed. The intended outcome is a more effective method to teach students in a situated learning EHR environment within a community of practice.

Stephens, et al. (2011) offer yet another approach to incorporating electronic health record in the curriculum by finding ways to use core educational competencies to teach and evaluate skills and performance within the situated learning electronic health record environment.

Faculty are another important factor in implementing electronic health record situated learning in health profession education. Instructors, facilitators and mentors will also need to know how to facilitate student learning in the electronic health record environment (Keenan, 2006; Mintz et al., 2009; Morrow, 2010; Scenarts, 2012).

## 2.4 A Call for Non-Positivistic Mixed Methods Research in Medical Education

Research in medical education has been traditionally quantitative, following the empirical approach to scientific research. It is only in the last decade or so that mixed methods research has started to appear in medical education (Schiffedercker, 2007).

Mixed methods research should be used in medical education research when educators are interested both the quantitative, measurable account of “if” something happened, but also the qualitative insight as to “why” it happened (Schiffedercker & Reed, 2009).

According to Schiffedercker & Reed (2009), “Mixed methods may prove superior in increasing the integrity and applicability of findings when studying new or complex initiatives and interactions in medical education research” (p. 637).

### 2.4.1 Mixed Methods Research Design Models

Schiffedercker (2007) conducted a literature search of mixed methods research studies in both medical and nursing education and found that there were four main research design models used (1) instrument development, (2) explanatory, (3) triangulation, and (4) longitudinal transformation. The instrument development model is used to help develop quantitative instruments (i.e. questionnaires, checklists) that can be used while observing individual participants or a cohort. The explanatory research model first examines quantitative data, and then uses qualitative data to explain gaps or questions regarding the quantitative data. The triangulation model collects qualitative and quantitative data at the same time and then integrates the data analysis to validate

a hypothesis. Longitudinal transformation model uses data collection at different times in a project across multiple populations. Data analysis and integration is an iterative process over the course of a project.

#### 2.4.2 Triangulation Research Design Model

Triangulation is a common research design model used in mixed methods research (Creswell & Plano Clark, 2007; Schifferdecker & Reed, 2009; Hall, 2013). Guided by the research question, both quantitative and qualitative data are collected and analyzed to address a specific hypothesis. The triangulation of data or methods, reinforces the reality of a situation and reduces bias (Denzin, 1970; Patton, 2002; Creswell & Plano Clark, 2007; Schifferdecker & Reed, 2009; Hall, 2013). The triangulation model can also be conducted in a relatively concise timeframe and with a specific population for example, first year health profession students (Creswell & Plano Clark, 2007; Schifferdecker & Reed, 2009).

Triangulation of data or methods can be used to reduce bias as much as possible. Methods triangulation is a type of triangulation used to validate findings using data from different collection methods (Denzin, 1978; Patton, 2002; Creswell & Plano Clark, 2007). Different methods approach the same phenomenon from different, complementary, perspectives to reduce bias and expose the reality of a phenomenon. (Denzin, 1978; Patton, 1999; Creswell & Plano Clark, 2007; Patton, 2002) This type of triangulation can reveal points where the data converge or diverge with both scenarios providing insights

to the researcher. Using a methods triangulation results in more information than a single method can reveal about a phenomenon, therefore giving the researcher a broader and deeper understanding of the phenomenon (Denzin, 1978; Patton, 1999).

## 2.5 Post-Positivist Paradigm for Mixed Methods Research

A single paradigm stance can and should be used for mixed methods research (Hall, 2013; Creswell, 2013). Ontologically, the post-positivist paradigm holds that reality exists but humans are unable to fully know or understand it (Guba, 1990).

Epistemologically in this paradigm, humans can use external means and methods to verify or understand reality. However, humans can only approximate understanding and true reality can never be known. (Lincoln & Guba, 1985; Guba, 1990; Guba & Lincoln, 1994) Methodologically in the post-positivist paradigm, multiple methods may be used to gather the information to obtain different perspectives and information in order to approach the knowledge of reality (Lincoln & Guba, 1985; Guba, 1990; Guba & Lincoln, 1994).

A post-positivist stance holds that human knowledge is constructed by the individual resulting in a bias toward the individual and therefore a researcher cannot separate her biases from the research (Tashakkori & Teddlie, 1998). A post-positivist position can underpin mixed methods research that utilizes the triangulation of methods for validation and an increased rich and in-depth understanding of a situation (Hall, 2013; Trochim, 2006; Denzin, 1970).

## 2.6 Initial Exploratory Study

An initial exploratory study was conducted (Figure 2.1) collaboratively with several interprofessional colleagues to initially test the impact of an online electronic health record based education intervention for achieving interprofessional education competencies including communication, teamwork, and professionalism in the electronic health record environment (Hoggatt Krumwiede, Gupta, Simpkins, Hocking, Latson, 2014).

### 2.6.1 Method

First year students from four programs (medicine, physical therapy, physician assistant studies, clinical nutrition) were placed into interprofessional teams and randomized to control or education intervention groups. The intervention group completed an interactive online module focused on effective communication in the electronic health record including: writing skills, professionalism, recognizing other professional roles, and integrating information from other professionals. The control group participated in a "placebo" module not including effective communication information and exercises. Both the control and intervention groups participated for one week in a situated learning exercise including daily logging in an electronic health record training environment. Each interprofessional team had identical patients for the teams to treat and document. Team performance was measured using a rubric based on

nationally published multisociety interprofessional education competencies (Interprofessional Education Collaborative Expert Panel, 2011).

## 2.6.2 Results

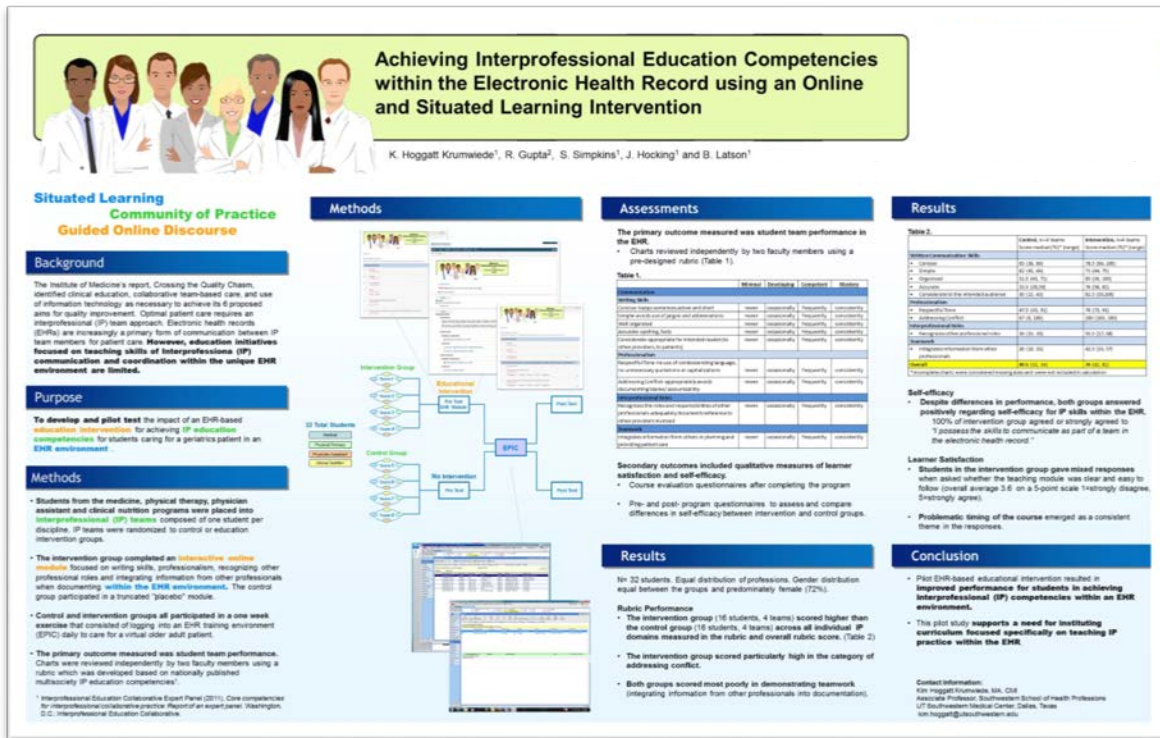
Interprofessional students from four programs participated in the pilot (n=32). The intervention group (4 teams of 4 students) scored higher than control group (4 teams of 4 students) across all interprofessional domains measured in the rubric. Self-assessment by students in both control and intervention groups demonstrated discrepancies between reported positive communications skills in their team and actual performance in the electronic health record.

## Conclusions

The electronic health record based educational intervention resulted in improved performance for students in achieving interprofessional competencies in writing skills, professionalism, recognizing other professional roles, and integrating information from other professionals within an electronic health record environment. There was a discrepancy between student self-assessment of one's communication skills within the team and actual performance. This indicates that students confuse proficiency in the electronic health record environment with interprofessional communication skills in the electronic health record. This pilot study supported a need for instituting curriculum focused specifically on teaching effective, interprofessional communication within the electronic health record.



Figure 2.1 Achieving interprofessional education competencies within the electronic health record using an online and situated learning intervention.



## 2.7 Electronic Health Record Exercise in the IDEAL Course

Results from the pilot study supported the inclusion of the online electronic health record exercise in the HCS5106 Interprofessional, Development, Education, and Active Learning (IDEAL). This is an interdisciplinary course designed to enhance interprofessional development, education and active learning amongst first year health profession students in the School of Health Professions at the University of Texas Southwestern Medical Center.

Physical therapy, physician assistant, and clinical nutrition students (n=94) completed the interactive online electronic health record module during the first (Fall 2014) semester of the IDEAL course. This included information and interactive exercises in a learning management system teaching concepts of effective communication practices in an electronic health record. The exercise also included activity in a situated learning environment, Epic electronic health record, with an interprofessional case study. Healthcare team members (students) used automated text entries and free text progress notes, wrote patient instructions and staff messages, and wrote consults to other members of a healthcare team. The activity in the electronic health record was scored using the interprofessional communication rubric (Table 2.1) developed during the pilot study.


Table 2.1 Interprofessional EHR Communication Rubric

<b>Interprofessional EHR Communication Rubric</b>				
Competency Domains for <u>Interprofessional Practice</u>	<b>Minimal [1]</b>	<b>Developing [2]</b>	<b>Competent [3]</b>	<b>Mastery [4]</b>
<b>Communication</b>				
<b>Writing Skills</b>				
Concise- keeps sentences active and short	never	occasionally	frequently	consistently
Simple- avoids use of jargon and abbreviations	never	occasionally	frequently	consistently
Well organized	never	occasionally	frequently	consistently
Accurate- spelling, facts	never	occasionally	frequently	consistently
Considerate- appropriate for intended reader (to other providers, to patients)	never	occasionally	frequently	consistently
<b>Professionalism</b>				
Respectful Tone- no use of condescending language, no unnecessary quotations or capitalizations	never	occasionally	frequently	consistently
Addressing Conflict- appropriately avoids documenting blame/ accountability	never	occasionally	frequently	consistently
<b>Interprofessional Roles</b>				
Recognizes the roles and responsibilities of other professionals-adequately documents reference to other providers involved	never	occasionally	frequently	consistently
<b>Teamwork</b>				
Integrates information from others in planning and providing patient care	never	occasionally	frequently	consistently

TOTAL SCORE \_\_\_\_\_

All students completed the asynchronous interactive learning activities in the Moodlerooms (moodle-based) learning management system over a period of two weeks. Pre and post assessment was included in the activity, as with other activities in the course, for formative quality measures. The pre assessment (Figure 2.2) included questions on demographics, knowledge, and self-assessment. The post assessment (Figure 2.3) included questions on knowledge, self-assessment and the exercise evaluation. De-identification for data collection and analysis was accomplished by students using self-selected pseudonyms in the exercises and assessments.

Figure 2.2 Pre assessment.



**Effective Interprofessional Practice**  
in the  
Electronic Health Record  
(EHR)

**Pre**

Please complete the survey below.

Complete the following BEFORE you begin the "Effective Interprofessional Practice in the Electronic Health Record" module.

---

**INFORMATION:**

---

1) **Name:**  
Use your unique pseudo-name or phrase used for prior IDEAL surveys  
\* must provide value

---

2) **I am a student in the:**  
\* must provide value

---

3) **Age:**  
\* must provide value

---

4) **Gender:**  
\* must provide value

Male  Female

---

5) **Have you had previous experience in health care?**  
\* must provide value

Yes  No

---

6) **Have you had previous experience using an electronic health record (EHR) system such as EPIC?**  
\* must provide value

Yes  No

Answer the following statements on a scale using Strongly disagree (1), Disagree (2), Neutral (3), Agree (4), Strongly agree (5)

**Communication Skills**

7) I have strong written communication skills.

\* must provide value

- Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

8) I understand the elements of written communication in a professional environment.

\* must provide value

- Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

9) I understand the elements of written communication in an electronic health record.

\* must provide value

- Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

10) I understand the most effective methods for written communication between health professionals.

\* must provide value

- Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

11) I understand how the most effective methods for written communication from health professionals to patients.

\* must provide value

- Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

**Interprofessional Roles and Responsibilities**

12) I can identify the roles and responsibilities of other healthcare team members.

\* must provide value

- Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

**Teamwork**

13) I understand the mechanics of how to communicate with other professionals within an electronic health record.

\* must provide value

- Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

**Electronic Health Record Skills**

**14) I possess the skills to communicate as part of a team in the electronic health record**

\* must provide value

- Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

**For the following multiple-choice items, please select the most correct response.**

**15) Which of the following is NOT an effective principle for written communication in an electronic health record (EHR)?**

\* must provide value

- A. Facts and spelling should be accurate.  
 B. Writing should be organized and clear.  
 C. Discipline specific language and extensive explanations should be included.  
 D. Communication should take into consideration the intended reader.  
 E. A professional tone should be used at all times.

**16) When addressing conflict in an electronic health record,**

\* must provide value

- A. identify the individual(s) responsible for an incident.  
 B. address the problem and suggest a solution.  
 C. refrain from direct contact with other health care providers though another form of communication, such as phone or p  
 D. openly express personal frustrations and emotions regarding a difficult situation.

**17) When communicating via an electronic health record**

\* must provide value

- A. focus strictly on your area of expertise.  
 B. acknowledge recommendations from other health care providers.  
 C. limit references to notes from only the primary physician and physician assistant.  
 D. refrain from references to other members of the health care team.

**18) Patient communication in an electronic health record should**

\* must provide value

- A. have a casual and friendly tone.  
 B. include detailed, complex descriptions.  
 C. use medical terminology when possible.  
 D. be written at a fifth grade reading level.

**19) When writing progress notes in an electronic health record**

\* must provide value

- A. limit information to your role with the patient.

- B. acknowledge roles and information from other health care providers.
- C. include additional information only from the primary physician.
- D. refrain from including information from other members of the health care team.

20) Choose which statement is NOT accurate.

\* must provide value

- A. Effective interprofessional teamwork increases the quality of patient care and reduces the number of medical errors.
- B. Teamwork requires a shared acknowledgement roles, abilities, and responsibilities of each member.
- D. When caring for a patient, it is important to focus strictly on your area of expertise.
- C. Without effective teamwork, a string of seemingly minor oversights may lead to decreased quality of care and medical


21) The majority of communication between healthcare providers is

\* must provide value

- A. written, remote, asynchronous, and via electronic health records.
- B. direct, synchronous, and via the phone.
- C. direct, face-to-face, in a clinical or hospital setting.
- D. written, remote, asynchronous, and through email.

Submit

Figure 2.3 Post assessment.



**Effective Interprofessional Practice**  
in the  
Electronic Health Record  
(EHR)

**Post**

Please complete the survey below.

Complete the following AFTER you have completed the "Effective Interprofessional Practice in the Electronic Health Record" module in EPIC activity.

---

**INFORMATION:**

---

1) **Name:**  
Use your unique pseudo-name or phrase used for prior IDEAL surveys  
\* must provide value

---

2) **EPIC Patient MRN #:**  
Use your assigned patient MRN number from the EPIC activity  
\* must provide value

---

3) **I am a student in the:**  
\* must provide value

---

**Answer the following statements on a scale using Strongly disagree (1), Disagree (2), Neutral (3), Agree (4), Strongly agree (5)**

---

**Communication Skills**

---

4) **I have strong written communication skills.**  
\* must provide value

Strongly disagree (1)    Disagree (2)    Neutral (3)    Agree (4)    Strongly agree (5)

---

5) **I understand the elements of written communication in a professional environment.**  
\* must provide value

1 of 4

(continued)



Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

6) I understand the elements of written communication in an electronic health record.

\* must provide value

Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

7) I understand the most effective methods for written communication between health professionals.

\* must provide value

Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

8) I understand how the most effective methods for written communication from health professionals to patients.

\* must provide value

Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

#### Interprofessional Roles and Responsibilities

9) I can identify the roles and responsibilities of other healthcare team members.

\* must provide value

Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

#### Teamwork

10) I understand the mechanics of how to communicate with other professionals within an electronic health record.

\* must provide value

Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

#### Electronic Health Record Skills

11) I possess the skills to communicate as part of a team in the electronic health record

\* must provide value

Strongly disagree (1)  Disagree (2)  Neutral (3)  Agree (4)  Strongly agree (5)

For the following multiple-choice items, please select the most correct response.

12) Which of the following is NOT an effective principle for written communication in an electronic health record (EHR)?

\* must provide value

- A. Facts and spelling should be accurate.
- B. Writing should be organized and clear.

- C. Discipline specific language and extensive explanations should be included.
- D. Communication should take into consideration the intended reader.
- E. A professional tone should be used at all times.

13) **When addressing conflict in an electronic health record,**

\* must provide value

- A. identify the individual(s) responsible for an incident.
- B. address the problem and suggest a solution.
- C. refrain from direct contact with other health care providers through another form of communication, such as phone or p
- D. openly express personal frustrations and emotions regarding a difficult situation.

14) **When communicating via an electronic health record**

\* must provide value

- A. focus strictly on your area of expertise.
- B. acknowledge recommendations from other health care providers.
- C. limit references to notes from only the primary physician and physician assistant.
- D. refrain from references to other members of the health care team.

15) **Patient communication in an electronic health record should**

\* must provide value

- A. have a casual and friendly tone.
- B. include detailed, complex descriptions.
- C. use medical terminology when possible.
- D. be written at a fifth grade reading level.

16) **When writing progress notes in an electronic health record**

\* must provide value

- A. limit information to your role with the patient.
- B. acknowledge roles and information from other health care providers.
- C. include additional information only from the primary physician.
- D. refrain from including information from other members of the health care team.

17) **Choose which statement is NOT accurate.**

\* must provide value

- A. Effective interprofessional teamwork increases the quality of patient care and reduces the number of medical errors.
- B. Teamwork requires a shared acknowledgement roles, abilities, and responsibilities of each member.
- D. When caring for a patient, it is important to focus strictly on your area of expertise.
- C. Without effective teamwork, a string of seemingly minor oversights may lead to decreased quality of care and medical

- 18) **The majority of communication between healthcare providers is**  
 \* must provide value
- A. written, remote, asynchronous, and via electronic health records.
  - B. direct, synchronous, and via the phone.
  - C. direct, face-to-face, in a clinical or hospital setting.
  - D. written, remote, asynchronous, and through email.

**EVALUATION**

The following were clear and easy to follow:

	Strongly disagree	Disagree	Neutral	Agree	S
19) <b>Instructions for the overall module</b> * must provide value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
20) <b>Instructions for the accessing and using the electronic health record system (EHR), EPIC</b> * must provide value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
21) <b>Writing exercise from health professional to health professional</b> * must provide value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
22) <b>Writing exercise from health professional to patient</b> * must provide value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
23) <b>Communication exercise on professionalism</b> * must provide value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
24) <b>Exercise on interprofessional roles</b> * must provide value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
25) <b>Exercise on teamwork</b> * must provide value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
26) <b>Electronic health record (EHR) exercise in EPIC</b> * must provide value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

27) **Comments**

28) **Suggestions**

**Submit**

## 2.8 Discussion of the Literature

The literature supported the need to teach students efficient and effective communication in the situated learning electronic health record environment within a community of practice. Many students have experience in online environments such as Facebook and Twitter, however this does not mean they know how to successfully communicate in the professional electronic health record environment. Effective professional communication in the online environment and electronic health record is not inherent and will not necessarily develop without initial guided, purposive instruction.

The literature also supported the importance of integrating situated learning, such as the electronic health record system, into the educational curriculum so students can transfer the knowledge and skills into practice. (Hammoud, et al., 2012; Association of Departments of Family Medicine , 2014; Wald, George, Reis, Taylor, 2014) Situated learning affords the students practice and formative experience within the environment they will transition into their professional careers.

The literature supported the need for more effort in integration of the electronic health record into medical and health profession education. Models and strategies have been proposed. There is not yet, however, enough empirical data to support one model or strategy over the other.

The literature also supported the use of mixed methods research in medical education. There are four research design models that are the most commonly used in

medical education — instrument development, explanatory, triangulation, and longitudinal transformation. Using a methods triangulation optimizes multiple perspectives that bring more information about a phenomenon than a single method can reveal. Triangulation gives the researcher a broader and deeper understanding of the phenomenon.

The literature supported a single paradigm to underpin mixed methods research. A post positivist paradigm can underpin mixed methods research that utilizes the triangulation of methods for validation and an increased, more in-depth, understanding of reality.

A preliminary pilot study tested the impact of an online electronic health record-based education intervention for achieving interprofessional education competencies including communication, teamwork, and professionalism in electronic health record environment. The results indicated that students confuse proficiency in the electronic health record environment with successful practice of interprofessional communication skills in the electronic health record. This pilot study supported a need for instituting curriculum focused specifically on teaching effective, interprofessional communication within the electronic health record.

## 2.9 Summary

The American Recovery and Reinvestment Act (ARRA), mandated by January 1, 2014, all public and private healthcare providers must be able to show they are using

electronic health records (EHR) in a meaningful way to maintain Medicaid and Medicare funding. Electronic health records will become a ubiquitous part of practice in healthcare environments. Unfortunately, while there are some efforts to teach student how to use the technical aspects of electronic health record online systems, there are no education initiatives focused on teaching skills of interprofessional discourse in this online electronic health record environment.

This chapter reviewed literature supporting (a) the importance of situated learning in a community of practice as it relates to the electronic health record; (b) that online discourse (i.e. written interaction) can be taught, and potentially improved, for more clear and relevant communication within the community of practice of health professionals in an electronic health record; (c) the integration of situated learning as it relates to the electronic health record into higher education for health profession students. The significance of effective and efficient communication in the electronic health record environment lies in the potential to prevent miscommunications, possible errors, and inefficient care in professional practice that could result in negative, and potentially fatal, patient care.

The literature also supported the use of mixed methods research in medical education. Specifically, the triangulation research design method was identified as a viable design for this study. Also, a single, post-positivist paradigm can underpin mixed methods research.

Results from an exploratory study indicated the need to include in the medical and health professional curriculum, educational interventions focused specifically on teaching effective, interprofessional communication within the electronic health record

Chapter 2 discusses the research design and methods used in this study. A review of the literature will cover a mixed methods research design model and well as concepts in situated learning and educational efforts for taching effective communication in the electronic health records.

## CHAPTER 3

### METHODS, DATA COLLECTION AND ANALYSIS

This was a mixed methods study that included both quantitative and qualitative inquiry underpinned by post-positivism and used a method triangulation research design model that has been used in medical education research (Schifferdecker & Reed, 2009; Denzin, 2008; Erlandson, et al, 1993). This chapter discusses the research question, research design, setting, participants, and data collection and analysis methods used in this study.

#### 3.1 Research Question

The research question central to this study was “Do students’ perceptions of their practice in an electronic health record match their knowledge and skills?”

To answer this overarching question, I used a mixed methods approach to attempt to answer the following sub-questions:

- Research Question 1. Can students learn the concepts for effective online discourse through an online educational module?
- Research Question 2. Will students take into practice, in a situated online learning environment, what they have learned?
- Research Question 3. Will students’ perceptions of their learning match their practice in the electronic health record?



### 3.2 Triangulation Design Research Model

Mixed methods research allows both quantitative and qualitative approaches to data collection and analysis (Creswell & Plano Clark, 2007; Schifferdecker & Reed, 2009; Hall, 2013). Using a triangulation design method research model optimizes multiple perspectives, rather than a singular method, that bring more information about a phenomenon. This triangulation gives the researcher a thick, rich, multifaceted understanding of the phenomenon (Denzin, 1978; Patton, 1999; Creswell & Plano Clark, 2007; Patton, 2002, Tashakori & Teddlie, 2008).

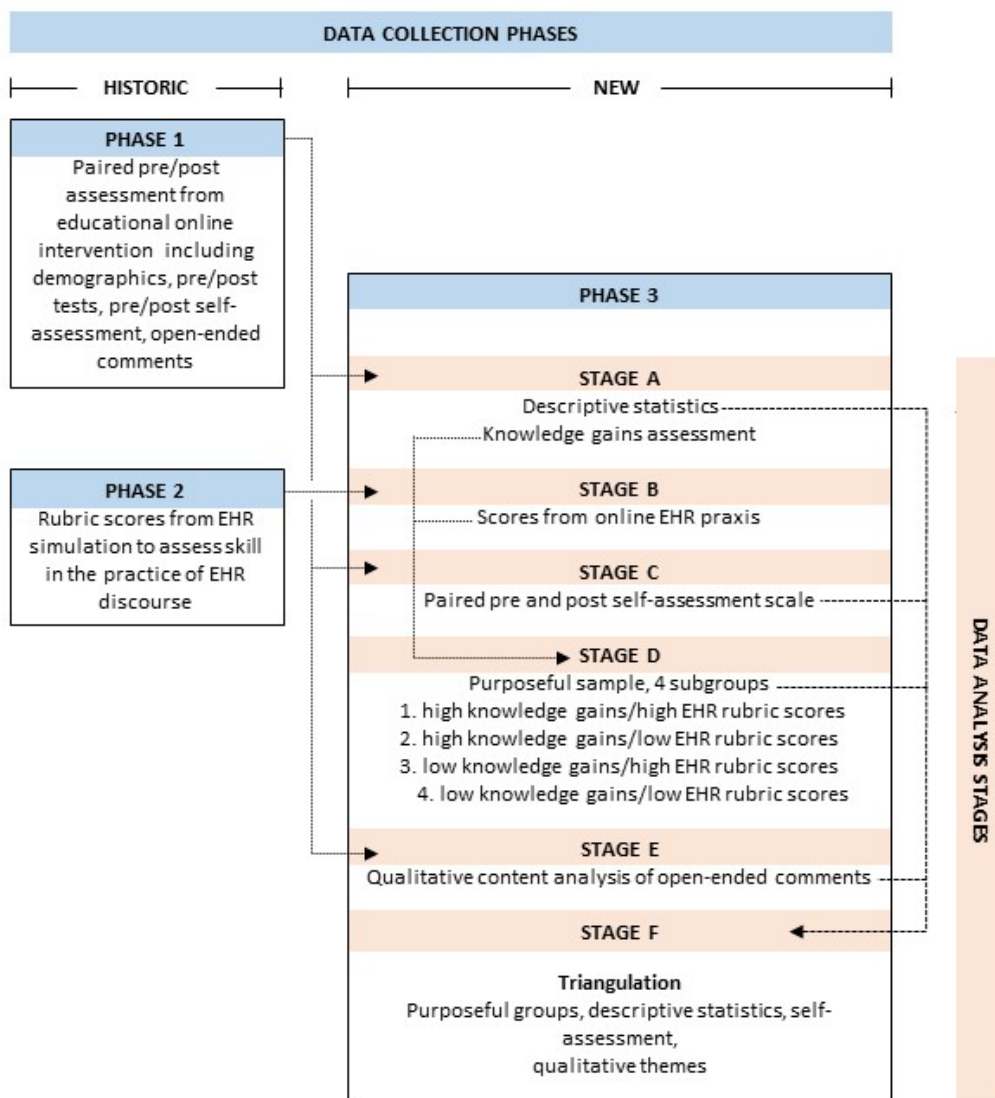
### 3.3 Research Setting

This study took place in a health professions school at a top-tier medical center in the Southwest, including medical education, biomedical research, and patient care. Participants included a cohort of first year health profession students from the 2014-2015 academic year who completed the course, HCS5106 Interprofessional, Development, Education, and Active Learning (IDEAL). The health profession students were enrolled in programs at either a master's or a doctoral level. These programs in health professions included doctor of physical therapy, master of physician assistant studies, and master of clinical nutrition. The healthcare science course included interprofessional competencies and concepts common to the different health profession programs, and allowed for an interprofessional cohort of students.

### 3.4 Methods

The research is derived from two previous research studies used as historical data and combined with a new third phase that provided depth under the non-positivistic paradigm. Figure 1.1 shows the triangulation of data collection.

Figure 3.1 Phases of Research



#### 3.4.1 Phases 1 and 2: Historical Data

Phase 1 was a quantitative research method that examined paired, pre and post knowledge assessments of an online educational intervention including concepts on effective online discourse in an electronic health record. The comparison of paired, pre and post data determined the existence, if any, of knowledge gains. Phase 2 was a quantitative research method that assessed students' skill at practicing effective online discourse in an electronic health record environment. Students interfaced with a standardized interprofessional case study within an electronic health record, a situated online learning environment in a community of practice, to communicate with other health professions and the patient. Scoring these specific written professional communications utilized a rubric developed during a prior pilot study (Hoggatt Krumwiede, Gupta, Simpkins, Hocking, Latson, 2014).

#### 3.4.2 Phase 3: Qualitative Triangulation

Phase 3 was designed to analyze the existing data including the paired scores from the knowledge gains assessment (phase 1) and the rubric scores from online electronic health record praxis (phase 2) to create a purposeful sample from which to select individuals for four subgroups of students to provide insight on the phenomenon of interest (Patton, 1990; Creswell and Plano Clark, 2011, Palinkas, et al, 2015).

Sub-groups of students were selected and invited to participate in semi-structured interviews to collect qualitative data for phase 3 of the research. The purpose

of the interviews was to identify whether the student's perception of their practice in the electronic health record matched their demonstrated knowledge and skills in an electronic health record. Unfortunately, none of the students from the previous studies agreed to participate in Phase 3.

There were a number of factors that could have contributed to the lack of volunteers. The timing of the proposed interviews was late in the students' course of study. Students have little time and many are on clinical rotations off campus during the final months before they graduate. The lack of volunteers could also have been due to the interview format which was not common in research taking place at the location of study. Incentives might have induced participation, however offering incentives for research participation was not permitted by the internal review board (IRB) at the location of the study.

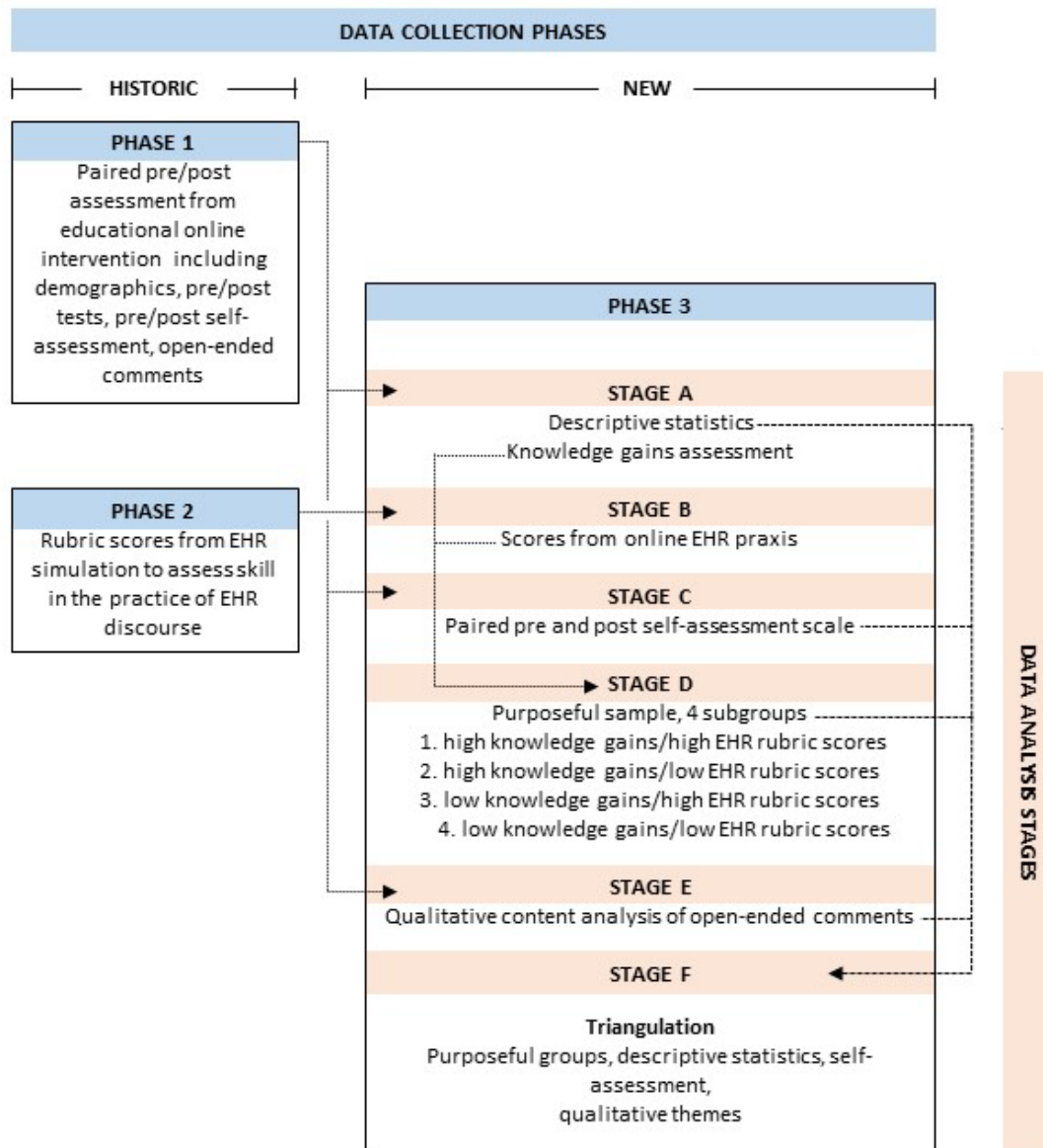
The lack of students to interview was not foreseen in the design and review of the study. An alternate approach was suggested to examine the open-ended comments on post assessment and evaluations that students reflected on the electronic health record activity and experience. The alternate approach was considered and approved.

#### 3.4.3 Data Collection

Data collection for the study occurred in all three phases of the research study. (Figure 3.2). Data were collected in the three phases and analyzed in various stages working

towards data sets that would provide insight and a more holistic understanding of the phenomenon of interest.

Figure 3.2 Data Collection and Analysis



#### 3.4.3.1 Phase 1

Collection of the first set of quantitative data was historic data, from the pre and post knowledge assessments (Figures 3 and 4) of the interactive online electronic health record module including concepts on effective interprofessional online discourse in an electronic health record. The pre and post assessment also included a self-assessment scale for interprofessional communication skills. The creation and testing of the instrument occurred during the pilot study (Hoggatt Krumwiede, Gupta, Simpkins, Hocking, Latson, 2014). Data collection was via a survey produced in REDCap, a web application created by Vanderbilt University and used for building and managing online surveys and databases, and stored on a secure institutional server behind an institutional firewall.

#### 3.4.3.2 Phase 2

Data collection for the second set of quantitative data was historic data and came from individual rubric (Table 2.1) scores from the situated environment, Epic electronic health record, using a standardized interprofessional case study. Students interfaced with a standardized interprofessional case study within an electronic health record, a situated online learning environment in a community of practice, to communicate with other health professions and the patient. Scoring these specific written professional communications utilized a rubric developed during a prior pilot study (Hoggatt Krumwiede, Gupta, Simpkins, Hocking, Latson, 2014).

### 3.4.2.3. Phase 3

Data collection in the third phase involved new data sets from the current research activity for use in qualitative triangulation. The first set of data came from Stage A of data analysis using paired pre-test and post-test scores to assess knowledge gains. The second set of data for triangulation was a result of Stage B data analysis of the rubric scores from online electronic health record praxis. The third set of data came from Stage C of data analysis which analyzed pre and post self-assessment scores. The fourth set of data for this phase of data collection for triangulation involved collecting qualitative data by gathering responses to open-ended questions from the post assessment and evaluation.

Student, self-assigned pseudonyms allowed for the pairing of data across multiple methods and stages of analysis. The use of these pseudonyms also allowed for the triangulation of data on an individual basis.

### 3.4.4 Data Analysis

Data analysis, new to this research study, used both the historic data and newly acquired data from the previous data collection section. Five different stages of data analysis were necessary to observe the different elements that could help address the research questions and sub questions (Patton, 1990; Creswell and Plano Clark, 2011, Palinkas, et al, 2015). Data were analyzed for use in triangulation in the non-positivistic qualitative research model. (Figure 3.2)

#### 3.4.4.1 Stage A: Knowledge Gains

Analysis of the pre and post data set in Stage A took place with IBM SPSS Statistics version 22.0 and used a paired samples, nonparametric Wilcoxon signed-rank test to determine knowledge gains after the educational intervention. A specific, non-random cohort, indicated the need to use a Wilcoxon signed rank test instead of a dependent paired t-test. The Wilcoxon signed rank test can be used to compare two scores from the same participants taken at different points in time, such as pre and post tests.

#### 3.4.4.2 Stage B: Practice Sills (Rubric Scores)

Rubric scores from the simulation part of the electronic health record activity were analyzed with IBM SPSS Statistics version 22.0 and used descriptive statistics and score distribution. A nonparametric analysis was also performed to check for correlation between rubric scores and knowledge gains.

#### 3.4.4.3 Stage C: Stratified Purposive Sample

Data from paired pre and post self-assessment instrument scores, part of the pre and post activity assessment, measured individuals' perceptions of performance in the electronic health record simulation.



#### 3.4.4.3.1 Scale Reliability and Validity

Verification of reliability and validity of the self-assessment scale on performance in the electronic health record simulation used study data to justify use for triangulation in the study. Researchers in the pilot study established the face validity and content validity for the instrument. Cronbach's alpha = 0.873 for the self-assessment professional written communication. This is between 0.9 and 0.8 indicating good internal consistency between the items in the scale and that the scale is reliable.

Factor analysis and pre and post test intervention comparison determined construct validity. Exploratory factor analysis pointed to a single factor on professional written communication. The removal of two questions for low correlation left six items in the professional written communication scale which answered the questions relevant to this study.

1. I understand the elements of written communication in a professional environment.
2. I possess the skills to communicate as part of a team in the electronic health record
3. I understand the mechanics of how to communicate with other professionals within an electronic health record.
4. I understand how the most effective methods for written communication from health professionals to patients.
5. I understand the most effective methods for written communication between health professionals.
6. I understand the elements of written communication in an electronic health record.

An additional perspective on construct validity used pre and post intervention self-assessment scores from the professional written communication scale. The null

hypothesis was that there would be no difference in the self-assessment of professional written communication skills pre intervention and post intervention. A two-tailed, paired t-test examined the pre and post self-assessment using the professional written communication scale. The difference between the scores was significant ( $p=0.001$ ) and resulted in the rejection of the null hypothesis that the difference in scores was unlikely to be explained by chance. The alternate hypothesis, that there was a difference in the pre and post self-assessment of professional written communication, was accepted contributing to the construct validity of the professional written communication scale.

The demonstration of reliability and validity of the self-assessment instrument consisting of the professional written communication supported the use of the scale in the triangulation of the data for this study.

#### 3.4.4.3.2 Analysis

IBM SPSS Statistics version 22.0 calculated individual professional communication scale scores and applied statistical correlation analysis with paired rubric scores. Additionally, pre and post self-assessment data were individually reviewed and graphed for individuals in the subgroups for use in the qualitative triangulation (Denzin, 1978; Patton, 1999; Creswell & Plano Clark, 2007; Patton, 2002, Tashakori & Teddlie, 2008) and comparison and contrast analysis of subgroups (Patton, 2002).

#### 3.4.4.4 Stage D: Self-Assessment

Stage D used the results from the first two sets (stages A and B) of quantitative data analysis to select a stratified purposeful sample (Patton, 2002; Palinkas, et al., 2015). Qualitative methods use purposeful sampling to identify and select cases or groups that have key information including knowledge and experience addressing the phenomenon of interest (Patton, 1990; Creswell and Plano Clark, 2011, Palinkas, et al., 2015). The stratified purposeful sampling strategy combines typical case sampling with extreme variation sampling utilizing specific characteristics to identify subgroups and allowing comparison between the groups (Patton, 2002)

The definition of the stratified purposeful subgroups from the original participant group used knowledge gains and rubric (practice skills) scores as criteria. The subgroups are listed in Table 3.1.

Table 3.1 Stratified Purposeful Sampling Subgroups

<b>Selected Characteristics</b>	<b>Subgroup 1</b>	<b>Subgroup 2</b>	<b>Subgroup 3</b>	<b>Subgroup 4</b>
<b>Knowledge Gains</b>	High	High	Low	Low
<b>Practice Skills Score</b>	High	Low	High	Low

#### 3.4.4.5 Stage E: Qualitative Analysis of Open-Ended Comments

This stage involved analyzing qualitative data(text) from open-ended comments on a post assessment using content analysis, a qualitative analysis technique (Downe-

Wamboldt, 1992; Zhang & Wildemuth, 2009). Qualitative content analysis is a technique used to analyze text within a specific context in order to assist in the explanation of, or add insight to, the phenomenon under study (Hsieh & Shannon, 2005). The directed approach to content analysis was used in order to let the initial research question provide a framework, or initial structure, to and direct the initial coding of the qualitative data (Patton, 2002). Additional codes were added based on emergent themes and lead to the categorization and identification of overarching themes (Miles & Huberman, 1994).

#### 3.4.4.6 Stage F: Data Triangulation for Stratified Subgroups

Final qualitative data analysis used the triangulation of data for the subgroups for comparison and contrast purposes. Data was gathered for individuals within the four purposeful stratified subgroups for a better understanding of gaps and discrepancies through contrast and comparison within and between groups (Patton, 2002).

Demographic data, including prior healthcare experience, prior electronic health record experience, and age were used from the pre assessment data and descriptive statistics from Stage A. The pre and post self-assessment data for the professional written communication scale was collected earlier in Stage C and was used in conjunction with graphs of individual scale responses for students within the four subgroups. Coded open-ended responses from Phase 3 were isolated for individuals within the purposeful stratified sample.

Demographic, self-assessment of professional communication, and coded open-ended responses were collected for individuals of the purposeful stratified subgroups. Initial analysis included comparison and contrast of individuals within an individual subgroups previously identified in Table 3. Comparison and contrast were used to identify any possible convergent or divergent trends between individuals within a specific subgroup. Further analysis included comparison and contrast of the data between groups for further identification of possible gaps or trends across subgroups. Likert scale (1=Strongly disagree, 2=Agree, 3=Neutral, 4=Agree, 5=Strongly Agree) response were examined. The purpose of examining the open ended questions in correlation with the self-assessment scores was to identify whether the student's perception of their practice in the electronic health record matched their demonstrated knowledge and skills in the electronic health record, and to delve deeper into the reasons behind any significant gaps and discrepancies.

### 3.5 Rigor and Trustworthiness (Lincoln and Guba, 1985).

In this post positivist mixed methods research, the same measures used to determine validity and reliability for the research in quantitative methods cannot be used for the qualitative methods. (Lincoln and Guba, 1985; Bradley, 1993) Qualitative research is based on non-empirical data such as assumptions and inferences. To establish rigor and trustworthiness for the qualitative research in this study, the

researcher followed a strategy utilizing four constructs presented by Lincoln and Guba (1985) including credibility, transferability, dependability, and confirmability.

Credibility is important to determine that the research study is actually testing what it is intended to measure, similar to internal validity. Credibility is one of the most important indicators or trustworthiness in a qualitative research method (Lincoln and Guba, 1985) and can defined a number of activities to help insure credibility.

This study used several measures proposed by Lincoln and Guba (1985) to ensure credibility including prolonged engagement, persistent observation, triangulation, and peer debriefing.

Prolonged engagement was the first measure of credibility. The researcher had been an active facilitator and course director in the IDEAL course for over six years thereby adequately familiarizing herself with the interprofessional students who have participated in the course.

Persistent observation was the second measure used to establish credibility. The researcher actively developed the course curriculum with the interprofessional faculty and facilitated active learning sessions with small groups of interprofessional students. Additionally, the researcher was a member of the initial research team that developed and piloted the interprofessional electronic health record activity.

Triangulation was also used as a measure to establish credibility. Triangulation was used both with methods and with data to reduce bias and reveal the reality of the situation (Denzin, 1970; Patton, 2002; Creswell & Plano Clark, 2007; Schifferdecker &

Reed, 2009; Hall, 2013). Methods triangulation for this study included both quantitative and qualitative resulting in more information than either method alone could reveal about a phenomenon (Denzin, 1978; Patton, 1999). Triangulation of data from different sources also aided in establishing credibility (Denzin, 1970; Patton, 2002; Creswell & Plano Clark, 2007; Schifferdecker & Reed, 2009; Hall, 2013).

Peer debriefing was another method used to establish credibility. The researcher met with a disinterested peer to review research methods and findings to help discover any unperceived biases or assumptions held by the researcher (Lincoln and Guba, 1985).

Transferability was established through thick and detailed description of all aspects of the setting, methods, data collection, analysis and results in order to provide others with enough information to assess if the conclusions of the research from this study could be applied, or transferred, to another setting or context (Lincoln and Guba, 1985).

Dependability was achieved by external review, or audit, of methods and results by the major professor and an external peer (Lincoln and Guba, 1985; Miles and Huberman; 1994). The peer, a professor from a basic science discipline, reviewed the results with the researcher asking probing questions regarding the research process and results.

Confirmability was achieved through the external audit by researcher's major professor and the dissertation committee. This document also serves as an audit trail to document processes and findings. The triangulation of methods and data, as described

earlier, also supported the confirmability of this study (Lincoln and Guba, 1985; Miles and Huberman; 1994).

### 3.6 Summary

This chapter introduced and described the research design, research setting, participants, data collection and analysis methods. Phase 1 and Phase 2 collected and analyzed retrospective data with quantitative methods. Phase 3 used analysis from the first two phases to identify stratified subgroups for use in the qualitative analysis. Additionally, text from open-ended comments underwent qualitative content analysis. Methods for collecting and analyzing quantitative data, qualitative data, and pre and post self-assessment data supported gathering data to use for triangulation of across and amongst the stratified subgroups.

Chapter 4 will discuss the data collection process and analysis for each phase of of this research study.



## CHAPTER 4

### RESULTS

Chapter 4 examines the results from the different stages of data analysis for this mixed methods research study. Initially, there is a description of the participants in the research including gender, age, program of study and experience in healthcare and in the electronic health record. Next, follows a description of the results for Stage A: Knowledge Gains utilizing pre and post assessment scores. Then, there is a description of Stage B, the analysis of skills involving interprofessional communication in the electronic health record environment by analyzing rubric scores. The description of Stage C begins with the explanation of the purposive stratified sampling of the participants based on knowledge gains and rubric scores from Stages A and B. Stage D: Self-Assessment includes the assessment of the participant self-assessment scores. Then there is a detailed description of Stage E, the process of examining text responses to open-ended questions through qualitative content analysis. Finally, Stage F describes the triangulation of results in the context of the research questions..

#### 4.1 Participant Demographics

Participants included a cohort of first year health profession students from the 2014-2015 academic year who completed the course, HCS5106 Interprofessional, Development, Education, and Active Learning (IDEAL). The health profession students

were enrolled in programs at a masters and a doctoral level. These programs in health professions included physical therapy, physician assistant studies, and clinical nutrition.

Part of the pre assessment for the activity encompassed collecting demographic information. The demographic information included academic program, age, gender, previous experience in healthcare, and previous experience using an electronic health record.

There were 78 participants (n=78) in the online educational simulation activity. With regard to gender, 83% (65) were female and 17% (13) were male. The age breakdown was as follows: 76% (59) were 18-25 years old; 20% (16) were 26-33 years old; 2 % (3) were 34-41 years old; and 1% (1) was 42-49 years old. Academic programs had the following distribution: 21% (16) Clinical Nutrition; 41% (32) Physical Therapy; and 38% (30) Physician Assistant Studies. When asked if they had previous experience in healthcare 35% (27) responded “no” and 65% (51) responded “yes”. When asked if they had previous experience using the electronic health record, 60% (47) responded “no” and 40% (31) responded “yes”. Table 4.1 shows the participant demographics for the study.

Table 4.1 Participant Demographics

	Total	%
<b>Gender</b>		
Female	65	83
Male	13	17
<b>Age</b>		
18-25 years old	59	76
26-33 years old	16	20
34-41 years old	2	3
42-49 years old	1	1
<b>Academic Program</b>		
Clinical Nutrition	16	21
Physical Therapy	32	41
Physician Assistant Studies	30	38
<b>Previous experience in healthcare</b>		
No	27	35
Yes	51	65
<b>Previous experience using an electronic health record</b>		
No	47	60
Yes	31	40

#### 4.2 Stage A: Knowledge Gains

The first stage of analysis compared pre and post knowledge assessment scores to determine if there were any knowledge gains by the participants, and to what degree. Pre and post data were retrieved and analyzed with IBM SPSS Statistics version 22.0 and used a paired sample, nonparametric Wilcoxon signed-rank test to determine knowledge gains after the educational intervention.

The pre test scores (N=78) had a mean of 80.21 with a standard deviation of 18.01 and a minimum score of 28.57 and a maximum score of 100. The post test scores (N=78) had a mean of 91.57 with a standard deviation of 11.61 and a minimum score of

57.14 and a maximum score of 100. The ranks test showed 11 participants had a higher pre test score than post test score. However, 41 participants had a higher post test score than pre test score. There were also 30 participants who showed no difference between pre and post test scores. A Wilcoxon signed ranks test indicated that the post test score ranks were higher than pre test ranks  $Z = -4.938$ , with a 2-tailed  $p < 0.001$ .

Table 4.2 includes the Wilcoxon test descriptive statistics that were later used to identify knowledge gains of individual participants for the purposeful subgroups.

Table 4.2 Wilcoxon Test Descriptive Statistics

	Pre Test	Post Test	Post Test – Pre Test (Knowledge Gains)
Number of values	78	78	78
Minimum	28.57	57.14	-14.29
25% Percentile	71.43	85.71	0
Median	85.71	100	14.28
75% Percentile	100	100	14.28
Maximum	100	100	57.14
Mean	80.22	91.57	11.36
Std. Deviation	18.02	11.61	16.66
Std. Error of Mean	2.04	1.35	1.866

#### 4.3 Stage B: Practice Skills (Rubric) Scores

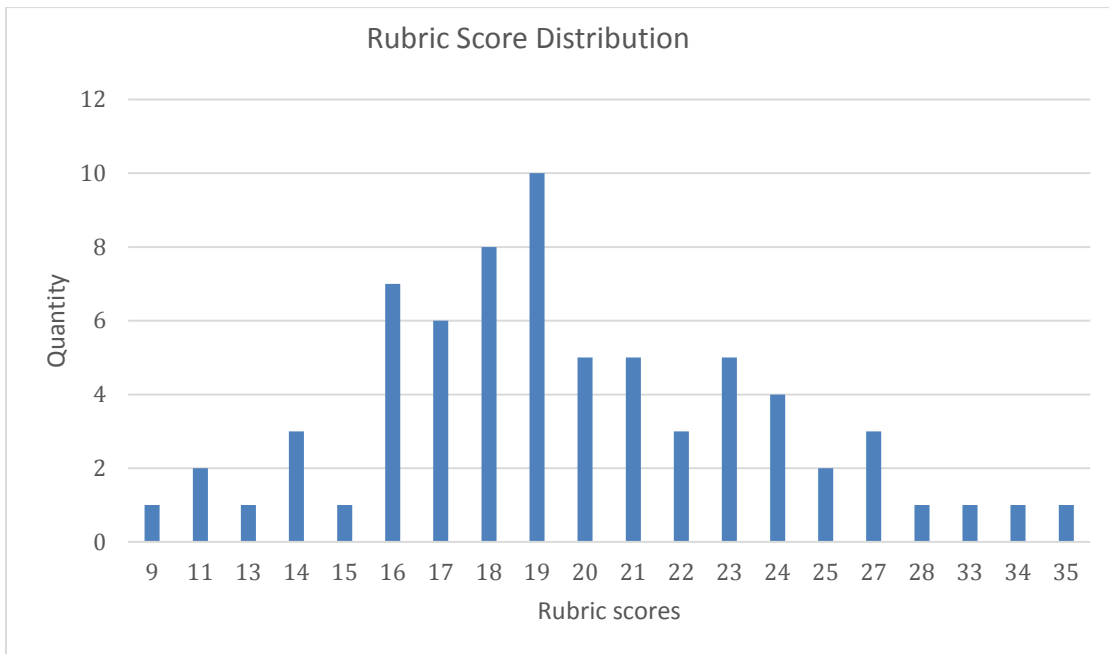
Rubric scores analyzed specific skills related to specific tasks participants demonstrated in the simulated electronic health record. Scores for the exercise were recorded in the online course and were downloaded in .csv format. Participants were

identified with their self-assigned pseudonyms which allowed paring of the rubric scores with the knowledge gains for subgroup selection. Descriptive statistics were run in IBM SPSS Statistics version 22.0. There were 78 participants, however 8 of the participants did not complete the assignment and did not receive a rubric score. The minimum score was 9 and the maximum score was 35, also the highest score possible. The median score was 19. Table 6 shows the descriptive statics for the rubric scores.

Table 4.3 Descriptive Statistics for Rubric Scores

Rubric Scores	
Mean	19.88571
Standard Error	0.584316
Median	19
Mode	19
Standard Deviation	4.888741
Sample Variance	23.89979
Kurtosis	1.613728
Skewness	0.830417
Range	26
Minimum	9
Maximum	35
Count	70

Figure 4.1 Rubric Score Distribution



Additionally, the researcher analyzed the data for a correlation between individual rubric (practice skills) scores and individual knowledge gains. This analysis used a two tailed, Spearman's rho to calculate correlation with only paired data (n=74). The correlation was not found to be significant ( $r_s = -0.027$ ,  $p = 0.822$ ).

External review suggested that correlation analysis should also be run between individual rubric scores and the individual post test scores to account for high scoring students who might not demonstrate any knowledge gains. This analysis used a two tailed, Spearman's rho to calculate correlation with only paired data (n=74). The correlation was not found to be significant ( $r_s = -0.007$ ,  $p = 0.950$ ).

#### 4.4. Stage C: Stratified Purposive Sample

It was necessary to select a purposeful sampling to identify and select cases or groups that have key information including knowledge and experience addressing the phenomenon of interest (Patton, 1990; Creswell and Plano Clark, 2011, Palinkas, et al., 2015). The phenomenon of interest addresses a students' self-assessment of their skills in relation to their knowledge gains and practice skills in an electronic health record.

Stage C, utilizing the self-assigned pseudonyms, paired the results from Stage A: Knowledge Gains and Stage B: Practice Skills (Rubric) Scores to select a stratified purposeful sample as listed in Table 7 (Patton, 2002; Palinkas, et al., 2015).

Table 4. 4 Stratified Sample of Subgroups

Selected Characteristics	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4
Knowledge Gains	High	High	Low	Low
Practice Skills (Rubric) Score	High	Low	High	Low

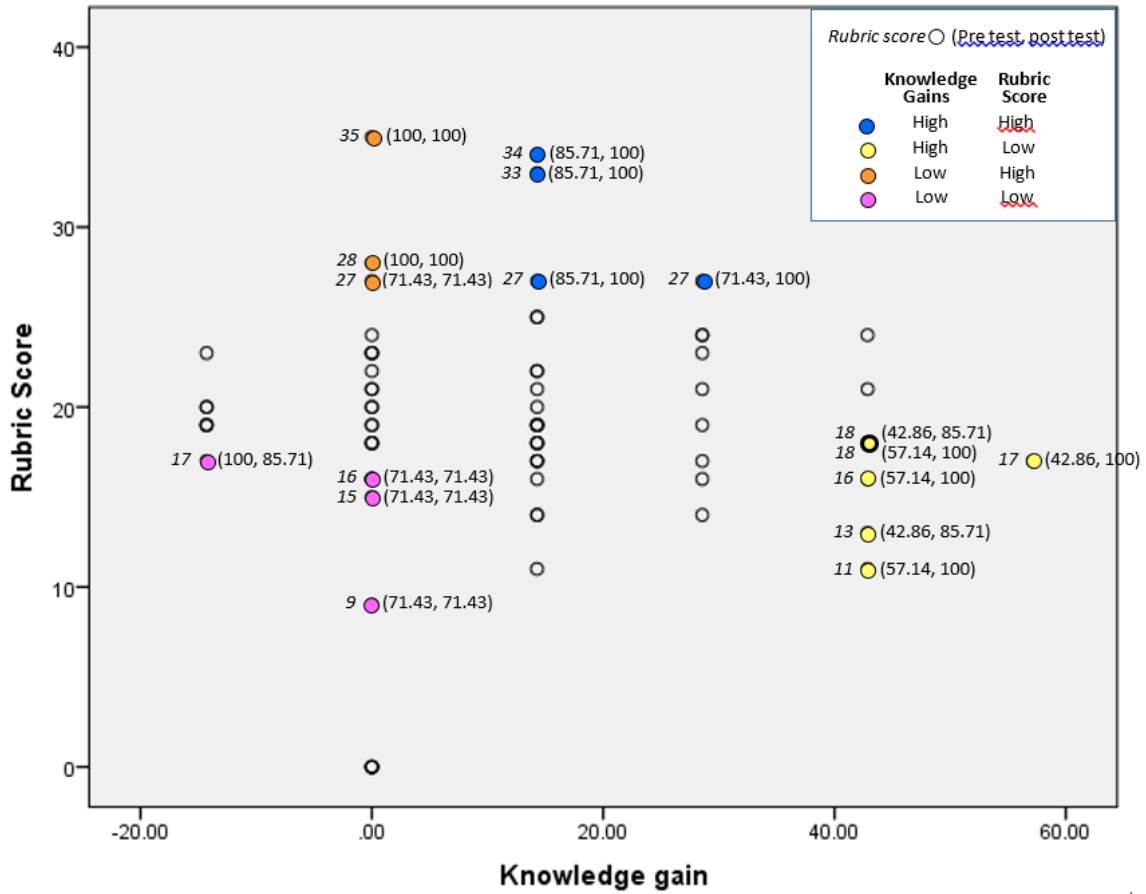
Students with high knowledge gains were identified by having greater than 1 standard deviation ( $sd=16.66$ ) gain in knowledge from pre to post test. Students with low knowledge gains were identified by having less than 1 standard deviation or no knowledge gain from pre to post test. Initially, students with high rubric scores were identified as having rubric scores in the top quartile ( $> 28.5$ ) of the rubric score distribution. This did not yield very many individuals, the researcher adjusted the criterion to include rubric scores equal to or greater than 27 to identify more individuals

and a potentially richer and thicker understanding. Students with low rubric scores identified as having rubric scores in the bottom quartile ( $< 15.5$ ) of the rubric score distribution. This resulted in a low yield of individuals and again the criterion was adjusted to include rubric scores equal to or less than 18 in order increase the number of individuals and a potentially richer understanding. IBM SPSS Statistics version 22.0 was used to run a correlation between knowledge gains and rubric scores.

Figure 4.2 shows a scatter plot of the correlation between knowledge gain and rubric scores and has been appended with individual information. Individuals meeting the criterion for the four subgroups are color coded. Additionally, corresponding scores have been added for the pre test, post test, and rubric.



Figure 4.2 Appended Scatter Plot of Rubric Scores and Knowledge Gains



#### 4.5 Stage D: Self-Assessment

The qualitative content analysis needed post self-assessment data for triangulation.

Initially, the self-assessment scale was developed and tested in the pilot project. Validity and reliability analysis for this study resulted in the professional written communication scale that was used to compare pre self-assessment and post self-assessment. The professional written communication scale (Table 4.5) consists of six statements on professional communication with a 5-point Likert scale (1=Strongly disagree, 2=Agree, 3=Neutral, 4=Agree, 5=Strongly Agree) response.

Table 4.5 Professional Written Communication Scale

<b>Professional Written Communication Scale</b>
1. I understand the elements of written communication in a professional environment.
2. I possess the skills to communicate as part of a team in the electronic health record.
3. I understand the mechanics of how to communicate with other professionals within an electronic health record.
4. I understand how the most effective methods for written communication from health professionals to patients.
5. I understand the most effective methods for written communication between health professionals.
6. I understand the elements of written communication in an electronic health record.

Initially, pre and post self-assessment using the professional written communication scale were compared with a two-tailed, paired t-test for all students (N=79). The pre professional written communication scores had a mean of 21.85 with a standard deviation = 3.79. Post written communication scores had a mean of 25.26 with a standard deviation= 2.53. The difference between the scores was significant ( $p=0.001$ ) and resulted in the rejection of the null hypothesis that the difference in scores was unlikely to be explained by chance. The alternate hypothesis, that there was a difference in the pre and post self-assessment of professional written communication was accepted. Effect size was calculated with Cohen's  $d = 1.05$  and effect size  $r = 0.466$  demonstrating a large magnitude of change.

The researcher then analyzed the data for a correlation between the rubric (practice skills) scores and the post professional written communication scale scores. For this analysis the Likert scale was considered ordinal (Carifio & Perla, 007; Jamiesons,

2004) and used a two tailed, Spearman's rho to calculate correlation with only paired data. The correlation was not found to be significant ( $r_s=0.108$ ,  $p=0.187$ ) resulting in accepting the null hypothesis that there was no correlation between the rubric scores and the post professional communication scale scores.

An external audit by a peer, who was also involved with the IDEAL course, led to an additional analysis to see if there were any correlations between knowledge gains and the pre and post self-assessment professional written communication scores. For this analysis the researcher again considered the Likert scale to be ordinal and used a two tailed, Spearman's rho to calculate correlation. The correlation between the pre professional written communication score and individual knowledge gains was not found to be significant ( $r_s= -0.012$ ,  $p=0.919$ ) resulting in accepting the null hypothesis that there was no correlation between the rubric scores and the post professional written communication scale scores. Additionally, the correlation between the post professional written communication score and individual knowledge gains was not found to be significant ( $r_s= -0.012$ ,  $p=0.916$ ) resulting in accepting the null hypothesis that there was no correlation between the rubric scores and the post professional written communication scale scores. Results from these correlations were used for additional facets of comparison and contrast to the four subgroups.

The researcher then decided to analyze the correlation between the paired pre test scores (knowledge) and the pre professional written communication (self-assessment) scores. There was a strong significant and positive correlation ( $r_s= 0.985$ ,

$p \geq 0.001$ ) thereby rejecting the null hypothesis that no correlation exists, and accepting the alternate hypothesis that there is a strong correlation between the pre test and pre professional written communication scores for this cohort..

Additionally, the researcher analyzed the correlation between the paired post test scores (knowledge) and post professional written communication (self-assessment) scores. There was a strong significant and positive correlation ( $r_s = 0.958$ ,  $p \geq 0.001$ ) thereby rejecting the null hypothesis that no correlation exists, and accepting the alternate hypothesis that there is a strong correlation between the post test and post professional written communication scores for this cohort.

#### 4.6 Stage E: Qualitative Analysis of Open-Ended Comments

Qualitative data were collected from responses to open-ended questions from the post assessment and evaluation. Content analysis, a qualitative analysis technique, was used to analyze the text (Downe-Wamboldt, 1992; Zhang & Wildemuth, 2009).

This study took place in a health professions school at a top-tier medical center in the Southwest, including medical education, biomedical research, and patient care. Participants included a cohort ( $n=78$ ) of first year health profession students from the 2014-2015 academic year who completed the course, HCS5106 Interprofessional, Development, Education, and Active Learning (IDEAL). The health profession students were enrolled in programs at either a masters or a doctoral level. These programs in

health professions included doctor of physical therapy, master of physician assistant studies, and master of clinical nutrition.

Students participated in an educational intervention including an online module on interprofessional communication in an electronic health record and a simulation in an electronic health record environment. Students were asked to “Provide comments on the electronic health record activity” In an open-ended format. The data were collected from the post assessment survey via a downloaded .csv file from REDCap from a server behind the institutional firewall.

The csv file was imported into Microsoft Excel 2013 for the purpose of initial review and preparation for the coding process. The initial round of coding included attribute coding of frequencies (Table 10). Comments were prepared in a table in preparation for initial structured “a priori” coding (Table 4.6).

Table 4.6. Attribute Coding

Attribute	Frequency
Gender	
Men	13
Women	65
Age ranges (years)	
18 – 25	59
26-33	16
34-41	2
42-49	1
Academic programs	
Clinical Nutrition	16
Physical Therapy	32
Physician Assistant	30
Previous healthcare experience	
No	27
Yes	51
Previous EHR experience	
No	46
Yes	31

Table 4.7 Open-ended Comments

Pseudonym	Course Comments
22-May	
ajm2993	So many directions, but got easier as activity went on.
arlene12	I found this activity not very helpful because I am already familiar with Epic.
Batman	It was pretty time consuming, but it was great practice with epic.
Bear2013	This was very tedious and at some times confusing. Also, the matching par was very difficult to move and drop them in the right spot.
betty	Too difficult to access. I wasn't aware I was looking for the type of mistakes it wanted me to notice. It would have been better to introduce it during class.
bigten26	
bulegumblondie12	I didn't really understand why we did this, and it was difficult to get started with the assignment. I felt like we were given little info.
Cassie	I liked exposure to EPIC, but the previous quizzes seemed like a waste of time. I did not learn much from it.
charlie	A little time-consuming- maybe at the beginning of the semester
Charlied	took an extremely long time! Complicated!
Chester (continued)	Took a lot of time

(continued) Cricket	Took 2 hours to do. Difficult to find time in lab when other classes weren't there.
curlyq624	discussed in class
Dietitian Debbie	
Eric	good to learn about EHR
Faith Hill	I'm glad to be exposed to the EHR, although it was time consuming activity
Feenixpawl	Helpful, but needed to be done earlier in the semester.
Ginger spice	Few glitches, but otherwise <u>worthwhile</u> activity
Ginny Weasley	Great exposure to Epic. However, the early modules (#1--4) did not help me learn about EPIC or professional communication very well.
GraceFace	I feel this would have been better in a class-room setting. I'm still not sure what I was supposed to get out of that exercise.
Granada	Very helpful for navigating Epic for the first time
hallk13187	Overall a good exercise, but would probably be more beneficial later in the program
hookem24	Not good learning activity for me.
Janelle	very helpful introduction to using online records
Johnny Football	A good way to be introduced to EPIC, but a little dry.
Kate Middleton	These were extremely time consuming and difficult!
Katherine	Learned a lot about Epic. Good. I did not agree with some of the answers on the 2nd assessment (one of the choices was "used many abbreviations," and the correct match only had one abbreviation. I figured that couldn't be the answer for that reason.)
Ke\$ha	too long - didn't think the "lessons" provided the right information to do well on the assessment
KiKi	Instructions were accurate, but tedious. Another way to explore EMR could be helpful.
Kingsbury Wife	Not very useful
kschass1	NOT NEEDED. This was not very helpful.
lasarah	LONG! Good to understand Epic if you work @ UTSW but everywhere will have different programs
Lassie	Pointless and unnecessarily time-consuming
L__G__	Confusing instructions on a few but helpful
Luna Moo	Not my favorite, a little stressful
michael jordan	Very time consuming with little benefit.
mimi	Not helpful doing this online. Didn't get much out of this.
Mitch Moreland	Had trouble with tests because I didn't realize the notes were in book format.
nannabanana	Maybe try to emphasize more ahead of time that one activity must be done using the school computer. I sat down to do the activity at home and then had to come into school. Luckily I did it a week early so it wasn't a time problem but could be if people put it off
Nutrition	Didn't enjoy it. Got most of the questions wrong even though I read the booklet. Questions not very clear.
OlsenTwin	Did not like this exercise - time consuming & didn't understand the part we had to do @ school.
Owl	Helpful to see & feel out the module.

P__ G_____	Some of the modules needed revamp. Some Q's were incorrect and I didn't think they were really testing our knowledge of Epic very much. Most of them were too vague.
redballoons	I thought the modules were helpful but some sections were repeated from previous sections.
Rita2583	Give intro assignment in class before opening it. Some instructions were hard to follow.
Snickerdoodle	Pretty good activity. Helpful to look at a chart but editing the notes wasn't necessarily helpful.
strose1	
Suki	It took me less time than others. I was confused because I didn't know what to change on the Epic notes. I haven't had enough experience with Epic to know so I didn't change anything.
Sunflower girl	It was a little confusing to use
Tad	understand the purpose, but longer than necessary - could've been mentioned or outlined in class before
tamer10389	Way too time consuming & inconvenient (have to do on campus)
Thanesif	hard to follow & a bit confusing
The Girl Next Door	Great idea, although not very convenient, directions were in a seperate window panel making navigation difficult and time consuming
The Mountain	Time consuming and a little confusing
Tiffany	This introduced me to electronic records, but I still don't feel comfortable or confident in using/navigating it.
triple trouble	It was good to practice rewriting notes and reading charts, but since we didn't get feedback we don't know how well we did/where we need to work or practice.
VBYNU1	
wahoobay06	Busy work! I had experience using Epic & honestly I'm glad I did or I wouldn't have known what to do. If the point was to intro Epic to students, it missed the mark.
Bilbo Swaggins	Not beneficial at the end of the semester w/ so much else going on
Bobby Jones	Tedius. Neutral opinion on usefulness of the exercise.
Dragoneyes	I personally ran into a lot of EPIC problems. Having access off campus would be more convenient. I really would have liked to learn more about EHR (how epic works) and the procedures of note taking, follow-up, etc. I really took this as an exercise on editing in EHR. Perhaps tell us the purpose of why we are editing a note. How should we be passing information to another professions? Is it not automatically forwarded to them?
Franny Glass	I understand the point of this exercise, but it did feel a bit like busywork, especially considering that my classmates and I have experience with EMRs.
Grandma	Time consuming & could have been shortened. Many of us write SOAP notes, discharge notes in our programs, so it was very repetative.
jgerbs3	important to see how epic works, but some inconsistencies
kcmg803	Would have been better to do earlier in the semester before our hospital rotations.
Lisa	drag
maddie lou	This is good info to solidify, however the second part within Epic was very time consuming.



Maximsu	It was OK, however epic was very confusing.
msjt2008	A little confusing. I have worked with Epic before but the instructions on what was wanted from us was a little confusing.
Nick	
Redcon1	Horrible. Didn't learn anything from this. It was frustrating to maneuver and didn't offer much in practicing EMR's.
R__ F__	Good
T__ D__	Good practice for those unfamiliar w/ EMR
W__ R__	A little lengthy but helpful
special sauce	Long & tedious -> will help if we made this a class activity
Tangelo789	This would have been great to do before my hospital rotation. Doing it after the fact didn't seem like a value-add.
Kristi	I did not get much out of this activity. Need more feedback on the submission.

#### 4.6.1 Initial Structured Codes

After initial review of the raw open-ended responses, the researcher began the directed approach to content analysis, by reviewing the initial research question to provide a framework, or initial structure, to and direct the initial coding of the qualitative data (Patton, 2002).

The research question central to this study was “Do students’ perceptions of their practice in an electronic health record match their knowledge and skills?”

To answer this overarching question, the mixed methods approach was selected to attempt to answer the following sub-questions:

- Research Question 1. Can students learn the concepts for effective online discourse through an online educational module?
- Research Question 2. Will students take into practice, in a situated online learning environment, what they have learned?
- Research Question 3. Will students’ perceptions of their learning match their practice in the electronic health record (EHR)?

Initial preset, or *a priori* codes for the first round of coding are listed in Table 4.8.

Table 4.8. Initial Structured *a priori* codes

<b>Initial structured <i>a priori</i> codes</b>
Learning perception
Knowledge
Communication Skills
Writing Skills
EHR competencies
Value of exercise

Phrases were the initial unit for coding, and a color scheme was given to the initial structured codes. As the initial coding process continued, emergent themes were revealed and added as codes to the initial structured code list. (Table 4.9)

Table 4.9 Initial Structured *a priori* Codes and Emergent Codes

<b>First Round Codes</b>
Initial structured <i>a priori</i> codes
Learning perception
Knowledge
Communication Skills
Writing Skills
EHR competence
Value of exercise
Other (emergent codes)
Content
Time for exercise
Accessibility
(Timing) Scheduling of activity
Online delivery
Likability

#### 4.6.2 First Round Coding

Because the initial units were phrases, more than one code applied to some phrases. Figure 4.3 is an example from the first round of coding.

Figure 4.3 Example from First Round of Coding

Pseudonym	Course Comments
22-May	
ajm2993	So many directions, but got easier as activity went on.
arlene12	I found this activity not very helpful because I am already familiar with Epic.
Batman	It was pretty time consuming, but it was great practice with epic.
Bear2013	This was very tedious and at some times confusing. Also, the matching par was very difficult to move and drop them in the right spot.

#### Color Coding Scheme

Learning perception

Knowledge

Communication Skills

Writing Skills

EHR competence

Value of exercise

Content

Time for exercise

Accessibility

(Timing) Scheduling of activity

Online delivery

#### 4.6.3 First Round Results

The first round of coding with structured “a priori” and emergent codes yielded the following results including frequencies and examples from each code:

##### *Learning perception (9)*

“got easier as activity went on.”

“I found this activity not very helpful because I am already familiar with Epic.”

“I did not lear’n much from it.”

“the early modules (#1--4) did not help me learn about EPIC or professional communication very well.”

“Not good learning activity for me.”

“didn't think the "lessons" provided the right information to do well on the assessment”

“Many of us write SOAP notes, discharge notes in our programs, so it was very repetative (sp).”

“ Didn't learn anything from this.”

“I did not get much out of this activity.”

The responses in the learning perception category were positive or negative. A majority of the responses reflected a perceive value of the activity, for example “Not a good learning activity for me” and “I did not get much out of this activity.”

##### *Knowledge (1)*

“it was very repetative(sp)”

##### *Communication Skills (1)*

“did not help me learn about EPIC or professional communication very well”

##### *Writing Skills (0)*

##### *EHR competence (8)*

“ I am already familiar with Epic”

“Learned a lot about Epic. Good.”

“I didn't think they were really testing our knowledge of Epic very much.”

“Helpful to look at a chart but editing the notes wasn't necessarily helpful.”

"I was confused because I didn't know what to change on the Epic notes. I haven't had enough experience with Epic to know so I didn't change anything."

"This introduced me to electronic records, but I still don't feel comfortable or confident in using/navigating it."

"Busy work! I had experience using Epic & honestly I'm glad I did or I wouldn't have known what to do."

" my classmates and I have experience with EMRs"

The responses pertaining to EHR competence seemed to relate more to the application navigation and proficiency and not communication skills, for example

"Helpful to look at a chart but editing the notes wasn't necessarily helpful."

#### *Value of exercise (41)*

"not very helpful because I am already familiar with Epic"

"very helpful introduction to using online records"

"Didn't get much out of this"

"Neutral opinion on usefulness of the exercise."

"Good practice for those unfamiliar w/ EMR"

"This is good info to solidify"

"I did not get much out of this activity."

"worthwhile activity"

There were many comments regarding the value of the exercise. Responses were both positive and negative, for example "Didn't get much out of this" and "worthwhile activity."

#### *Content (32)*

"Complicated!"

"Instructions were accurate, but tedious."

"directions were in a separate (sp) window panel making navigation difficult"

"could have been shortened"

"the second part within Epic was very time consuming"

"didn't offer much in practicing EMR's"

"the previous quizzes seemed like a waste of time"

"a little dry"

Responses under the “Content” label included many comments pertaining to logistics such as, “directions were in a separate (sp) window panel making navigation difficult.” The amount time the activity took was also commented on for example, “the second part within Epic was very time consuming.”

*Time for exercise (22)*

- “It was pretty time consuming”
- “A little time-consuming”
- “Took a lot of time”
- “LONG!”
- “A little lengthy”
- “longer than necessary”
- “time consuming”
- “very time consuming”

Time for exercise was alluded to in a significant number of comments, for example, “It was pretty time consuming,” “Took a lot of time,” and “LONG!”

*Accessibility (6)*

- “Too difficult to access.”
- “Difficult to find time in lab when other classes weren't there.”
- “Maybe try to emphasize more ahead of time that one activity must be done using the school computer. I sat down to do the activity at home and then had to come into school.”
- “didn't understand the part we had to do @ school.”
- “inconvenient (have to do on campus)”
- “I personally ran into a lot of EPIC problems. Having access off campus would be more convenient.”

Accessibility emerged as a logistics issue. There were comments such as “didn't understand the part we had to do @ school” and “inconvenient (have to do on campus).”

*(Timing) Scheduling of activity (7)*

- “It would have been better to introduce it during class.”
- “maybe at the beginning of the semester”

“needed to be done earlier in the semester”  
“but would probably be more beneficial later in the program”  
“Not beneficial at the end of the semester w/ so much else going on”  
“Would have been better to do earlier in the semester before our hospital rotations.”  
“This would have been great to do before my hospital rotation. Doing it after the fact didn't seem like a value-add.”

Timing emerged as a theme in the comments for example, “maybe at the beginning of the semester” and “but would probably be more beneficial later in the program.”

*Online delivery (5)*

“I feel this would have been better in a class-room setting.”  
“Not helpful doing this online.”  
“Give intro assignment in class before opening it. Some instructions were hard to follow.”  
“could've been mentioned or outlined in class before”  
“will help if we made this a class activity”

Online delivery was an emerging theme. In the online delivery list, there were comments that seemed to refer to location from a logistics perspective, such as “I feel this would have been better in a class-room setting” and “will help if we made this a class activity.”

*Likability (6)*

“Not my favorite”  
“Didn't enjoy it.”  
“Did not like this exercise”  
“Busy work!”  
“Drag”  
“It was frustrating to maneuver”

There were some comments on likability, and they were mostly negative, such as “Did not like this exercise” and “Drag.”

After reviewing the first round of coding, the codes could be grouped into three overarching categories (1) *a priori* codes,( 2) descriptive, and ( 3) emotion. Further delineation within codes was also noted (Table 4.10).

Table 4.10 Overarching Categories for First Round Coding

<b>Grouping</b>	<b>Sub-categories</b>
<b>Initial structured <i>a priori</i> codes</b>	
Learning perception (9)	negative - didn't learn enough about EHR(7) neutral (2)
Knowledge (1)	already know content (1)
Communication Skills (1)	didn't feel learned skill (1)
Writing Skills (0)	-
EHR competence (8)	already have Epic exp. feel confident (3) learned a lot about Epic (1) no epic experience, still not confident (2) didn't feel learned enough about Epic (2)
<b>Descriptive</b>	
Content (32)	
Time for exercise (22)	
Accessibility (6)	
(Timing) Scheduling of activity (7)	
Online delivery (5)	
<b>Emotion</b>	
Value of exercise (41)	positive (29) neutral (4) negative (8)
Likability (6)	negative (6)



A memo was written noting a considerable number of comments on how much time the activity took. There were also numerous comment on the convenience of the activity regarding scheduling and location. The researcher noted that while these are more evaluative comments regarding the efficiency of the activity, they might add additional perspectives for triangulation.

#### 4.6.4. Second Round Coding

A review of first round overarching categories and breakdowns within the codes from the first round of coding revealed three major themes:

1. The value of the exercise to the individual
2. The how the logistics of the exercise affected the individual
3. Prior experience in EHR and/or EMR influenced the student's experience

The unit for second round coding was the entire comment to include context for the coding. Individual comments were reviewed and coded with the applicable category or categories.

Figure 4.4 shows an example of second round coding.

Figure 4.4 Example from Second Round of Coding

Pseudonym	Course Comments	Themes
22-May		
ajm2993	So many directions, but got easier as activity went on.	Value Logistics
arlene12	I found this activity not very helpful because I am already familiar with Epic.	Value Experience
Batman	It was pretty time consuming, but it was great practice with epic.	Value Logistics
Bear2013	This was very tedious and at some times confusing. Also, the matching par was very difficult to move and drop them in the right spot.	Logistics
betty	Too difficult to access. I wasn't aware I was looking for the type of mistakes it wanted me to notice. It would have been better to introduce it during class.	Logistics

#### 4.6.5 Second Round Coding Results

The three major themes were: (1) The value of the exercise to the individual, (2) How the logistics of the exercise affected the individual, and (3) Prior experience in EHR and/or EMR influenced the student's experience. The second round of coding with emergent themes and combination of themes yielded the following results including frequencies and some examples of each:

1. *The value of the exercise to the individual* (9)

"good to learn about EHR"  
"Very helpful for navigating Epic for the first time"  
"Not good learning activity for me."  
"very helpful introduction to using online records"  
"Not very useful"  
"NOT NEEDED. This was not very helpful."  
"Not my favorite, a little stressful"  
"Helpful to see & feel out the module."  
"Drag"

The comments on the value of the exercise tended to be either positive or negative such as, "good to learn about EHR" and "Not very useful."

2. *The how the logistics of the exercise affected the individual* (8)

"This was very tedious and at some times confusing. Also, the matching par was very difficult to move and drop them in the right spot."  
"Too difficult to access. I wasn't aware I was looking for the type of mistakes it wanted me to notice. It would have been better to introduce it during class."  
"I didn't really understand why we did this, and it was difficult to get started with the assignment. I felt like we were given little info."  
"A little time-consuming- maybe at the beginning of the semester"  
"took an extremely long time! Complicated!"  
"Took 2 hours to do. Difficult to find time in lab when other classes weren't there."

“Maybe try to emphasize more ahead of time that one activity must be done using the school computer. I sat down to do the activity at home and then had to come into school. Luckily I did it a week early so it wasn't a time problem but could be if people put it off”

“Give intro assignment in class before opening it. Some instructions were hard to follow.”

Comments regarding logistics of the exercise were mostly about ease of use such as, “took an extremely long time! Complicated!”

### *3. Prior experience in EHR and/or EMR influenced the student's experience (0)*

There were not any individuals who solely commented on prior experience in the electronic health record.

### *1. The value of the exercise to the individual AND 2. The how the logistics of the exercise affected the individual (24)*

“So many directions, but got easier as activity went on.”

“It was pretty time consuming, but it was great practice with epic.”

“liked exposure to EPIC, but the previous quizzes seemed like a waste of time. I did not learn much from it.”

“I'm glad to be exposed to the EHR, although it was time consuming activity”

“Helpful, but needed to be done earlier in the semester.”

“Few glitches, but otherwise worthwhile activity”

“Great exposure to Epic. However, the early modules (#1--4) did not help me learn about EPIC or professional communication very well.”

“I feel this would have been better in a class-room setting. I'm still not sure what I was supposed to get out of that exercise.”

“Overall a good exercise, but would probably be more beneficial later in the program”

Many individuals commented on both the value of the exercise and the logistics for example, “It was pretty time consuming, but it was great practice with epic.”

1. *The value of the exercise to the individual* AND 3. *Prior experience in EHR and/or EMR influenced the student's experience* (4)

"Pretty good activity. Helpful to look at a chart but editing the notes wasn't necessarily helpful."

"This introduced me to electronic records, but I still don't feel comfortable or confident in using/navigating it."

"I understand the point of this exercise, but it did feel a bit like busywork, especially considering that my classmates and I have experience with EMRs."

"I found this activity not very helpful because I am already familiar with Epic."

A few individuals commented on both the value of the exercise and their prior experience in the electronic health record for example, "I found this activity not very helpful because I am already familiar with Epic." These comments could be valuable to observe how prior electronic health record experience might affect their perceived value of the exercise.

2. *The how the logistics of the exercise affected the individual* AND 3. *Prior experience in EHR and/or EMR influenced the student's experience* (2)

"Some of the modules needed revamp. Some Q's were incorrect and I didn't think they were really testing our knowledge of Epic very much. Most of them were too vague."

"It took me less time than others. I was confused because I didn't know what to change on the Epic notes. I haven't had enough experience with Epic to know so I didn't change anything."

There were a few comments that indicated a student's experience with the logistics of the exercise might be affected by their prior experience in the electronic health record for example, "It took me less time than others. I was confused because I didn't know what to change on the Epic notes. I haven't had enough experience with Epic to know so I didn't change anything."

1. *The value of the exercise to the individual* AND 2. *The how the logistics of the exercise affected the individual* AND 3. *Prior experience in EHR and/or EMR influenced the student's experience* (2)

“Learned a lot about Epic. Good. I did not agree with some of the answers on the 2nd assessment (one of the choices was "used many abbreviations," and the correct match only had one abbreviation. I figured that couldn't be the answer for that reason.)”

“Busy work! I had experience using Epic & honestly I'm glad I did or I wouldn't have known what to do. If the point was to intro Epic to students, it missed the mark.”

Only two individuals commented on the value of the exercise, the logistics and their prior experiences the electronic health record. They demonstrated different viewpoints.

An additional coding note observation stated that comments coded with the value theme were positive and negative. Also, many comments coded with the logistics theme had to do with the length of time the exercise took them to do.

#### 4.7 Stage F: Data Triangulation for Stratified Subgroups

In Stage F, demographic data, self-assessment and qualitative coding of open-ended comments were brought together for individuals in the stratified subgroups (Table 4.11).

Table 4.11 Triangulation Data Table of Stratified Subgroups

Subgroup	Program	Age (years)	Gender	Previous experience	Previous EHR experience	PR_comm	PS_comm	Value	Logistics	EHR experience
<b>High knowledge gains/ High EHR rubric scores</b>										
Katherine	Clinical Nutrition Program	18-25	Female	Yes	No	20	21	+		
Dragoneye	Physician Assistant Studies Program	26-33	Female	Yes	No	19	24			
Special sauce	Physician Assistant Studies Program	34-41	Male	Yes	No	27	25		time	
publgumblonde 12	Physician Assistant Studies Program	18-25	Female	Yes	No	12	26			
<b>High knowledge gains/Low EHR rubric scores</b>										
Johnny Fox	Physician Assistant Studies Program	18-25	Male	Yes	Yes	24	30	+	-	
The Girl Next Door	Physician Assistant Studies Program	18-25	Female	Yes	No	18	24	+	time	
Chester	Physical Therapy Program	18-25	Female	Yes	No	20	21		time	
The Mountain	Physical Therapy Program	18-25	Male	Yes	No	22	21		time	
Janelle	Physical Therapy Program	18-25	Female	No	No	21	24	+		
Olsen Twin	Physical Therapy Program	18-25	Female	No	No	23	25	-	time	
<b>Low knowledge gains/High EHR rubric scores</b>										
maddie lou	Clinical Nutrition Program	26-33	Female	No	No	16	25	+	time	
Ginger spice	Physical Therapy Program	18-25	Female	Yes	No	18	27	+		
Cricket	Physical Therapy Program	18-25	Female	Yes	No	22	24		time	
<b>Low knowledge gains/Low EHR rubric scores</b>										
nannabannana	Physical Therapy Program	18-25	Female	Yes	No	18	23		time	
Wayne Rogers	Physical Therapy Program	26-33	Male	No	Yes	24	24	+		
Grandma	Physical Therapy Program	26-33	Female	Yes	Yes	24	24	∅	time	
Faith Hill	Physical Therapy Program	18-25	Female	No	No	17	26	+	time	

A review across the stratified subgroups shows a distribution of student from each academic program that is consistent with the distribution of programs within the course. This is the same for age groups, with the majority of students falling in the 18-25 years old category. The gender distribution is approximately 80% female and 20% male which is consistent to that of the course. Across the stratified subgroups, 70% (n=12) have prior experience in healthcare and 30% (n=5) did not have prior experience in healthcare. Only 18% (n=3) had prior experience in an electronic health record and 82% (n=14) did not. Regarding the self- assessment professional written communication scale, the median pre score was 20 with a range of 12 to 27 and the post median score was 24 with a range from 21 to 30.

#### 4.7.1 Average student profile

Based on the data, the average student profile (Table 4.12) for this cohort is female, 18-25 years old with previous experience in healthcare and no previous experience in an electronic health record (EHR). The average knowledge gain is 14.28 and the median rubric score is 19. With respect to self-assessment, the pre professional written communication scale score is 21.85 and the post professional written communication scale score is 25.26. Open-ended comments included both the value of the exercise to the individual AND how the logistics of the exercise affected the individual. There is an equal chance that the comment on the value of the exercise is a



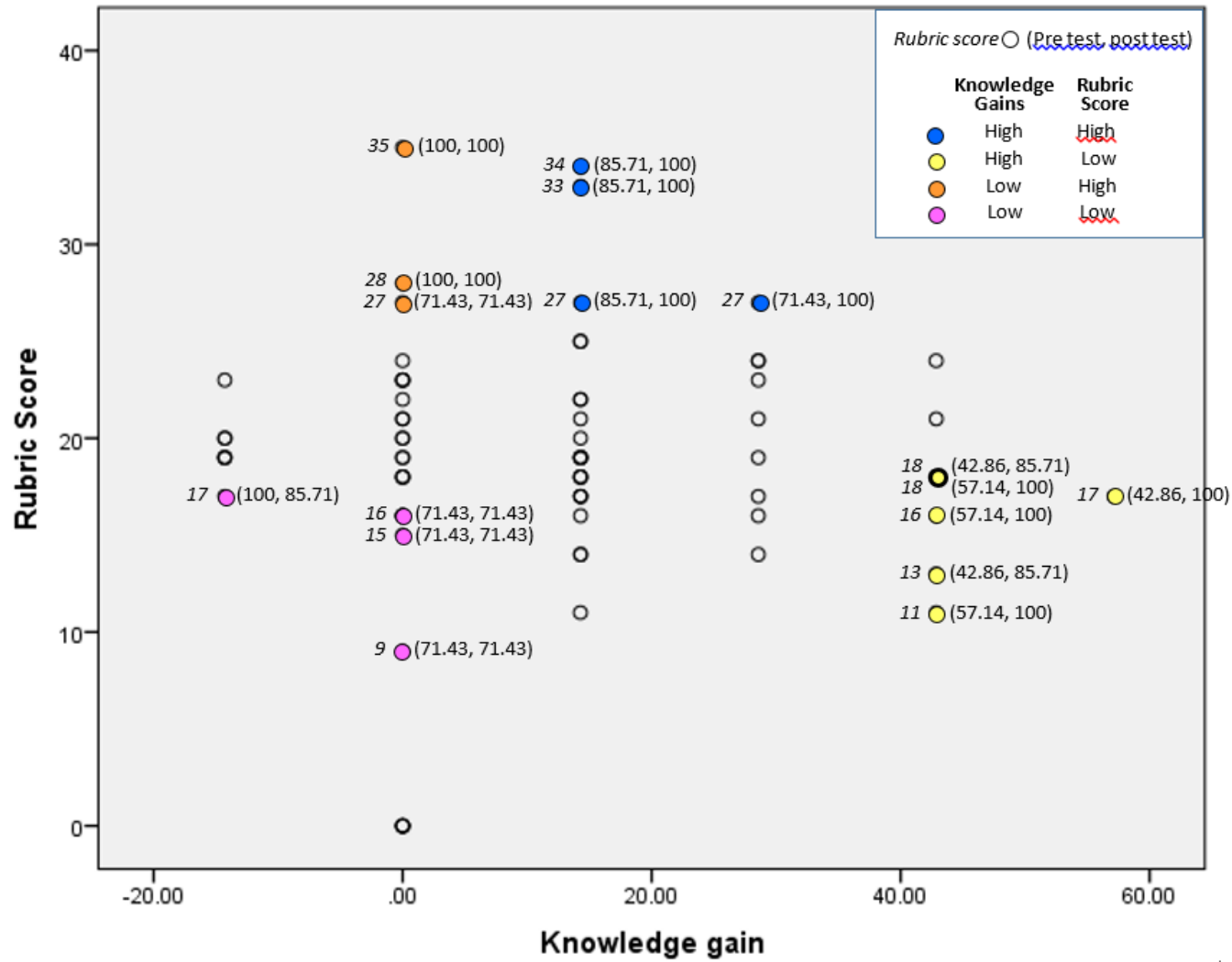
positive or a negative comment. The comment on the logistics of the exercise included mention of the activity taking too much time.

Table 4.12 Average Student Profile.

Program	Age	Gender	Previous experience in healthcare	Previous experience in EHR	Pre Prof_com m	Post Prof comm i	Value	Logistics
Physical Therapy or Physician Assistant Studies	18-25	Female	Yes	No	21.85	25.26	+ or -	time

The appended Rubric/knowledge gains correlation plot was another visualization of data for the triangulation of subgroups (Figure 9). For the cohort the average knowledge gain was 14.28 and the median rubric score was 19.

Figure 4.5. Appended Rubric/Knowledge Gains Correlation Plot



### 4.7.2 Data Triangulation Within Subgroups

Table 4.13. Subgroup 1: High knowledge Gains/ High Rubric Scores

Subgroup	Program	Age (years)	Gender	Previous experience	Previous experience using an EHR	PB_score	PS_score	Value	Logistics	EHR experience	Pre, post scores	Comments
High knowledge gains/ High EHR rubric scores												
Katherine	Clinical Nutrition Program	18-25	Female	Yes	No	20	21	"+"			71.43, 100	learned a lot about Epic. Good. I did not agree with some of the answers on the 2nd assessment (one of the choices was "used many abbreviations," and the correct match only had one abbreviation. I figured that couldn't be the answer for that reason.)
Dragoneve	Physician Assistant Studies Program	26-33	Female	Yes	No	19	24				85.71, 100	I personally ran into a lot of EPIC problems. Having access off campus would be more convenient. I really would have liked to learn more about EHR (how epic works) and the procedures of note taking, follow-up, etc. I really took this as an exercise on editing in EHR. Perhaps tell us the purpose of why we are editing a note. How should we be passing information to another professions? Is it not automatically forwarded to them?
Special sauce	Physician Assistant Studies Program	34-41	Male	Yes	No	27	25		time		85.71, 100	Long & tedious -> will help if we made this a class activity
bulgumblon de12	Physician Assistant Studies Program	18-25	Female	Yes	No	12	26				85.71, 100	I didn't really understand why we did this, and it was difficult to get started with the assignment. I felt like we were given little info.

S

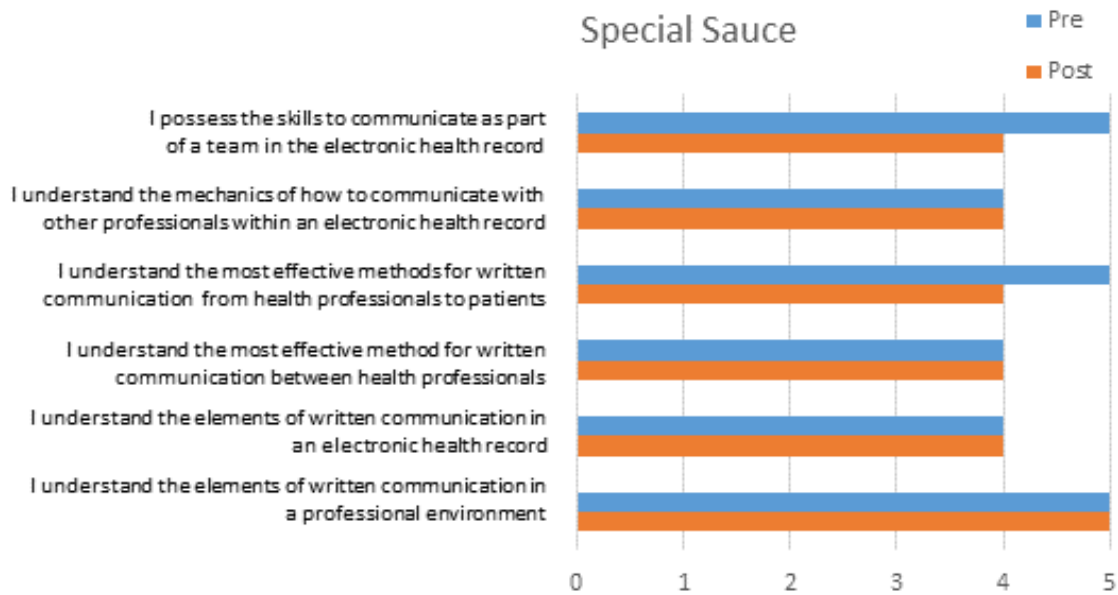
#### 4.7.2.1 Subgroup 1: High knowledge Gains/ High Rubric Scores

The Subgroup 1: High knowledge Gains/ High Rubric Scores consisted of students from all three programs. There were both females (n=3) and male (n=1) students in this subgroup. All students (n=4) had previous healthcare experience. The students spanned three age ranges including 18-25 years (n=2), 26-33 years (n=1), and 34-41 years (n=1). None of the students had previous EHR experience. All students showed high knowledge gains (n=6), and all four students (n=4) had a post score of 100. Three of the students (n=3) had higher post self –assessment scores for the professional written communication scale. One student “special sauce” had a higher pre written communication score. All students (n=4) made comments regarding logistics, but only “special sauce” made a comment regarding taking too much time “Long and tedious.” “Katherine”, the student with the highest knowledge gain, expressed positive value of the exercise, “learned a lot about Epic. Good.” which accurately reflected her knowledge gain.

A review of the breakdown of the pre and post professional written communication scale showed equal to or higher on post self-assessment on the individual scale questions for the four students. “Special Sauce” was higher on two pre scores (Figure 4.6). For “I possess the skills to communicate as part of a team in the electronic health record”. For the pre assessment he answered “5-Strongly agree” and only “4-Agree” on the post assessment. For the statement “I understand the most effective methods for written communication from health professionals to patients” he

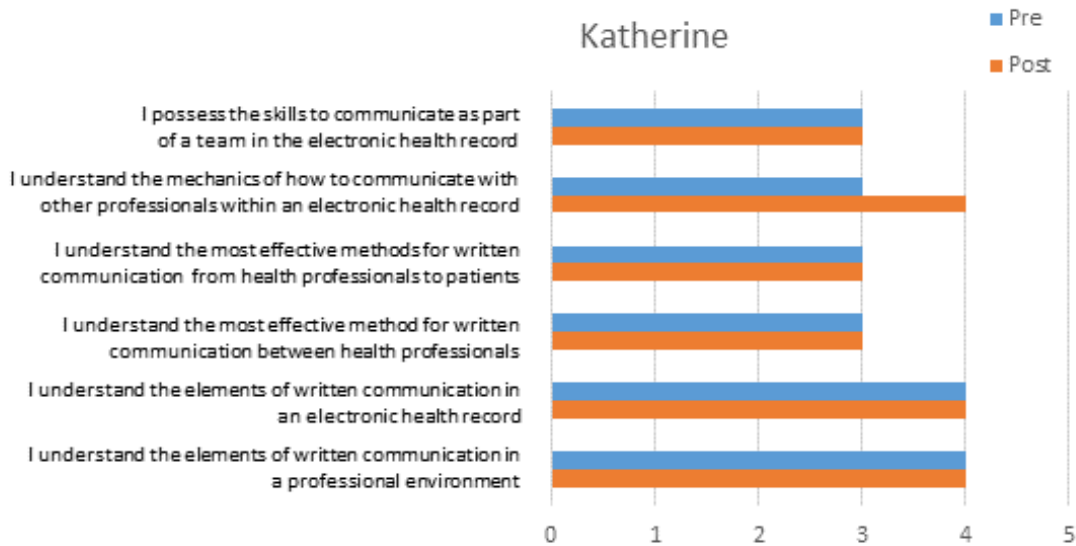
answered “5-Strongly agree” and only “4-Agree” on the post assessment. Interestingly, he had the highest rubric score in the group a 34 out of 35 possible.

Figure 4.6. Self –Assessment Bar Graph for Special Sauce



Katherine, the student with the highest knowledge gains showed the same pre and post answers for pre and post assessment four 5 of the six statements. On the statement “I understand the mechanics of how to communicate with other professionals within an electronic health record” she answered “3- Neutral” on the pre assessment and “4-Agree” on the post assessment.

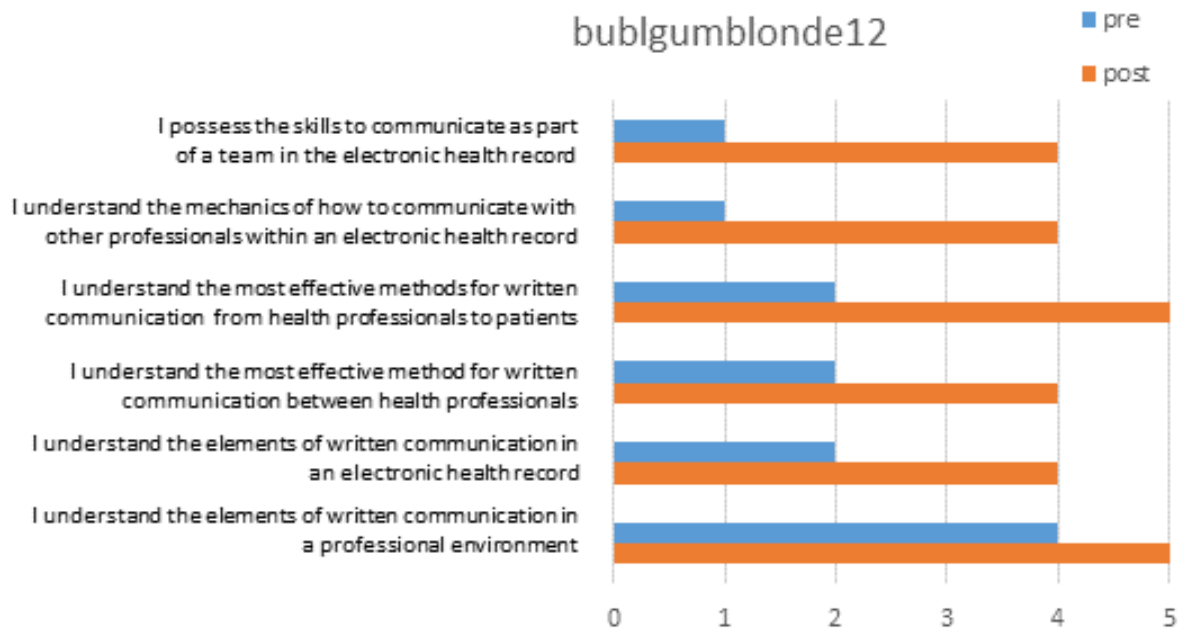
Figure 4.7. Self –Assessment Bar Graph for Katherine



“bublgumblonde12” has the most significant changes in self-assessment for the professional written communication scale. For the statement “ I possess the skills to communicate as part of a team in the electronic health record she went from pre “1-Strongly disagree” to post “4-agree.” For “I understand the mechanics of how to communicate with other professional within an electronic health record she went from pre “1-Strongly disagree” to post “4-agree.” For “ I understand the most effective methods for written communication from health professionals to patients” she selected pre “2-Disagree” and post “5-Strongly agree.” For “I understand the most effective methods for written communication between health professionals” she selected pre “2-Disagree” and post “4-Agree.” For “I understand the elements of written communication in an electronic health record,”bublgumblonde” chose pre “2-Disagree” and post “4-Agree.” The smallest change from pre to post was for the statement “ I

understand the elements of written communication I a professional environment” for which she selected pre “ 4-Agree” and post “5-Strongly agree.”

Figure 4.8. Self –Assessment Bar Graph for bublgumblonde12



“Dragoneye” had some changes in self-assessment for the professional written communication scale. For the statement “ I possess the skills to communicate as part of a team in the electronic health record she went from pre “2-Disagree” to post “4-agree.” For “I understand the mechanics of how to communicate with other professional within an electronic health record she stayed the same at pre “4-agree.” and same post “4-agree.” For “ I understand the most effective methods for written communication from health professionals to patients” she stayed the same at pre “4-agree.” and same post “4-agree.” For “I understand the most effective methods for written communication

between health professionals” she selected pre “3-Neutral” and post “4-Agree.” For “I understand the elements of written communication in an electronic health record,”bublgumblonde” chose pre “2-Disagree” and post “4-Agree.” There was no change from pre to post for the statement “ I understand the elements of written communication in a professional environment” for which she selected pre “ 4-Agree” and post “ 4-Agree.”

Figure 4.9. Self –Assessment Bar Graph for Dragoneye

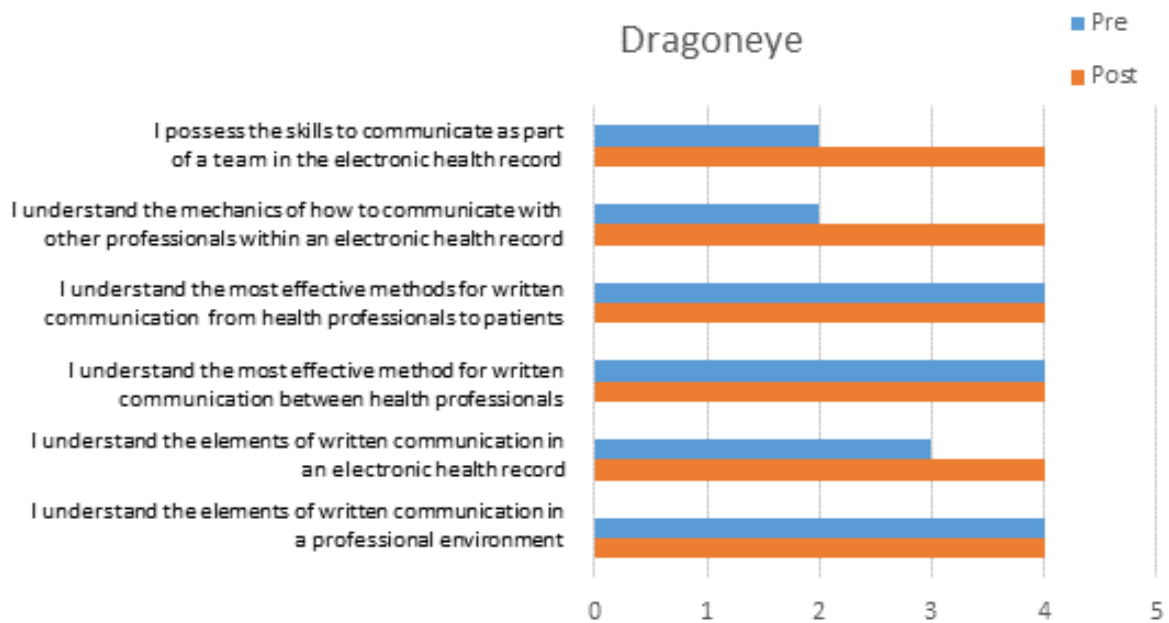




Table 4.14. Subgroup 2: High knowledge Gains/ Low Rubric Scores

Subgroup	Program	Age (years)	Gender	Previous experience	Previous experience using an EHR	PR_comm	PS_comm	Value	Logistics	EHR experience	Pre, post scores	Comments
<b>High knowledge gains/Low EHR rubric scores</b>												
Johnny Football	Physician Assistant Studies Program	18-25	Male	Yes	Yes	24	30	"+"	"-"		42.86, 100	A good way to be introduced to EPIC, but a little dry.
The Girl Next Door	Physician Assistant Studies Program	18-25	Female	Yes	No	18	24	"+"	time		57.14, 100	Great idea, although not very convenient, directions were in a <del>seperate</del> window panel making navigation difficult and time consuming
Chester	Physical Therapy Program	18-25	Female	Yes	No	20	21		time		57.14, 100	Took a lot of time
The Mountain	Physical Therapy Program	18-25	Male	Yes	No	22	21		time		42.86, 85.71	Time consuming and a little confusing
Janelle	Physical Therapy Program	18-25	Female	No	No	21	24	"+"			57.14, 100	very helpful introduction to using online records
Olsen Twin	Physical Therapy Program	18-25	Female	No	No	23	25	"-"	time		42.86, 85.71	Did not like this exercise - time consuming & didn't understand the part we had to do @ school.

#### 4.7.2.2 Subgroup 2: High knowledge Gains/ Low Rubric Scores

Subgroup 2: High knowledge Gains/ Low Rubric Scores consisted of students from only the Physician Assistant Studies (n=2) and the Physical Therapy (n=4) programs. There were both female (n=4) and male (n=2) students. All of the students were in the 18-25 years old age range (n=6). Only four students had previous healthcare experience (n=4). Only one student had previous experience using an electronic health record (n=1). All students showed high knowledge gains (n=6) and four students had a post score of 100 (n=4). The remaining two students had a post score of 85.71 (n=2). All six students had higher post self-assessment scores for the professional written communication scale (n=6).

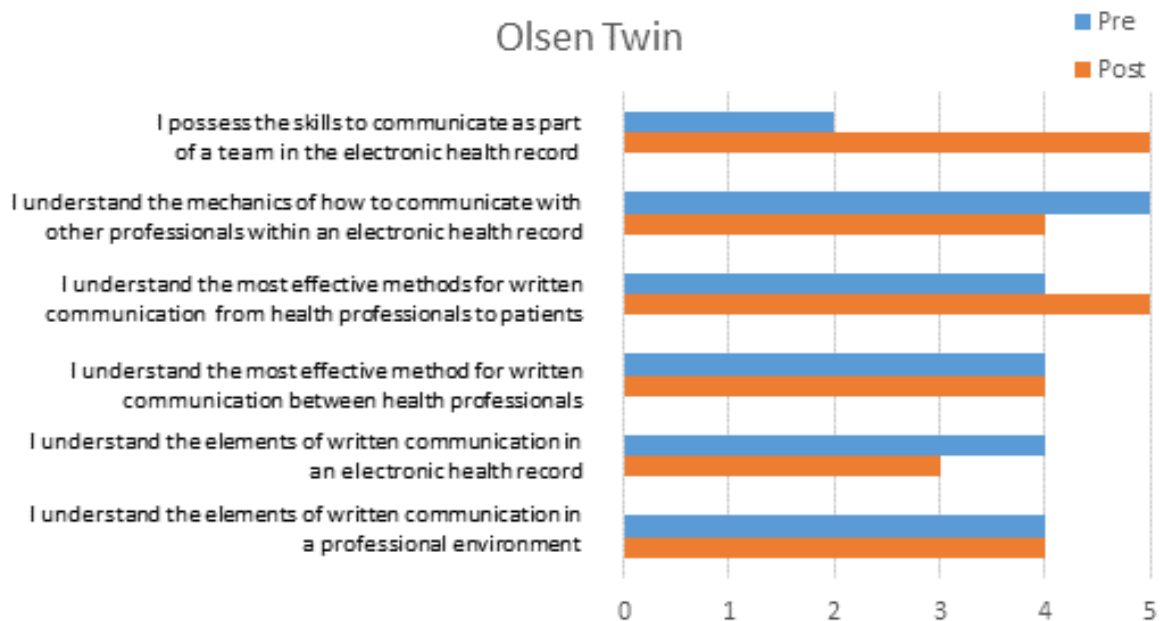
Four of the students commented on the value of the exercise (n=4). Three of the students had positive value comments (n=3). "Johnny Football" commented "A good way to be introduced to EPIC..." "The Girl Next Door" remarked "Great idea..." "Janelle" commented "very helpful introduction to using online records" There was one negative value comment from "Olsen Twin" stating "Did not like this exercise."

Five out of the six students in this group commented on logistics. One negative comment from "Johnny Football" stated the exercise was "a little dry." The other four comments specifically addressed the amount of time the exercise took. "The Girl Next Door" commented, "...not very convenient, directions were in a separate(sp) window panel making navigation difficult and time consuming." "Chester" stated "Took a lot of

time.” “The Mountain” remarked “Time consuming and a little confusing.” “Olsen Twin” declared “ ...time consuming & didn’t understand the part we had to do @ school.”

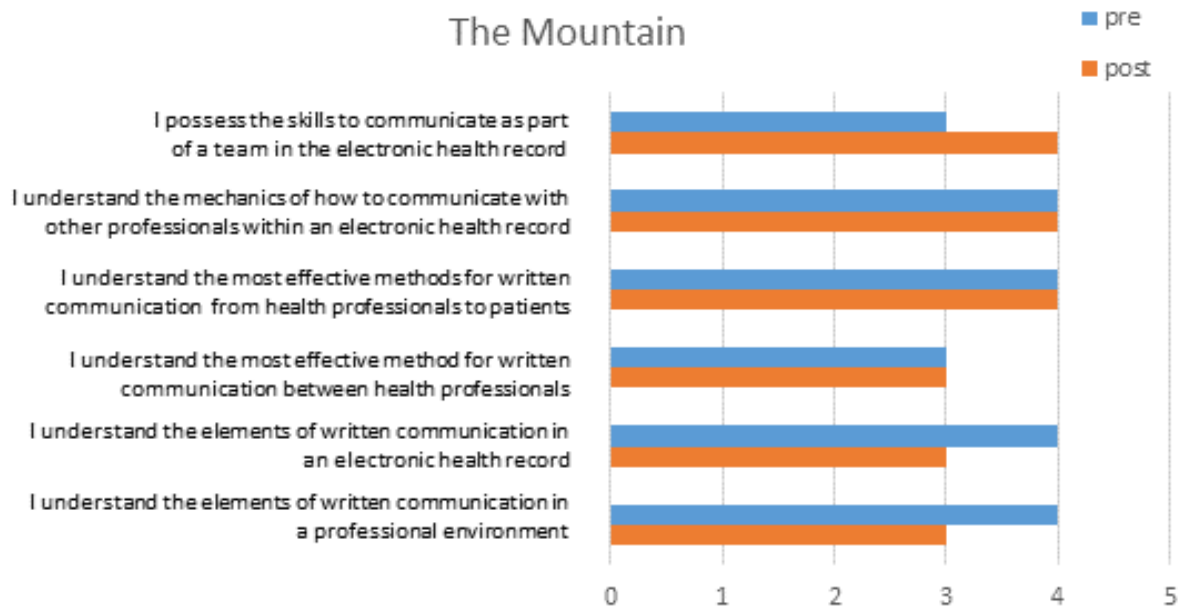
A review of the breakdown of the pre and post professional written communication scale showed equal to or higher on post self-assessment on the individual scale questions for four students (n=3). “Olsen Twin was higher on one pre assessment score (Figure 4.10). For “ I understand the elements of written communication in an electronic health record,” she answered “ 4-Agree” on pre and only “3-Neutral” on post assessment. This was alluded to in her comment “ ...time consuming & didn’t understand the part we had to do @ school.”

Figure 4.10 Self –assessment Bar Graph for Olsen Twin



“The Mountain” had higher pre scores on two items in the written professional communication scale (Figure 4.11). For “ I understand the elements of written communication in an electronic health record,” he answered “ 4-Agree” on pre and only “3-Neutral” on post assessment. For “ I understand the elements of written communication in a professional environment,” he answered “ 4-Agree” on pre and only “3-Neutral” on post assessment. He also had a “3-Neutral for both pre and post for the statement “ I understand the most effective methods for written communication between health professionals.” This was somewhat reflected in his comment, “Time consuming and a little confusing.”

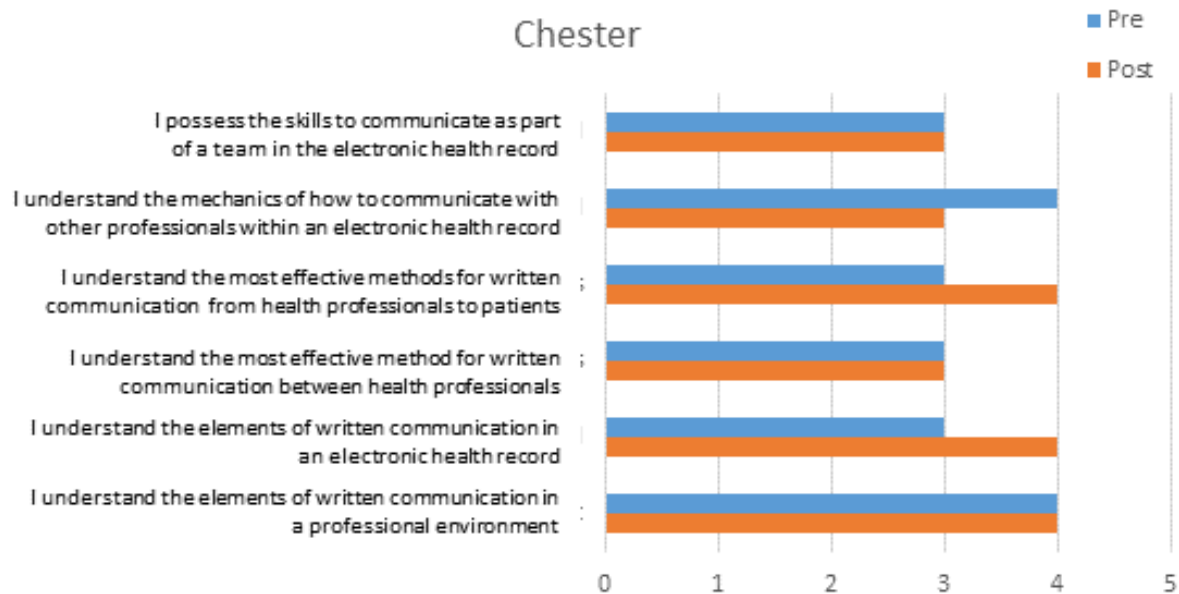
Figure 4.11 Self –assessment Bar Graph for The Mountain



“Chester” had a lower post score “3-Neutral” than post score “4-Agree” for the statement “ I understand the mechanics of how to communicate with other

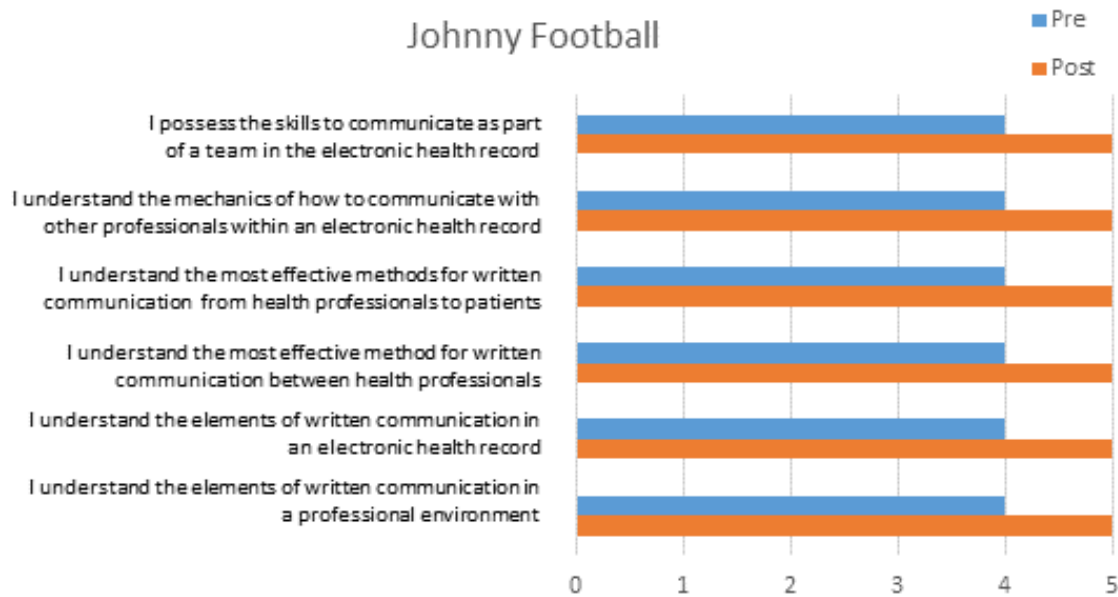
professionals within an electronic health record.” She went from pre “3-Neutral” to post “4-Agree “ on both “I understand the most effective methods for written communication from health professionals to patients” and “I understand the elements of written communication in an electronic health record.”

Figure 4.12 Self –assessment Bar Graph for Chester



“Johnny Football” had the largest knowledge gains (pre 42.86, post 100) of any individual in the cohort. On the individual items across the self—assessment all pre statements were marked “4- Agree” and all post statements were marked “5- Strongly agree” (Figure 4.13). This would correspond to his high knowledge gains, but not his low practice skills score on the rubric (rubric score =17).

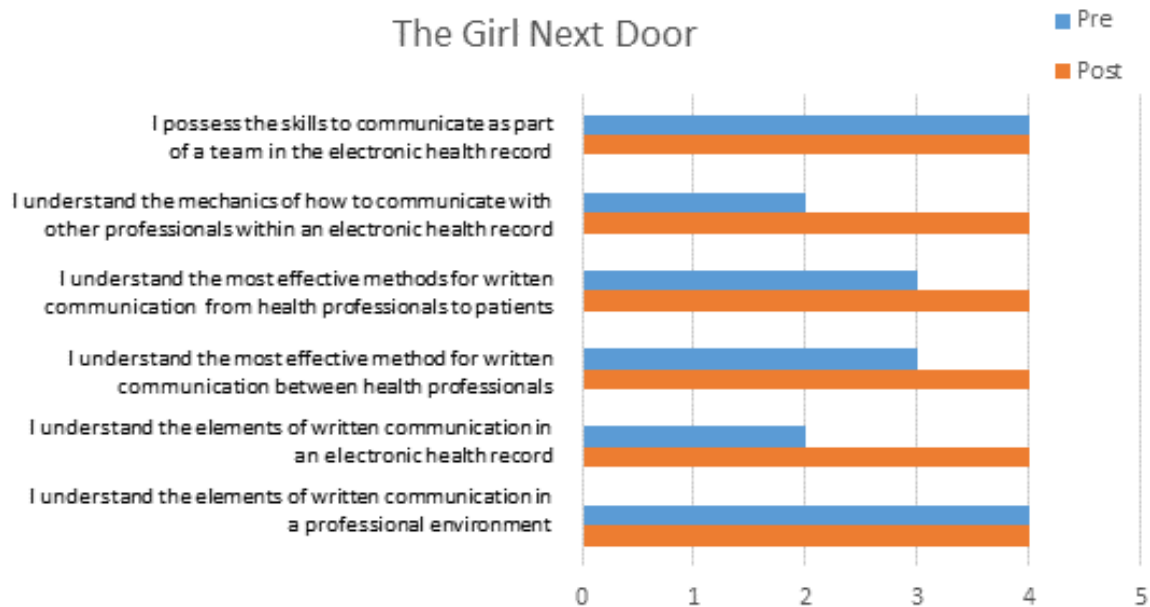
Figure 4.13 Self –assessment Bar Graph for Johnny Football



“The Girl Next Door” had the largest change from pre to post in the self-assessment (Figure 4.14) She did remained the same from pre to post at “4-Agree” on both .“I understand the elements of written communication in a professional environment” and “I possess the skills to communicate as part of a team in the electronic health record.” She answered “ 2-Disagree” on pre and ”4-Agree” on post assessment for “ I understand the elements of written communication in a professional environment.” She also answered “ 2-Disagree” on pre and ”4-Agree” on post for “ I understand the mechanics of how to communicate with other professionals within an effective health record.” She also had a “3-Neutral” for pre and “4-Agree” post for the

statements “ I understand the most effective methods for written communication between health professionals.” and “I understand the most effective methods for written communication from health professionals to patients.”

Figure 4.14 Self –assessment Bar Graph for The Girl Next Door



Janelle felt “4-Agree” on pre and post on 4 of the statements in the self assessment (Figure 4.15). She chose “2-Disagree” pre and “4-Agree” post on “I possess the skills to communicate as part of a team in the electronic health record.” She also had a positive difference from 3-Neutral” to “4-Agree” on the statement “ I understand the mechanics of how to communicate with other professionals within an electronic health record.”

This is consistent with her positive value comment, “very helpful introduction to using online records.”

Figure 4.15 Self –assessment Bar Graph for Janelle

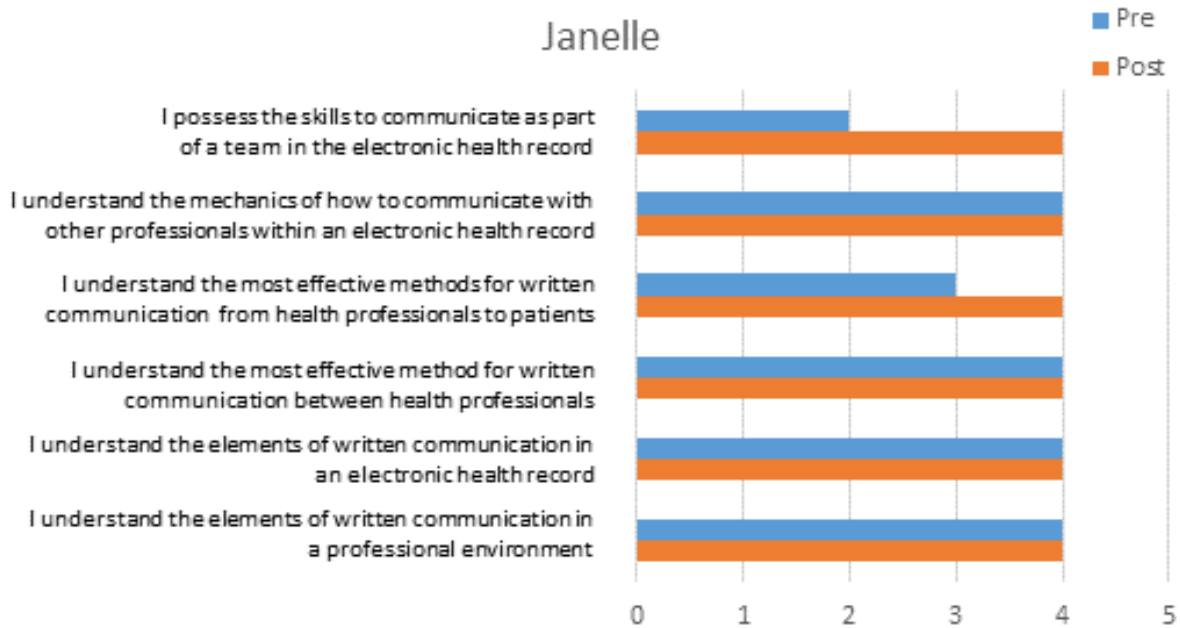




Table 4.15. Subgroup 3: Low knowledge Gains/ High Rubric Scores

Subgroup	Program	Age (years)	Gender	Previous experience	Previous experience using an EHR	PR_score	PS_score	Value	Logistics	EHR experience	Pre, post scores	Comments
<b>Low knowledge gains/High EHR rubric scores</b>												
maddie lou	Clinical Nutrition Program	26-33	Female	No	No	16	25	"+"	time		100.100	This is good info to solidify, however the second part within Epic was very time consuming.
Ginger spice	Physical Therapy Program	18-25	Female	Yes	No	18	27	"+"			100.100	Few glitches, but otherwise <u>worthwhile</u> activity
Cricket	Physical Therapy Program	18-25	Female	Yes	No	22	24		time		71.43, 71.43	Took 2 hours to do. Difficult to find time in lab when other classes weren't there.

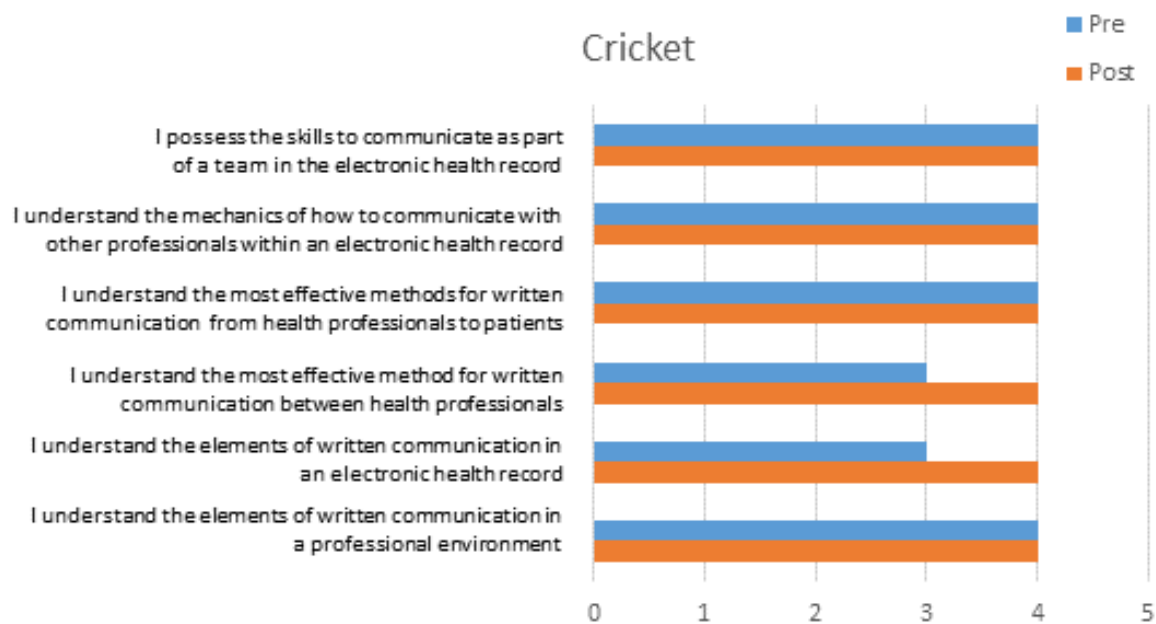
#### 4.7.2.3 Subgroup 3: Low knowledge Gains/ High Rubric Scores

Subgroup 3: Low knowledge Gains/ High Rubric Scores consisted of students (n=3) from the Clinical Nutrition program (n=1) and the Physical Therapy program (n=2). There were only female (n=3) students in this group. Two students were 18-25 years old (n=2) and one student was 26-33 years old (n=1). Two students had previous healthcare experience (n=2). None of the students had previous experience using an electronic health record. All three students had higher post self-assessment scores for the professional written communication scale (n=3). None of the students showed any knowledge gains, however two of the students scored 100 on both the pre and post test. The third student scored 71.43 on both the pre and post test. All three students made comments regarding logistics. Two of the students specifically commented on time. "Maddie lou" commented "the second part within Epic was very time consuming." "Cricket" stated "Took 2 hours to do. Difficult to find time in lab when other classes weren't there." Two of the students expressed positive value for the activity. "Maddie lou" commented "This is good info to solidify..." "Maddie lou" scored 100 on both the pre and post test and also a perfect score of 35 for her rubric score. "Ginger spice" commented "Few glitches, but otherwise a worthwhile activity." "Ginger spiec" scored 100 on both the pre and post tests and had a rubric score of 28.

An analysis of the breakdown of the pre and post professional written communication scale showed equal to or higher on the individual scale questions for all three students. "Cricket" showed the least amount of change from the pre to post

assessment (Figure 4.16).. She selected “4-Agree” to pre and post on all statements but two. For “I understand the most effective methods for written communication between health professionals” she responded “3-Neutral” on the pre and “4-Agree” on the post self-assessment. For the statement “ I understand the elements of written communication in an electronic health record” she responded “3-Neutral” on the pre and “4-Agree” on the post. There were three statements that she ranked “5-Strongly agree” on the post assessment.”

Figure 4.16 Self –assessment Bar Graph for Cricket

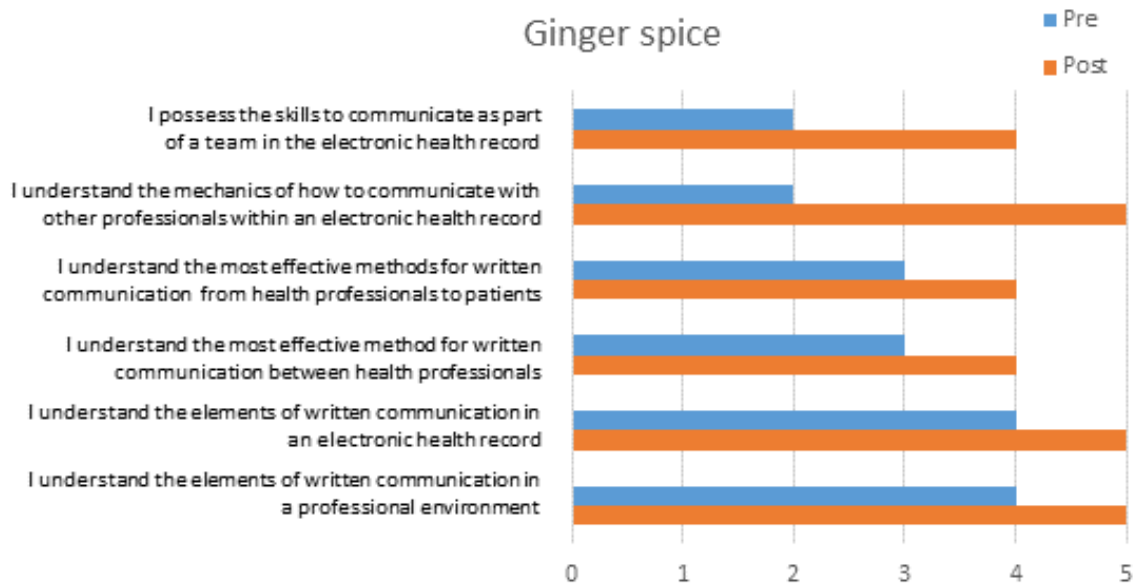


“Ginger spice” scored higher on the post self-assessment on all statements (Figure 4.17). She selected “4-Agree” pre and “5-Strongly agree” post for both “I understand the elements of written communication in a professional environment” and

“I understand the elements of written communication in an electronic health record.”

The greatest gain from pre to post in self-assessment was when she selected “2-Disagree” pre and “5—Strongly agree” post for the statement “I understand the mechanics of how to communicate with other professionals within an electronic health record.”

Figure 4.17 Self –assessment Bar Graph for Ginger spice



“Maddie lou” showed a gain from pre to post on four of the professional written communication scale statements (Figure 4.18). She went from “2-Disagree” to “4-Agree” on four of the statements including “I understand the mechanics of how to communicate with other professionals within an electronic health record,” “I understand the most effective methods for written communication from health

professionals to patients,” “I understand the most effective methods for written communication between health professionals,” and “I understand the elements of written communication in an electronic health record. She also selected “3-Neutral” pre and “4-Agree” post for the statement “I possess the skills to communicate as part of a team in the electronic health record.”

Figure 4.18 Self –assessment Bar Graph for Maddie lou

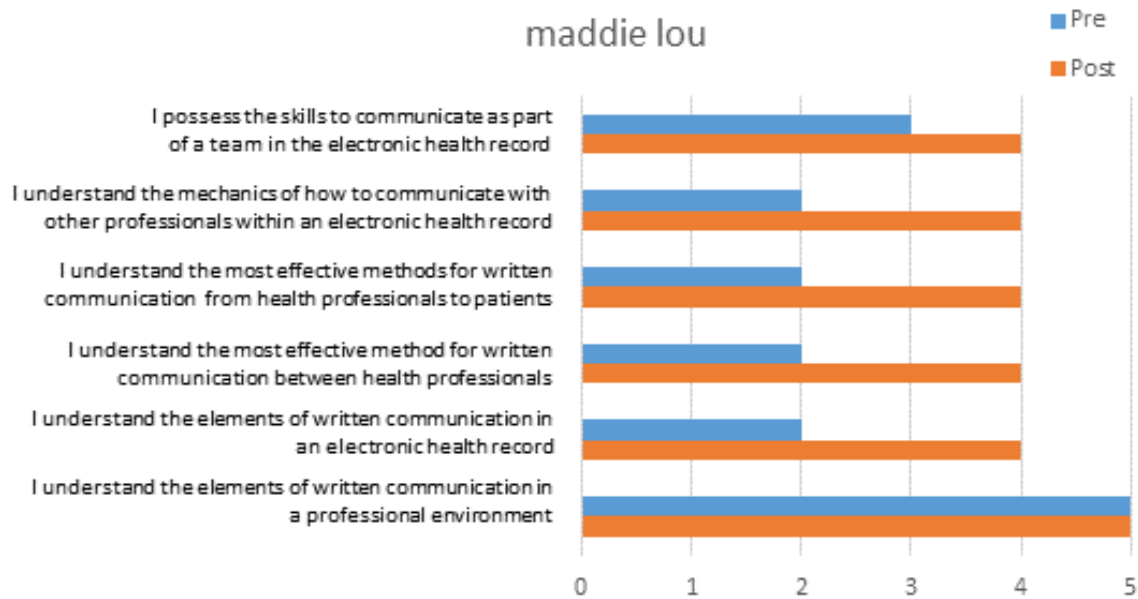


Table 4.16 Subgroup 4: Low knowledge Gains/ Low Rubric Scores

Subgroup	Program	Age (years)	Gender	Previous experience	Previous experience using an EHR	PR_comm	PS_comm	Value	Logistics	EHR experience	Pre, post scores	Comments
<b>Low knowledge gains/Low EHR rubric scores</b>												
0a00aba00a0a	Physical Therapy Program	18-25	Female	Yes	No	18	23		time		100, 85.71	Maybe try to emphasize more ahead of time that one activity must be done using the school computer. I sat down to do the activity at home and then had to come into school. Luckily I did it a week early so it wasn't a time problem but could be if people put it off
Wayne Rogers	Physical Therapy Program	26-33	Male	No	Yes	24	24	"+"			71.43, 71.43	A little lengthy but helpful
Grandma	Physical Therapy Program	26-33	Female	Yes	Yes	24	24	∅	time		71.43, 71.43	Time consuming & could have been shortened. Many of us write SOAP notes, discharge notes in our programs, so it was very <u>repetative</u> .
Faith Hill	Physical Therapy Program	18-25	Female	No	No	17	26	"+"	time		71.43, 71.43	I'm glad to be exposed to the EHR, although it was time consuming activity

#### 4.7.2.4 Subgroup 4: Low knowledge Gains/ Low Rubric Scores

The Subgroup 4: Low knowledge Gains/ Low Rubric Scores consisted of students solely from the Physical Therapy program (n=4). There both female (n=3) and male (n=1) students in this group. Two of the students were in the age range 18-25 years old (n=2), and two were in the age range 26-33 years old (n=2). Two students had previous experience in healthcare (n=2) and only one had previous experience using an electronic health record (n=1). Three of the students showed no knowledge gains holding at 71.34 for both pre and post test scores. One student showed a knowledge loss from 100 pre test score to 85.71 post test score. Two of the students did not show a change from pre to post on the written professional communication scale. Two students showed a higher score on the post professional communication scale. Three students commented on the value of the exercise and two of them were positive. Wayne Rogers” commented “A little lengthy but helpful.” Faith Hill” commented “I am glad to be exposed to the EHR...” All four students commented on the logistics of the exercise and three of them mentioned the length of the exercise. Nannabanana” commented “Luckily I did it a week early so it wasn’t a time problem but could be if people put it off.” Grandma” stated “Time consuming & could have been shortened.” Faith Hill” declared “I’m glad to be exposed to the EHR, although it was time consuming activity.”

An analysis of the breakdown of the pre and post professional written communication scale showed equal to or higher on the individual scale questions for all three students. Two students, “Wayne Rogers” and “Grandma,” did not show a

difference on any of their responses on the self-assessment, answering “4-Agree” to all statements (Figures 4.19 and 4.20).

Figure 4.19 Self –assessment Bar Graph for Wayne Rogers

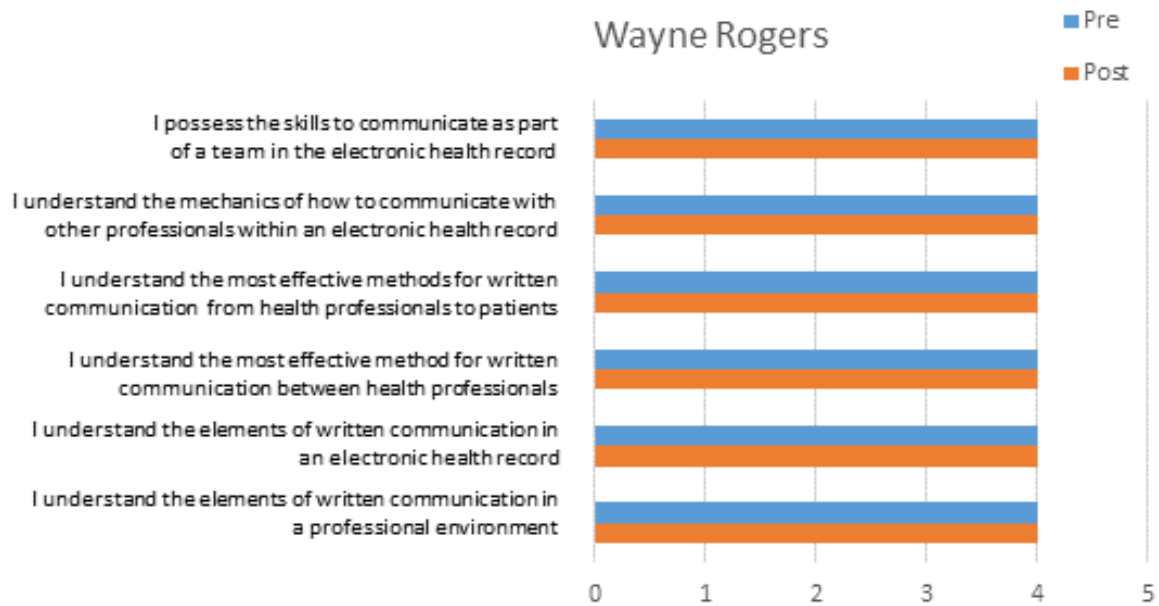
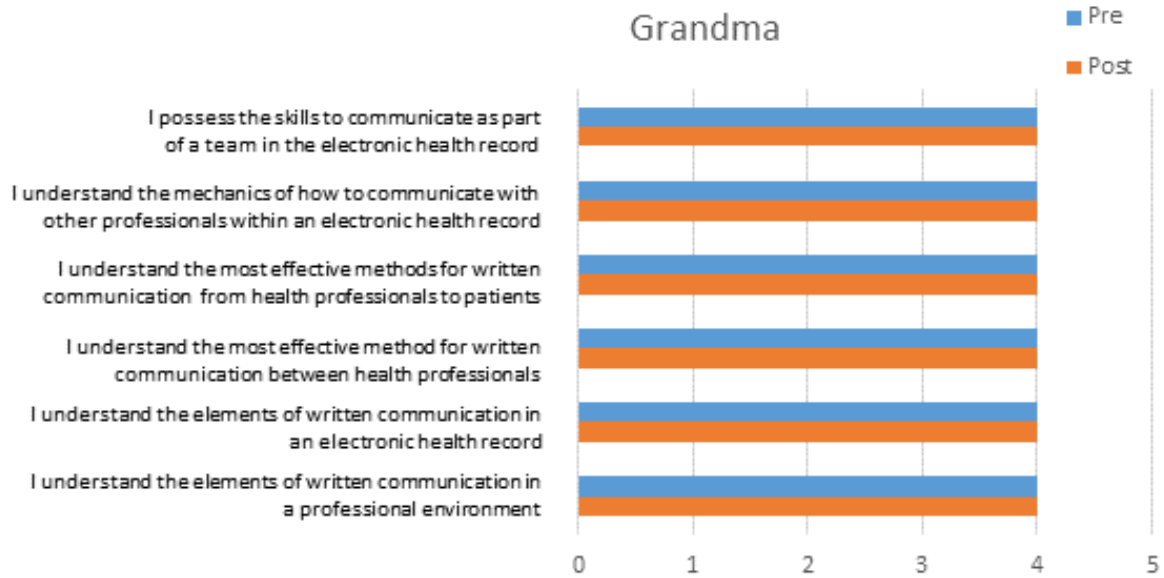


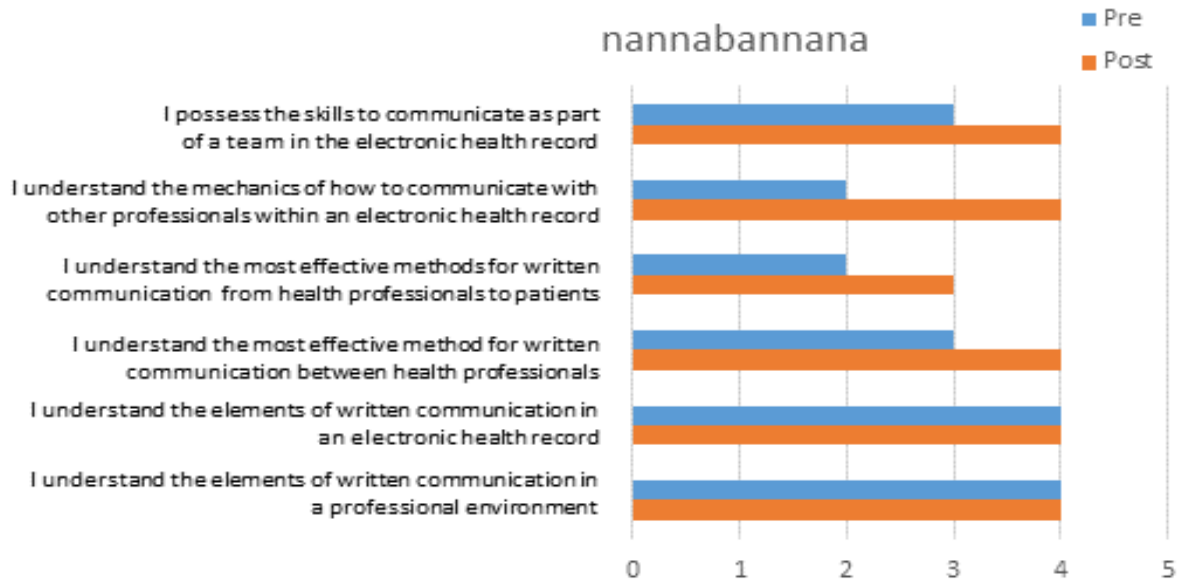


Figure 4.20 Self –assessment Bar Graph for Grandma



“Nannabanana” highest response to any post statements was “4-Agree” (Figure 4.21). She responded “4-Agree” to every statement with the exception of one. For the statement “I understand the most effective methods for written communication from health professionals to patients” she responded “2-Disagree” pre and “4-Agree” post.

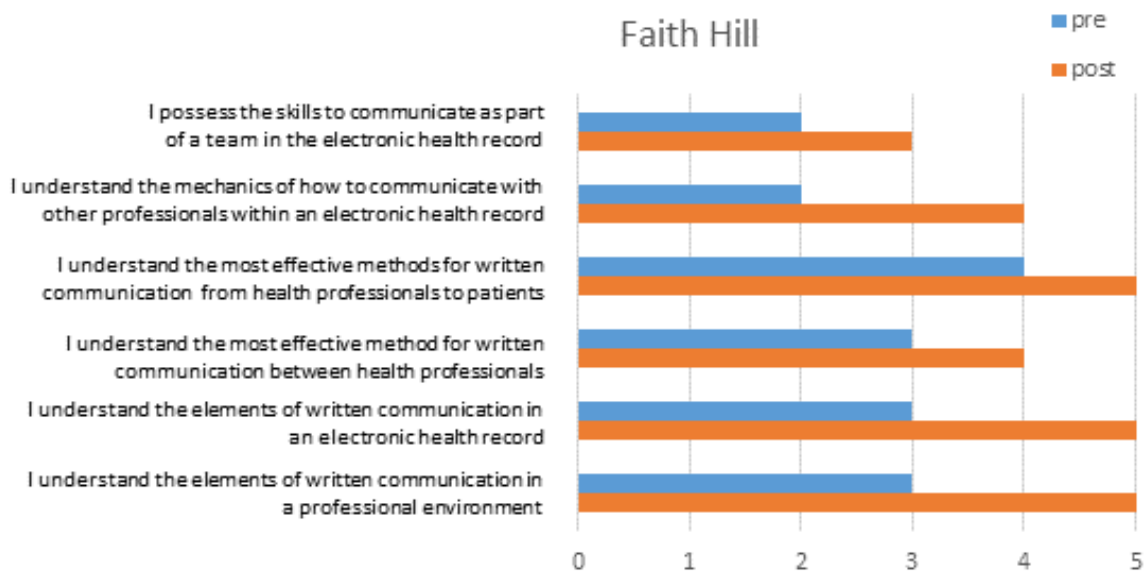
Figure 4.21 Self –assessment Bar Graph for nannabannana



Faith Hill had the most varied difference between pre and post for all of the statements in the written communication scale (Figure 4.22). She responded “2-Disagree” and “3-Neutral” for the statement “ I possess the skills to communicate as part of a team in the electronic health record.” For the statement “I understand the mechanics of how to communicate with other professional within an electronic health record” she marked “2-Disagree” pre and “4-Agree” post. She responded “4-Agee” pre and “5-Strongly agree” post for the statement “I understand the most effective methods for written communication from health professionals to patients.” “Faith Hill” selected “3-Neutral” pre and “4-Agree” post for the statement I understand the most effective had effective methods for written communication between health professionals.” She chose “3-Neutral” pre and “5-Strongly agree” post for both statements “I understand

the elements of written communication in an electronic health record” and “I understand the elements of written communication in a professional environment.”

Figure 4.22 Self –assessment Bar Graph for Faith Hill.



#### 4.8 Summary

This chapter examined the data results for the 3 phases of this mixed methods research study. Initially, descriptive statistics were presented. Next the researcher described the results from Stage A which included the quantitative analysis of knowledge gains utilizing pre and post assessment scores. Then, there were the results from Stage B including quantitative analysis of skills involving interprofessional communication in the electronic health record environment by analyzing rubric scores.

Stage C results included the purposive stratified sampling of the participants based on knowledge gains and rubric scores. Additionally, results from the quantitative assessment of the participant self-assessment scores were presented in Stage D. A detailed description of the qualitative process, Stage E, used to examine text responses to open-ended questions followed with the results of the qualitative content analysis. The chapter ended with the results from Stage F, the triangulation of methods examining data across the subgroups and within the individual stratified subgroups.

The next chapter will discuss the results of the data analysis with respect to the research questions in the study.

## CHAPTER 5

### DISCUSSION

This was a mixed methods study that included both quantitative and qualitative inquiry underpinned by post-positivism and used a methods triangulation research design model. (Schiffedercker & Reed, 2009; Denzin, 2008; Erlandson, et al, 1993). This chapter discusses the results of the data with respect to the central research question, and sub questions of this study. Emergent themes are discussed along with their implications. Finally, areas for future research are suggested.

The research question central to this study was “Do students’ perceptions of their practice in an electronic health record match their knowledge and skills?”

To examine this overarching question, the researcher used a mixed methods approach to attempt to answer the following sub-questions:

- Research Question 1. Can students learn the concepts for effective online discourse through an online educational module?
- Research Question 2. Will students take into practice, in a situated online learning environment, what they have learned?
- Research Question 3. Will students’ perceptions of their learning match their practice in the electronic health record?

### 5.1 Research Question 1. Can students learn the concepts for effective online discourse through an online educational module?

Initial analysis of the data from the pre and post knowledge assessment, showed knowledge gains across the majority of the cohort. In deeper review of the purposive stratified groups, there were some students who showed high knowledge gains. There were some students who had low or no knowledge gains. Some students had no knowledge gains because they had high knowledge to begin with and maintained that knowledge. The majority of students with low knowledge gains had low knowledge before the activity and did not show any knowledge gains after the activity.

### 5.2 Research Question 2. Will students take into practice, in a situated online learning environment, what they have learned?

For the majority of this cohort of students, there did not appear to be a strong relationship between what students learned from the online activity in effective interprofessional communication in an electronic health record and how they practiced effective communication skills in the Epic simulation. There were a few students who did have high knowledge gains and also demonstrated high performance in the situated environment. There were also a few students who demonstrated low performance in the situated environment and had equally low knowledge gains.

### 5.3 Research Question 3. Will students' perceptions of their learning match their practice in the electronic health record?

A majority of students in the cohort felt they improved their professional communication skills after the online activity in effective interprofessional communication in an electronic health record, however their self-assessment was not reflected in their performance in the simulated electronic health record. The majority of students demonstrating the highest skills in the simulated electronic health record also felt their professional written communication scores had improved after the exercise. The majority of students who demonstrated the lowest performance in the electronic health also felt their professional written communication skills had improved after the exercise. There did not appear to be a strong relationship between how an individual performed in the simulated electronic health record and how they assessed their professional written communication skills after the exercise.

### 5.4 Do students' perceptions of their practice in an electronic health record match their knowledge and skills?

The majority of students in this research study felt their individual skills in an electronic health record improved after the educational activity on effective interprofessional communication in an electronic health record. A majority of students had some knowledge gains after the activity. There were few students who had correspondingly high knowledge gains after the online educational activity. There were

also a few students with low knowledge gains after the activity who felt their skills had improved.

Some students demonstrated practicing professional written communication skills in the electronic health record. Very few students demonstrated high performance of written communication skills in the electronic health record. There were also some students who did not demonstrate practicing written professional communication skills in the situated environment. This does not correspond to majority of who felt their skills had improved after the educational activity.

### 5.5 Emergent Themes

In order to further explore this phenomenon, a qualitative analysis across methods was used to look at more perspectives for possible illumination of the situation. Students in this cohort were compared to the group and were also compared and contrasted across groups that were identified by knowledge gains and skills practice in a simulated electronic health record.

Data from open-ended comments were analyzed with a directed content analysis technique using the research questions to establish pre-set codes. Emergent codes were recognized and combined with the a priori codes to define categories. Second round coding used the categories to define three overarching themes: 1) The value of the exercise to the individual, (2) How the logistics of the exercise affected the



individual, and (3) Prior experience in EHR and/or EMR influenced the student's experience.

#### 5.5.1 Value of the Exercise

A majority of the value comments were positive with regard to the value of the exercise. Delving deeper, individuals with either high or low knowledge gains or skills were more inclined to make strictly positive comments regarding the value of the exercise which differs from the rest of the students in this group who made either positive or negative comments on the value. Interestingly, the majority of students with both low knowledge gains and low skills demonstration had positive comments on the value of the exercise.

It is possible that the perceived value of the exercise is not necessarily a reflection of the outcomes of the activity, but of the experience itself. A student who struggles with the exercise, with low knowledge gains or low demonstrations of practice skills might still have found the experience valuable because of the struggle. This theme of perceived value is an area for further exploration with students.

#### 5.5.2 The Logistics of the Exercise

Many students made comments regarding logistics related to the activity such as scheduling, technology snags, and having to use computers on campus.

When the activity was scheduled during the semester was of concern to a number of students. There were comments from some individuals, across all groups, that the activity was scheduled during a very busy time during the semester for them. While this did seem program specific, it also indicated a possible priority or preferential bias for activities associated strictly with their academic program as opposed to interprofessional activities that span all programs and professions. This too is an area for further exploration.

One strong emergent theme was the concept of time and the length of the activity. The overwhelming majority of students in this cohort felt the activity on interprofessional communication in the electronic health record took too much time to complete. This negative perception regarding the length of the activity was in spite of their knowledge gains, demonstration of skills in the electronic health record, and perception of improved professional communication skills. In total, the activity was not any longer than the face-to-face sessions for the IDEAL course, yet some students indicated they would have preferred if it would have taken place in the classroom. It is not clear why individuals felt this IDEAL activity, that could be completed at the individual's discretion and that did not physically take place in the classroom was more of a burden than the face-to-face class. This also seems at odd with statement from some students that they wanted to be able to use their personal computers to complete the assignment, so they would have more flexibility on when and where they could complete the assignment.

Time in general was such a strong issue across all three academic programs. This is a noted issue in interprofessional education which by its very nature involves students from more than one academic program (Freeth, Hammick, Reeves, Koppell and Barr, 2008). Students place a premium on their time for courses and activities dedicated exclusively to their field of practice. Activities outside the exclusive scope of their field might be perceived as time consuming or might suffer in performance measures, even if the activity is perceived as having positive value.

It is possible that the electronic health record simulation is seen more in terms of learning the software application and not as applying the professional written communication skills to the electronic health record. This is interesting because the academic programs in health programs have a didactic component, usually in the classroom or online, for learning the basic concepts of healthcare relative to one's field. Then students transition into a clinical setting to learn to apply those concepts to skills for patient care. This is similar from the transition of acquiring knowledge on the concepts of professional written communication from an online learning module and then transitioning to a simulated, situated learning environment in the electronic health record. In order to assist students in the clinical transition of their knowledge to applied clinical behavior a competency-based learning strategy is often used in the medical curriculum. Knowledge is built upon and students transition through a model of until the reach mastery of a competency. It is possible that this same model of competency-based education should be applied to skills involving technology, such as an electronic

health record. Competency cannot be achieved through one, or two isolated interactions with the technology, even if it is in a situated learning environment. Additionally, because a learner is functioning in the situated learning environment in a community of practice does not necessarily mean the individual feels or is competent in online discourse skills, such as online reading and writing, that are important to effectively communicate in this environment (Curan, Kirby, Parsons & Lockyer, 2003; Han & Lopp, 2013; Tierne, et al, 2013). The exposure needs to be more frequent, immersive, and purposive involving formative feedback until mastery of competence is demonstrated (Ericsson, Krampe & Tesch-Römer, 1993; Stephenson, et al, 2014).

An electronic health record could be used longitudinally in a program and threaded through the curriculum (Schenartz & Schenartz, 2012; Elliot et al., 2011). A basic introduction to effective professional written communication skills could be delivered electronically, and initially in conjunction with a reinforcing activity in the situated learning environment, the electronic health record. A consistent assessment, such as the electronic health record rubric, could be used by the facilitators, peers, and individuals for self- assessment. Additionally, a tool such as the professional written communication scale could be used in conjunction with the rubric to assess if their perception of their skills matches their competence in written professional communication in the electronic health record (Hammoud et al., 2012; Stephens, et al.: 2011). Instructors, facilitators and mentors will also need to know how to facilitate

student learning in the electronic health record environment (Keenan, 2006; Mintz et al., 2009; Morrow, 2010; Scenarts, 2012).

The emergent themes regarding logistics open more avenues for exploration. Students' perceptions of time, the value of an activity as it relates to their program, and the flexibility of the assignment were all emergent themes that should be addressed more in depth with students.

### 5.5.3 The Influence of Prior Experience in the Electronic Health Record

The majority of students in the cohort had previous experience in healthcare. This experience did not seem to affect knowledge gains or practice of communications skills for the majority of students. Very few had prior experience in an electronic health record. Interestingly, the students with prior electronic health record experience felt that they had strong professional communication skills before and after the exercise, but this was not demonstrated in the exercise. Any are for future exploration would be to address with students why electronic health record experience might make them overly confident in their individual skills despite participating in activities that would indicate the contrary.

### 5.6 Limitations

Time constraints and access to the students were some limitations to this study. The specific cohort of students were only available for a limited time before they graduated

from their programs and moved on. Additionally, students did not want to avail themselves for more in depth interviews on this experience. Effort might be needed in health care education to make the environment more conducive and acceptable for face-to-face interviews with students. This would allow for more in depth analysis and thick rich exploration of phenomenon associated with educational activities in all aspects of health care education. This would also assist in supporting the call for more mixed methods research studies in medical and health profession education.

## 5.7 Implications

The results from this research study has possible implications for other interprofessional education programs utilizing an online situated learning environment in order for students to learn interprofessional communication concepts and practice professional communication skills an electronic health record. It is possible for students to learn concepts for professional communication, but not take them into practice when in an electronic health record environment. Measures might need to be taken, such as additional oversight, formative feedback and reflection to ensure students practice what they learn. Additionally, student's self-assessment of their professional written communication skills might not reflect their knowledge and skills in an electronic health record environment. Efforts might need to be taken to more realistically align students perceptions with reality.

Emergent themes could also have implications for other program utilizing an online situated learning environment for students to learn how to communicate in an electronic health record. A student's perceived value of the exercise might not be directly related to their knowledge gains or demonstrated skills. Also, prior experience utilizing an electronic health record may not necessarily transfer into, or might be a barrier, to learning concepts and practices in an electronic health record that are necessary for their field of study. Additionally, logistics of the overall activity play a large role for the students. Flexibility, location, scheduling, and especially the amount of time necessary to complete the activity all have a potentially significant impact on the student's experience and should have significant consideration while designing a similar educational activity.

#### 5.8 Areas for Future Research

The emergent themes in this research study have indicated a number of areas for future research. Students' perceived value of the effective interprofessional communication in an electronic health record should be explored. Additionally, students' perceptions of time, the value of an activity as it relates to their program, and the flexibility of the assignment were all emergent themes that should be addressed more in depth with students. Also, an area for future exploration might be to address the impact prior electronic health record experience might have on a student's learning

and practice in an electronic health record once they are enrolled in an academic health profession program.

As stated in the literature (Ericsson, Krampe & Tesch-Römer, 1993; Stephenson, et al, 2014), and reinforced by this research study, it is important to find a learning model to help students apply their knowledge of professional written communication to their practice within the electronic health record. A learning model should explore longitudinal integration of a situated online community of practice within a medical/health profession curriculum with the final outcome mastery of written professional communication in an electronic health record. It will also be important to find an accurate method for students to self-assess their professional written communication skills within the electronic health. False confidence in substandard skills can lead to poor communication, mistakes and put patient safety at risk.

## 5.9 Conclusion

A primary consideration for the adoption of electronic health records is the potential improvement in patient safety (Buntin, Burke, Hoaglin, Blumenthal, 2009) as well as quality and efficiency of care (Chaudhry, Wang, Wu, Maglione, Mojic , Roth, Morton, Shekelle, 2006). Additionally, electronic health records are increasingly the primary form of communication for patient care between healthcare team members and with patients (Institute of Medicine, 2003). Using an electronic health record



effectively can result in improved communication and teamwork (Bates, Ebell, Gotlieb, Zapp & Mullins, 2003; Mintz et al., 2009).

The problem exists that there are no education initiatives focused on teaching and taking into practice the skills of effective interprofessional discourse in this online, asynchronous, professional environment. Students who learn to practice effective, interprofessional online discourse in the electronic health record could have a positive impact on patient care, safety, and outcomes.

A review of the literature supported (a) the importance of situated learning in a community of practice as it relates to the electronic health record; (b) the teachability of online discourse (i.e. written interaction), and potential improvement, for more clear and relevant communication within the community of practice of health professionals in an electronic health record; (c) the integration of situated learning, as it relates to the electronic health record, into higher education for health profession students.

This is significant since effective and efficient communication in the electronic health record environment could decrease miscommunications, potential errors, and inefficient care in professional practice that could have a negative, potentially fatal, impact on patient care (Bates et al., 2003; Mintz et al., 2009; Stephenson et al, 2014).

Stephens et al. (2011) point out that in current teaching environments for utilizing electronic health records, the emphasis is on entering accurate clinical data, not on effective online discourse and communication skills.

This mixed methods research study attempted to study the phenomenon of whether students' perceptions of their practice in an electronic health record match their knowledge and skills for a specific cohort of students. The students' perceptions of their practice in an electronic health record did not necessarily match their knowledge and skills in this group of students. Emergent themes from the study pointed in the possible direction of perceived value of the exercise, prior experience in an electronic health record, and logistical barriers to the activity. Perceived time constraints was a particularly strong concern of the students. While these themes were specific to this group of students, they might be valuable considerations for other interprofessional programs looking to implement similar activities concerning the electronic health record. Further research is needed in this areas as these themes relate to future health care professionals learning and practicing effective interprofessional communication in the electronic health record.

APPENDIX  
CODING MANUAL

	Course Comments	Themes
Pseudonym		1. The value of the exercise to the individual 2. The how the logistics of the exercise affected the individual 3. Prior experience in EHR and/or EMR influenced the students experience
22-May		
ajm2993	So many directions, but got easier as activity went on.	Value Logistics
arlene12	I found this activity not very helpful because I am already familiar with Epic.	Value Experience
Batman	It was pretty time consuming, but it was great practice with epic.	Value Logistics
Bear2013	This was very tedious and at some times confusing. Also, the matching par was very difficult to move and drop them in the right spot.	Logistics
betty	Too difficult to access. I wasn't aware I was looking for the type of mistakes it wanted me to notice. It would have been better to introduce it during class.	Logistics
bigten26		
bublegumblondie12	I didn't really understand why we did this, and it was difficult to get started with the assignment. I felt like we were given little info.	Logistics
Cassie	I liked exposure to EPIC, but the previous quizzes seemed like a waste of time. I did not learn much from it.	Value Logistics
charlie	A little time-consuming- maybe at the beginning of the semester	Logistics
Charlied	took an extremely long time! Complicated!	Logistics
Chester	Took a lot of time	Logistics
Cricket	Took 2 hours to do. Difficult to find time in lab when other classes weren't there.	Logistics
curlyq624	discussed in class	

Dietitian Debbie		
Eric	good to learn about EHR	Value
Faith Hill	I'm glad to be exposed to the EHR, although it was time consuming activity	Value Logistics
Feenixpawl	Helpful, but needed to be done earlier in the semester.	Value Logistics
Ginger spice	Few glitches, but otherwise worthwhile activity	Value Logistics
Ginny Weasley	Great exposure to Epic. However, the early modules (#1--4) did not help me learn about EPIC or professional communication very well.	Value Logistics
GraceFace	I feel this would have been better in a class-room setting. I'm still not sure what I was supposed to get out of that exercise.	Value Logistics
Granada	Very helpful for navigating Epic for the first time	Value
hallk13187	Overall a good exercise, but would probably be more beneficial later in the program	Value Logistics
hookem24	Not good learning activity for me.	Value
Janelle	very helpful introduction to using online records	Value
Johnny Football	A good way to be introduced to EPIC, but a little dry.	Value Logistics
Kate Middleton	These were extremely time consuming and difficult!	
Katherine	Learned a lot about Epic. Good. I did not agree with some of the answers on the 2nd assessment (one of the choices was "used many abbreviations," and the correct match only had one abbreviation. I figured that couldn't be the answer for that reason.)	Value Logistics Experience
Ke\$ha	too long - didn't think the "lessons" provided the right information to do well on the assessment	Value Logistics
KIKI	Instructions were accurate, but tedious. Another way to explore EMR could be helpful.	Value Logistics
Kingsbury Wife	Not very useful	Value

kschass1	NOT NEEDED. This was not very helpful.	Value
lasarah	LONG! Good to understand Epic if you work @ UTSW but everywhere will have different programs	Value Logistics
Lassie	Pointless and unnecessarily time-consuming	Value Logistics
LexiGrey	Confusing instructions on a few but helpful	Value Logistics
Luna Moo	Not my favorite, a little stressful	Value
michael jordan	Very time consuming with little benefit.	Value Logistics
mimi	Not helpful doing this online. Didn't get much out of this.	Value Logistics
Mitch Moreland	Had trouble with tests because I didn't realize the notes were in book format.	
nannabanana	Maybe try to emphasize more ahead of time that one activity must be done using the school computer. I sat down to do the activity at home and then had to come into school. Luckily I did it a week early so it wasn't a time problem but could be if people put it off	Logistics
Nutrition	Didn't enjoy it. Got most of the questions wrong even though I read the booklet. Questions not very clear.	Value Logistics
OlsenTwin	Did not like this exercise - time consuming & didn't understand the part we had to do @ school.	Value Logistics
Owl	Helpful to see & feel out the module.	Value
Paul Gonzales	Some of the modules needed revamp. Some Q's were incorrect and I didn't think they were really testing our knowledge of Epic very much. Most of them were too vague.	Logistics Experience
redballoons	I thought the modules were helpful but some sections were repeated from previous sections.	Value Logistics
Rita2583	Give intro assignment in class before opening it. Some instructions were hard to follow.	Logistics

Snickerdoodle	Pretty good activity. Helpful to look at a chart but editing the notes wasn't necessarily helpful.	Value Experience
stlrose1		
Suki	It took me less time than others. I was confused because I didn't know what to change on the Epic notes. I haven't had enough experience with Epic to know so I didn't change anything.	Logistics Experience
Sunflower girl	It was a little confusing to use	Logistics
Tad	understand the purpose, but longer than necessary - could've been mentioned or outlined in class before	Value Logistics
tamer10389	Way too time consuming & inconvenient (have to do on campus)	Logistics
Thanesif	hard to follow & a bit confusing	Logistics
The Girl Next Door	Great idea, although not very convenient, directions were in a separate window panel making navigation difficult and time consuming	Value Logistics
The Mountain	Time consuming and a little confusing	Logistics
Tiffany	This introduced me to electronic records, but I still don't feel comfortable or confident in using/navigating it.	Value Experience
triple trouble	It was good to practice rewriting notes and reading charts, but since we didn't get feedback we don't know how well we did/where we need to work or practice.	Value Logistics
VBYNU1		
wahobay06	Busy work! I had experience using Epic & honestly I'm glad I did or I wouldn't have known what to do. If the point was to intro Epic to students, it missed the mark.	Value Logistics Experience
Bilbo Swaggins	Not beneficial at the end of the semester w/ so much else going on	Logistics
Bobby Jones	Tedius. Neutral opinion on usefulness of the exercise.	Value Logistics
Dragoneyes	I personally ran into a lot of EPIC problems. Having access off campus would be more convenient. I really would have liked to learn more about EHR	Logistics

	(how epic works) and the procedures of note taking, follow-up, etc. I really took this as an exercise on editing in EHR. Perhaps tell us the purpose of why we are editing a note. How should we be passing information to another professions? Is it not automatically forwarded to them?	
Franny Glass	I understand the point of this exercise, but it did feel a bit like busywork, especially considering that my classmates and I have experience with EMRs.	Value Experience
Grandma	Time consuming & could have been shortened. Many of us write SOAP notes, discharge notes in our programs, so it was very repetative.	Value Logistics
jgerbs3	important to see how epic works, but some inconsistencies	Value Logistics
kcmg803	Would have been better to do earlier in the semester before our hospital rotations.	Logistics
Lisa	drag	Value
maddie lou	This is good info to solidify, however the second part within Epic was very time consuming.	Value Logistics
Maximsu	It was OK, however epic was very confusing.	Value Logistics
msjt2008	A little confusing. I have worked with Epic before but the instructions on what was wanted from us was a little confusing.	Logistics
Nick		
Redcon1	Horrible. Didn't learn anything from this. It was frustrating to maneuver and didn't offer much in practicing EMR's.	Value Logistics
Rod Farva	Good	Value
Tyler Durden	Good practice for those unfamiliar w/ EMR	Value
Wayne Ronova	A little lengthy but helpful	Value Logistics
special sauce	Long & tedious -> will help if we made this a class activity	Logistics



Tangelo789	This would have been great to do before my hospital rotation. Doing it after the fact didn't seem like a value-add.	Value Logistics
Kristi	I did not get much out of this activity. Need more feedback on the submission.	Value Logistics

Anchor codes("a priori codes") based on research questions

Learning perception (9)

So many directions, but got easier as activity went on.

I found this activity not very helpful because I am already familiar with Epic.

I liked exposure to EPIC, but the previous quizzes seemed like a waste of time. I did not learn much from it.

Great exposure to Epic. However, the early modules (#1--4) did not help me learn about EPIC or professional communication very well.

Not good learning activity for me.

too long - didn't think the "lessons" provided the right information to do well on the assessment

Time consuming & could have been shortened. Many of us write SOAP notes, discharge notes in our programs, so it was very repetitive.

Horrible. Didn't learn anything from this. It was frustrating to maneuver and didn't offer much in practicing EMR's.

I did not get much out of this activity. Need more feedback on the submission.

Knowledge (1)

Many of us write SOAP notes, discharge notes in our programs, so it was very repetitive.

## Communication Skills (1)

Great exposure to Epic. However, the early modules (#1--4) did not help me learn about EPIC or professional communication very well.

## Writing Skills (0)

## EHR competence (8)

I found this activity not very helpful because I am already familiar with Epic.

Learned a lot about Epic. Good. I did not agree with some of the answers on the 2nd assessment (one of the choices was "used many abbreviations," and the correct match only had one abbreviation. I figured that couldn't be the answer for that reason.)

Some of the modules needed revamp. Some Q's were incorrect and I didn't think they were really testing our knowledge of Epic very much. Most of them were too vague.

Pretty good activity. Helpful to look at a chart but editing the notes wasn't necessarily helpful.

I was confused because I didn't know what to change on the Epic notes. I haven't had enough experience with Epic to know so I didn't change anything.

This introduced me to electronic records, but I still don't feel comfortable or confident in using/navigating it.

Busy work! I had experience using Epic & honestly I'm glad I did or I wouldn't have known what to do.

I understand the point of this exercise, but it did feel a bit like busywork, especially considering that my classmates and I have experience with EMRs.

Value of exercise (41)    Positive (29)    Neutral (4)    Negative (8)

I found this activity not very helpful because I am already familiar with Epic.

It was pretty time consuming, but it was great practice with epic.

I liked exposure to EPIC, but the previous quizzes seemed like a waste of time. I did not learn much from it.

good to learn about HER

I'm glad to be exposed to the EHR, although it was time consuming activity

Helpful, but needed to be done earlier in the semester.

Few glitches, but otherwise worthwhile activity

Great exposure to Epic. However, the early modules (#1--4) did not help me learn about EPIC or professional communication very well

I feel this would have been better in a class-room setting. I'm still not sure what I was supposed to get out of that exercise.

Very helpful for navigating Epic for the first time

Overall a good exercise, but would probably be more beneficial later in the program

very helpful introduction to using online records

A good way to be introduced to EPIC, but a little dry.

Learned a lot about Epic. Good. I did not agree with some of the answers on the 2nd assessment (one of the choices was "used many abbreviations," and the correct match only had one abbreviation. I figured that couldn't be the answer for that reason.)

Instructions were accurate, but tedious. Another way to explore EMR could be helpful.

Not very useful

NOT NEEDED. This was not very helpful.

LONG! Good to understand Epic if you work @ UTSW but everywhere will have different programs

Pointless and unnecessarily time-consuming

Confusing instructions on a few but helpful

Very time consuming with little benefit.

Not helpful doing this online. Didn't get much out of this.

Helpful to see & feel out the module.

I thought the modules were helpful but some sections were repeated from previous sections.

Pretty good activity. Helpful to look at a chart but editing the notes wasn't necessarily helpful.

understand the purpose, but longer than necessary - could've been mentioned or outlined in class before

Great idea, although not very convenient, directions were in a separate window panel making navigation difficult and time consuming

It was good to practice rewriting notes and reading charts, but since we didn't get feedback we don't know how well we did/where we need to work or practice.

Busy work! I had experience using Epic & honestly I'm glad I did or I wouldn't have known what to do. If the point was to intro Epic to students, it missed the mark.

Tedious. Neutral opinion on usefulness of the exercise.

I understand the point of this exercise, but it did feel a bit like busywork, especially considering that my classmates and I have experience with

important to see how epic works, but some inconsistencies

This is good info to solidify, however the second part within Epic was very time consuming.

It was OK, however epic was very confusing.

Horrible. Didn't learn anything from this. It was frustrating to maneuver and didn't offer much in practicing EMR's.

Good

Good practice for those unfamiliar w/ EMR

A little lengthy but helpful

This would have been great to do before my hospital rotation. Doing it after the fact didn't seem like a value-add.

I did not get much out of this activity. Need more feedback on the submission.

Other (Emergent codes)

### Content (32)

So many directions, but got easier as activity went on.

This was very tedious and at some times confusing. Also, the matching par was very difficult to move and drop them in the right spot.

Too difficult to access. I wasn't aware I was looking for the type of mistakes it wanted me to notice. It would have been better to introduce it during class.

I didn't really understand why we did this, and it was difficult to get started with the assignment. I felt like we were given little info.

I liked exposure to EPIC, but the previous quizzes seemed like a waste of time. I did not learn much from it.

took an extremely long time! Complicated!

Few glitches, but otherwise worthwhile activity

Great exposure to Epic. However, the early modules (#1--4) did not help me learn about EPIC or professional communication very well.

A good way to be introduced to EPIC, but a little dry.

Learned a lot about Epic. Good. I did not agree with some of the answers on the 2nd assessment (one of the choices was "used many abbreviations," and the correct match only had one abbreviation. I figured that couldn't be the answer for that reason.)

too long - didn't think the "lessons" provided the right information to do well on the assessment

Instructions were accurate, but tedious. Another way to explore EMR could be helpful.

Confusing instructions on a few but helpful

Had trouble with tests because I didn't realize the notes were in book format.

Didn't enjoy it. Got most of the questions wrong even though I read the booklet. Questions not very clear.

Did not like this exercise - time consuming & didn't understand the part we had to do @ school

Some of the modules needed revamp. Some Q's were incorrect and I didn't think they were really testing our knowledge of Epic very much. Most of them were too vague.

I thought the modules were helpful but some sections were repeated from previous sections.

It was a little confusing to use

hard to follow & a bit confusing

Great idea, although not very convenient, directions were in a separate window panel making navigation difficult and time consuming

Time consuming and a little confusing

It was good to practice rewriting notes and reading charts, but since we didn't get feedback we don't know how well we did/where we need to work or practice.

Tedious. Neutral opinion on usefulness of the exercise.

I personally ran into a lot of EPIC problems. Having access off campus would be more convenient. I really would have liked to learn more about EHR (how epic works) and the procedures of note taking, follow-up, etc. I really took this as an exercise on editing in EHR. Perhaps tell us the purpose of why we are editing a note. How should we be passing information to another professions? Is it not automatically forwarded to them?

Time consuming & could have been shortened. Many of us write SOAP notes, discharge notes in our programs, so it was very repetitive.

important to see how epic works, but some inconsistencies

This is good info to solidify, however the second part within Epic was very time consuming.

It was OK, however epic was very confusing.

A little confusing. I have worked with Epic before but the instructions on what was wanted from us was a little confusing.

Horrible. Didn't learn anything from this. It was frustrating to maneuver and didn't offer much in practicing EMR's.

I did not get much out of this activity. Need more feedback on the submission.

### Time for exercise (22)

It was pretty time consuming, but it was great practice with epic.

I liked exposure to EPIC, but the previous quizzes seemed like a waste of time. I did not learn much from it.

A little time-consuming- maybe at the beginning of the semester

took an extremely long time! Complicated!

Took a lot of time

Took 2 hours to do. Difficult to find time in lab when other classes weren't there.

I'm glad to be exposed to the EHR, although it was time consuming activity

These were extremely time consuming and difficult!

too long - didn't think the "lessons" provided the right information to do well on the assessment

LONG! Good to understand Epic if you work @ UTSW but everywhere will have different programs Pointless and unnecessarily time-consuming

Very time consuming with little benefit.

Maybe try to emphasize more ahead of time that one activity must be done using the school computer. I sat down to do the activity at home and then had to come into school. Luckily I did it a week early so it wasn't a time problem but could be if people put it off

Did not like this exercise - time consuming & didn't understand the part we had to do @ school.

It took me less time than others. I was confused because I didn't know what to change on the Epic notes. I haven't had enough experience with Epic to know so I didn't change anything.

understand the purpose, but longer than necessary - could've been mentioned or outlined in class before

Way too time consuming & inconvenient (have to do on campus)

Great idea, although not very convenient, directions were in a separate window panel making navigation difficult and time consuming

Time consuming and a little confusing

Time consuming & could have been shortened. Many of us write SOAP notes, discharge notes in our programs, so it was very repetitive.

This is good info to solidify, however the second part within Epic was very time consuming.

A little lengthy but helpful

Long & tedious -> will help if we made this a class activity

### Accessibility (6)

Too difficult to access. I wasn't aware I was looking for the type of mistakes it wanted me to notice. It would have been better to introduce it during class.

Took 2 hours to do. Difficult to find time in lab when other classes weren't there.

Maybe try to emphasize more ahead of time that one activity must be done using the school computer. I sat down to do the activity at home and then had to come into school. Luckily I did it a week early so it wasn't a time problem but could be if people put it off

Did not like this exercise - time consuming & didn't understand the part we had to do @ school.

Way too time consuming & inconvenient (have to do on campus)

I personally ran into a lot of EPIC problems. Having access off campus would be more convenient. I really would have liked to learn more about EHR (how epic works) and the procedures of note taking, follow-up, etc. I really took this as an exercise on editing in EHR. Perhaps tell us the purpose of why we are editing a note. How should we be passing information to another professions? Is it not automatically forwarded to them?

### (Timing) Scheduling of activity (7)

Too difficult to access. I wasn't aware I was looking for the type of mistakes it wanted me to notice. It would have been better to introduce it during class.

A little time-consuming- maybe at the beginning of the semester

Helpful, but needed to be done earlier in the semester.

Overall a good exercise, but would probably be more beneficial later in the program

Not beneficial at the end of the semester w/ so much else going on

Would have been better to do earlier in the semester before our hospital rotations.

This would have been great to do before my hospital rotation. Doing it after the fact didn't seem like a value-add.

### Online delivery (5)

I feel this would have been better in a class-room setting. I'm still not sure what I was supposed to get out of that exercise

Not helpful doing this online. Didn't get much out of this.

Give intro assignment in class before opening it. Some instructions were hard to follow.

understand the purpose, but longer than necessary - could've been mentioned or outlined in class before

Long & tedious -> will help if we made this a class activity

### Likability (6)

Not my favorite, a little stressful

Didn't enjoy it. Got most of the questions wrong even though I read the booklet. Questions not very clear.

Did not like this exercise - time consuming & didn't understand the part we had to do @ school.

Busy work! I had experience using Epic & honestly I'm glad I did or I wouldn't have known what to do. the point was to intro Epic to students, it missed the mark.

Drag

Horrible. Didn't learn anything from this. It was frustrating to maneuver and didn't offer much in practicing EMR's.

First round coding with frequencies:

Attribute coding

Gender



Men (13) Women (65)

Age ranges

18 – 25 (59) 26-33 (16) 34-41 (2) 42-49 (1)

Academic programs

Clinical Nutrition (16) Physical Therapy (32) Physician Assistant (30)

Health care experience

No (27) Yes (51)

EHR experience

No (46) Yes (31)

Anchor codes (“ a Priori)

**Learning perception** (9) negative - didn't learn enough about EHR(7) neutral (2)

**Knowledge** (1) already know content (1)

**Communication Skills** (1) didn't feel learned skill (1)

**Writing Skills** (0)

**EHR competence** (8) (3) Already have epic exp. feel confident (1) learned a lot about epic  
(2) No epic exp. Still not confident (2) didn't feel learned enough about epic

Descriptive

**Content (32)**

**Time for exercise (22)**

**Accessibility (6)**

**(Timing) Scheduling of activity (7)**

**Online delivery (5)**

**Emotion**

**Value of exercise** (41) Positive (29) Neutral (4) Negative (8)

**Likability** (6) Negative (6)

## Second cycle coding

Categories determined from first cycle coding: Value, Logistics, Experience

### 3 major themes

1. The value of the exercise to the individual
2. The how the logistics of the exercise affected the individual
3. Prior experience in EHR and/or EMR influenced the student's experience

#### 1. The value of the exercise to the individual (9)

good to learn about EHR

Very helpful for navigating Epic for the first time

Not good learning activity for me.

very helpful introduction to using online records

Not very useful

NOT NEEDED. This was not very helpful.

**Not my favorite**, a little stressful

Helpful to see & feel out the module.

**Drag**

#### 2. The how the logistics of the exercise affected the individual (8)

This was very tedious and at some times confusing. Also, the matching par was very difficult to move and drop them in the right spot.

Too difficult to access. I wasn't aware I was looking for the type of mistakes it wanted me to notice. It would have been better to introduce it during class.

I didn't really understand why we did this, and it was difficult to get started with the assignment. I felt like we were given little info.

A little time-consuming- maybe at the beginning of the semester

took an extremely long time! Complicated!

Took 2 hours to do. Difficult to find time in lab when other classes weren't there.

Maybe try to emphasize more ahead of time that one activity must be done using the school computer. I sat down to do the activity at home and then had to come into school. Luckily I did it a week early so it wasn't a time problem but could be if people put it off

Give intro assignment in class before opening it. Some instructions were hard to follow.

### 3. Prior experience in EHR and/or EMR influenced the student's experience (0)

1. The value of the exercise to the individual

(24)

2. The how the logistics of the exercise affected the individual

So many directions, but got easier as activity went on.

It was pretty time consuming, but it was great practice with epic.

liked exposure to EPIC, but the previous quizzes seemed like a waste of time. I did not learn much from it.

I'm glad to be exposed to the EHR, although it was time consuming activity

Helpful, but needed to be done earlier in the semester.

Few glitches, but otherwise worthwhile activity

Great exposure to Epic. However, the early modules (#1--4) did not help me learn about EPIC or professional communication very well.

I feel this would have been better in a class-room setting. I'm still not sure what I was supposed to get out of that exercise.

Overall a good exercise, but would probably be more beneficial later in the program

A good way to be introduced to EPIC, but a little dry.

too long - didn't think the "lessons" provided the right information to do well on the assessment

Instructions were accurate, but tedious. Another way to explore EMR could be helpful.

LONG! Good to understand Epic if you work @ UTSW but everywhere will have different programs

Pointless and unnecessarily time-consuming

Confusing instructions on a few but helpful

Very time consuming with little benefit.

Not helpful doing this online. Didn't get much out of this.

Didn't enjoy it. Got most of the questions wrong even though I read the booklet. Questions not very clear.

Did not like this exercise - time consuming & didn't understand the part we had to do @ school.

thought the modules were helpful but some sections were repeated from previous sections.

understand the purpose, but longer than necessary - could've been mentioned or outlined in class before

Great idea, although not very convenient, directions were in a separate window panel making navigation difficult and time consuming

It was good to practice rewriting notes and reading charts, but since we didn't get feedback we don't know how well we did/where we need to work or practice.

Tedius. Neutral opinion on usefulness of the exercise.

- 1. The value of the exercise to the individual (4)
- 3. Prior experience in EHR and/or EMR influenced the student's experience

Pretty good activity. Helpful to look at a chart but editing the notes wasn't necessarily helpful.

This introduced me to electronic records, but I still don't feel comfortable or confident in using/navigating it.

I understand the point of this exercise, but it did feel a bit like busywork, especially considering that my classmates and I have experience with EMRs.

I found this activity not very helpful because I am already familiar with Epic.

- 2. The how the logistics of the exercise affected the individual (2)
- 3. Prior experience in EHR and/or EMR influenced the student's experience

Some of the modules needed revamp. Some Q's were incorrect and I didn't think they were really testing our knowledge of Epic very much. Most of them were too vague.

It took me less time than others. I was confused because I didn't know what to change on the Epic notes. I haven't had enough experience with Epic to know so I didn't change anything.

- 1. The value of the exercise to the individual (2)
- 2. The how the logistics of the exercise affected the individual
- 3. Prior experience in EHR and/or EMR influenced the student's experience

Learned a lot about Epic. Good. I did not agree with some of the answers on the 2nd assessment (one of the choices was "used many abbreviations," and the correct match only had one abbreviation. I figured that couldn't be the answer for that reason.)

Busy work! I had experience using Epic & honestly I'm glad I did or I wouldn't have known what to do. If the point was to intro Epic to students, it missed the mark.

**Coding notes:**

1. Comments coded with the value theme were positive and negative.
2. Many comments coded with the logistics theme had to do with the length of time the exercise took them to do.

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