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Transmission of *Escherichia coli* Through Toilet Seats

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*Keywords: contact transmission, E. coli*
Abstract

Microbes are found on all kinds of surfaces, but not all are pathogenic. Bathrooms are perceived by the public as an important area in the transmission of pathogenic microbes, and the purpose of this project was to investigate the transmission of bacteria from toilet seats to skin. *Escherichia coli* strain K-12 was applied to the toilet seat and different methods were used to see which was the best way to prevent the transmission of bacteria to the skin. *E. coli* strain K-12 was identified in samples using the differential media, Eosin Methylene Blue agar. This experiment found that cleaning the toilet seat prior to use will be the most effective method for stopping transmission, and that using a paper barrier will not stop the transmission.
Introduction

The warm and humid environment typically found in bathrooms provides a perfect setting for the survival of microorganisms. Many of these pathogens, like *E. coli*, can survive on environmental surfaces for weeks or even months. Toilets can also play a role in transmission both through direct contact and through the generation of aerosols during flushing (Suen, et al., 2019; Johnson, et al., 2013). Previous studies have shown that flushing toilets produces a plume that can last for up to 8 minutes and seed the toilet seat with bacteria (Johnson, et al., 2013).

Eosin methylene blue (EMB) agar is a selective and differential medium used for the identification of Gram-negative fecal coliform bacteria. EMB agar selects for Gram-negative bacteria based on the presence of eosin and methylene blue dyes. It is differential based on the fermentation of lactose. Bacteria that ferment lactose in the medium form colored colonies (dark purple or black), while those that do not ferment lactose appear as colorless colonies. Colonies of *E. coli* will be a metallic green on EMB agar, making them easy to distinguish from other lactose fermenting colonies. EMB agar is used in water quality tests to distinguish coliforms and fecal coliforms that signal possible pathogenic microorganism contamination in water samples (Lal and Cheeptham, 2007; Johnson and Case, 2019).

This study investigated the transmission of *E. coli* from toilet sets in order to compare different ways of preventing transmission. It was hypothesized that if a paper barrier is used, it will not stop the transmission of *E. coli*.

Methods

The experiment was performed in a biological safety cabinet to decrease the risk of contamination. Prior to the experiment, the toilet seat was disinfected using Lysol disinfectant wipes and UV light. A toilet seat was marked to separate it into two sides. One side had a paper toilet seat cover over it and the other did not. Each side was also divided into a wet and dry area.

The nonpathogenic *E. coli* strain K12 was applied to the testing area and allowed to dry. A paper toilet seat cover was placed over half of the toilet seat, and distilled water was used to wet the “wet” testing areas. Using a gloved hand, a finger
was placed on the testing area and then pressed onto the corresponding EMB plate. A sterile swab saturated with distilled water was used to swab the finger. The swab was placed into nutrient broth. Each condition was repeated three times and gloves were changed after each replicate. Disinfectant wipes were used on the toilet seat according to manufacturer's protocol, which stated that the surface needs to dry for 10 minutes after application. The gloved finger and wet swabs were used to test these areas in the same manner as previously discussed. All media was incubated at 37ºC for 12 hours.

Results

Metallic green colonies, typical of *E. coli* growth, were observed on EMB plates corresponding to the paper wet (Figure 1) and no paper wet conditions. No growth was observed on the EMB plates for paper dry, no paper dry and disinfectant wipes. Turbidity was observed in the nutrient broth for the paper wet (Figure 1) and no paper wet conditions. No growth was observed in the nutrient broth for paper dry, no paper dry and disinfectant wipes.

<table>
<thead>
<tr>
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Figure 1. Showing results on EMB plate (top) and nutrient broth (bottom)

Discussion

This study demonstrated that *E. coli* was transferred from the toilet seat to the gloved finger, only when the seat or paper was wet. The hypothesis that the
transmission of \textit{E. coli} would not be prevented by the paper toilet seat cover was supported. Further, a wet toilet seat could potentially be the cause of the transmission of pathogenic microbes found in human feces and vomit, and emphasizes the importance for handwashing after using the bathroom. In fact, \textit{E. coli} can persist after a few days to a few years in water, soil, and habitats where generation could increase opportunities for transmission (Chiyo, et al., 2014).

Cleaning the toilet seat with a disinfectant wipe is better at stopping transmission than using a paper toilet seat cover. Previous studies have shown that disinfection is the most effective way to reduce the amount of microbial contamination on a toilet seat (Johnson, et al., 2013). Based on all of these studies, it would be more beneficial to have disinfectant in public restrooms than to have paper toilet seat covers to prevent the transmission of pathogenic microbes. This specific disinfectant’s main ingredients are similar to many aerosol germicides found on the market today. Furthermore, the active ingredients in Lysol are full of Alkyl dimethyl benzyl ammonium chlorides, which share a similar ingredient list to Pledge (multi-surface disinfectant spray). Pledge was one of the most effective aerosol agents used in a study conducted by Turgeon, et al. (2016), which tested various aerosol germicides (Turgeon, et al., 2016).

The risk of infection resulting from transmission in a public restroom depends on the infectious dose of the microbes. Microbes with lower infectious dose, such as norovirus and \textit{Shigella}, have a higher chance of causing infection compared to microbes with higher infectious doses (Gerhardtts, et al., 2012).

In conclusion, this study demonstrated that if skin were to contact a wet toilet seat with or without a paper barrier, then transmission of microbes found on the seat would occur. The data also demonstrated that disinfection lowered the risk of transmission. In order to prevent the transmission of microbes from a toilet seat, it is better to use a disinfecting wipe rather than use a paper toilet seat cover.
References


Evaluating the Effectiveness of a Continuing Education Program for the Improvement of Clinical Reasoning Skills among Nurses using the Early Warning Scoring Protocol

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Keywords: Critical Thinking, Clinical Reasoning Cycle, Early Warning Scores, Education and Training, Teaching Methods, Outcomes
Abstract

This pilot study evaluates the effectiveness of a continuing education (CE) program on nurses' clinical reasoning skills in utilizing the Early Warning Scoring (EWS) protocol. The CE program aimed at improving nurses' competency in using the EWS protocol for early warning detection through clinical reasoning skills training. The CE program involved a two-hour session that included an overview of the clinical reasoning framework, three simulated patient scenarios, and a reflective dialogue. Due to COVID-19 restrictions, a convenience sample of seven registered nurses participated in the program. Simulated scenarios were given to the participants to complete before and after the CE program. A clinical reasoning rubric based on Levitt-Jones' clinical reasoning framework, Benner's novice to expert theory, and Dreyfus model of skill acquisition measured the competency level before and after the CE program. The study shows that the CE program was effective in improving the clinical reasoning skills of nurses.
Background

The Early Warning Score (EWS) system is a protocol developed by the Central Manchester University Hospitals National Health Service Foundation Trust in the United Kingdom to detect patient deterioration that is commonly preceded by several hours of severe physiological changes (Fang et al., 2020; Gerry et al., 2017; Alam et al., 2014; Morgan et al., 1997). Early Warning Scores are obtained by allotting points to patients' routine vital sign measurements based on physiological derangement from a predetermined normal range to obtain summed scores (Mohammed et al., 2008). The score is calculated based on numerous physiological indicators, including the heart rate, systolic blood pressure, respiratory rate, and consciousness level (Carberry et al., 2014). However, individual interpretations during a patient assessment may limit their accuracy (Downey et al., 2017). As a result, the use of an EHR integrated EWS system with best practice alerts for patient deterioration have not yet yielded the desired impact on patient clinical outcomes citing clinician related challenges, such as compliance and alert fatigue (Bedoya et al., 2019; Horton et al., 2019; Alam, 2014). Sound clinical judgment and clinical decision-making skills when evaluating a patient’s situation, lack of enforcement of therapy or transfer to a higher level of care, and lack of evidence on best practice after an alert were among other cited factors explaining these results. An overreliance on clinical decision support systems (CDSS) may potentially jeopardize the quality of patient care when a system does not fully integrate with the workflow, and may affect nurses’ competence in early detection and their timely response, undermining patient safety (Jensen et al., 2019; Sutton et al., 2020). This poor performance in supporting clinical decision-making provides insight into the importance of addressing clinician related challenges. Therefore, enhancing nurses' competence in critical thinking and clinical reasoning may increase Early Warning Scores' accuracy.

Accurate patient assessment requires analytical skills, sound clinical judgment, and the ability to think like a nurse using broad knowledge of practice and context, including ideas, theories, and concepts. Several factors affect the acquisition, retention, and promotion of nurses' clinical competence (Tajvidi et al., 2019). These factors are imperative for critical thinking and clinical reasoning, two skills essential for nurses' ability to make sound clinical decisions competently. Critical thinking is defined as the mental process of active and skillful perception, analysis, synthesis, and evaluation of
collected information through observation, experience, and communication, leading to a decision for action (Papathanasiou et al., 2014). It is one of the factors influencing nurse’s clinical competence, an essential component of clinical decision-making and professional competence using cognitive and intellectual capabilities (Tajvidi, 2019). Strong critical thinkers demonstrate several characteristics including inquisitiveness; being well-informed; readiness to use critical thinking; self-confidence in ability to reason; open-mindedness regarding divergent worldviews; flexibility in considering alternatives and opinions; understanding of the opinions of other people; fair-mindedness in appraising reasoning; honesty in facing one's own biases, prejudices, stereotype, or egocentric tendencies; prudence in suspending, making, or altering judgments; and willingness to reconsider and revise views where honest reflection suggests that change is warranted (Facione, 2007). A clinical decision support system cannot fully replace any of these clinician characteristics.

The purpose of the continuing education program is to improve nurses’ competency in using the EWS protocol for early warning detection through a training in clinical reasoning cycle. The goal is to achieve more accurate patient-specific early warning scores and ultimately improve patient outcomes.

Theoretical Framework

As the nursing profession continues to strive to find ways to measure the concepts of critical thinking and clinical reasoning, nurses must identify these terms and understand the difference between them. Both of these concepts represent an essential set of processes that allow nurses to exhibit sound clinical judgment. Obtaining measurable outcomes for nurse education and competencies is possible through strategies designed to evaluate how nurses analyze, apply, and act in a clinical situation.

Critical thinking is a cognitive process used to analyze clinical situations based on evidence, science, and sound judgment; clinical reasoning applies critical thinking to a clinical situation. Critical thinkers utilize the following cognitive skills of analyzing, applying standards, discriminating, information seeking, logical reasoning, predicting, and transforming knowledge (Shoulders et al., 2014).
Clinical reasoning refers to a set of cognitive processes used to discern the relevance of the evidence and scientific knowledge as it applies to a particular patient (Victor-Chmil, 2013). Clinical reasoning is a systematic and cyclical process that guides clinical decision-making, particularly in unpredictable, emergent, and non-routine situations, leading to accurate and informed clinical judgments. It is defined as “the process by which nurses collect cues, process the information, come to an understanding of a patient problem or situation, plan and implement interventions, evaluate outcomes, and reflect on and learn from the process” (Levitt-Jones, 2018, p. 4). The clinical reasoning process is an iterative cycle by which nurses may combine one or more steps or move back and forth between them before reaching a diagnosis, taking action, or evaluating outcomes. There are eight steps of the clinical reasoning cycle (Levitt-Jones, 2018).

The first step of the clinical reasoning cycle is to consider the patient situation in which a nurse acquires an initial impression of the patient that may be negatively influenced by the nurse’s preconceptions, assumptions, and biases. As with critical thinking, in order to have an effective and accurate initial patient assessment, a nurse must develop independence of thought, fairness, insight into the personal and public level, humble intellect and crisis deferral, integrity, perseverance, self-confidence, and research interest (Papathanasiou, 2014).

Step two of the cycle is to collect cues and information. This important step involves the collection of relevant information about the patient. This information is acquired from the handover report’s available resources, the patient’s medical and social history, clinical documentation, and electronic medical records. The third step is process information through which the nurse interprets the cues that have been collected and identifies significant aberrations from normal. Cues are then grouped into meaningful clusters, clinical patterns are identified, inferences are made, and hypotheses are generated (Levitt-Jones, 2018).

The fourth step is to identify problems and issues where nurses synthesize the data that has been collected and processed in order to identify the most appropriate nursing diagnosis. In the fifth step, to establish goals, the nurse clarifies and prioritizes care goals depending on urgency. Goals must be SMART (Specific, Measurable,
Achievable, Realistic, and Timely) and designed to address the nursing diagnosis and ensure nursing interventions' effectiveness (Levitt-Jones, 2018).

In the sixth step of the clinical reasoning process, to **take action**, the nurse selects the most appropriate course of action to achieve the goals of care and address the nursing diagnoses. Once this step is implemented and completed, the nurse must **evaluate outcomes**, which is the seventh step. This requires the nurse to reexamine objective and subjective data (patient cues) to evaluate how effective the nursing interventions have been and whether the patient’s problem has improved. If it is concluded that the patient’s condition has not improved, the nurse reconsiders the patient’s situation and seeks to identify a more appropriate course of action, which may be the need to engage in a new cycle of clinical reasoning (Levitt-Jones, 2018).

The eighth and final step in the clinical reasoning cycle is to **reflect on the process and new learning**, which requires nurses to critically review their practice to refine, improve, or change. Reflection is intrinsic to learning as the nurses begin to examine: *What happened and why? What was done well? What should be done differently if presented in the same or similar situation? What was learned that could be used when caring for another patient? What is needed to improve future practice, for example, more knowledge about a specific condition or more practice in particular skills?* (Levitt-Jones, 2018).

Besides implementing and applying the clinical reasoning cycle to EWS protocol, it is essential to question and understand errors. Nurses must develop insight and self-awareness by reflecting on their biases and preconceptions. Nurses must have defined dispositions that influence critical thinking. These include open-mindedness, which allows the willingness to seek new evidence or possibilities, and fair-mindedness, which is an unprejudiced examination of evidence that might question beliefs or a viewpoint contrary to the nurse’s own beliefs. These skills are gained through on-going continuing education, clinical experience, open communication, and most importantly, time. This pilot study examines the effectiveness of a clinical reasoning simulation program on nurses' competency in using the EWS protocol. The study will compare nurses' skill level in EWS before and after training them on the clinical reasoning cycle in the context of using the EWS protocol.
Methods

A convenience sample of seven registered nurses currently working on a telemetry unit participated in the education program voluntarily through a direct invitation by the principal investigator after obtaining the IRB approval from Kean University. Data collection and management procedures ensured the anonymity and confidentiality of recorded participants' scores on the achievement rubric. The COVID-19 restrictions limited the sample size and any further enrollments in the study.

Data analysis was performed using the Statistical Package for Social Sciences (SPSS Ver.22.0; SPSS Inc., Chicago, USA). All data were described using frequency tables, central tendency measures, and variability measures. Moreover, a paired t-test was used to examine the effectiveness of the continuing education program to improve participants’ application of clinical reasoning skills. P-Value of less than 0.05 was considered as a significant level.

The participating nurses completed three simulated patient scenarios based on their current nursing knowledge level and skill, followed by a two-hour training program. The training program included

- an overview of the clinical reasoning cycle,
- handouts containing a description of the case scenarios, and
- a collaborative review of the body systems and a discussion of critical incidents using problem-based learning and simulated mannequins.

A reflective dialogue was undertaken to allow the nurses to assess their practice and explore their reactions. Discussions were conducted with the nurses after the rubric was completed.

The program's problem-based learning component involved a presentation and analysis of patient cases for the nursing staff to determine the best course of action to take in the care of that specific patient. Encountering a similar situation in the future, the nurse would critically think it through while applying clinical reasoning and make an appropriate clinical judgment (LaMartina et al., 2014). Using simulated mannequins alongside these clinical activities enhances critical thinking and provides a safe, controlled environment, allowing the learner to make mistakes without actually harming a patient (LaMartina, 2014). The goal is to have nurses acquire knowledge and skill to
apply when encountering real practice, improve EWS accuracy, and ultimately yield positive patient outcomes.

Each body system was reviewed using a standard head to toe assessment, and any deviation from the normal was discussed. The patient’s neurological status was the first to be assessed. Changes in the patient’s baseline mentation were reviewed. Changes and deviations were discussed. The patient’s cardiac status was assessed, followed by the respiratory status. The potential causes for any deviation, i.e., bradycardia, tachycardia, hypotension, and hypertension, were explained and reviewed. Lung sounds were reviewed with the various oxygen modalities that the physician ordered. The patient’s gastrointestinal system was assessed as well as their urinary tract system. Three patient simulations were reviewed, lasting approximately thirty minutes each. After the three simulations were completed, the nurses engaged in a reflective dialogue. The following questions were asked: After completing the course, did you change any clinical decisions in the scenarios? What decisions did you make differently, and why? How did the clinical reasoning cycle impact the change in your clinical decisions? Was the rubric clear, concise, and fair? If not, why?

A Clinical Reasoning Rubric was developed to evaluate the nurses’ application of clinical reasoning skills to the given scenario questions after receiving training in Early Warning Scoring. This rubric is based on nurse theorist Patricia Benner and her utilization of the Dreyfus Model of Skill Acquisition to nursing. The Dreyfus model posits that, in acquiring and developing a skill, one passes through five levels of proficiency: novice, advanced beginner, competent, proficient, and expert (Benner, 2001). Each step of the clinical reasoning cycle was incorporated into the rubric as a skill and evaluated using a 5-point Likert scale level of competency that ranges from "Novice" to "Expert."

According to Benner, Level I and II, novices and advanced beginners can take in little of the situation; it is too new, too strange. They have to concentrate on remembering the rules they have been taught. Level III, Competent nurses are typically nursing on the job for two to three years. At this level, the nurse begins to see his or her actions in terms of long-range goals or plans. Level IV, the proficient nurse, characteristically perceives situations as wholes, rather than in terms of aspects, and performance is guided by maxims. Experience teaches the proficient nurse what typical
events to expect in a given situation and how to modify plans in response to these events. The expert nurse, level V, has an enormous background of experience, has an intuitive grasp of the situation, and zeros in on the accurate region of the problem without wasteful consideration of a large range of unfruitful possible problem situations (Benner, 2001).

Using Benner’s Novice to Expert theory, nurses' critical thinking and clinical reasoning education can be targeted and specialized according to experience level. A nurse’s expertise level reflects changes in two general aspects of skilled performance. One is a movement from reliance on abstract principles to past, concrete experience as paradigms (Benner, 2001). There was a post-grading discussion and analysis of the rubric and a question and answering session.

The nurses completed a qualitative post-course evaluation one month after the course was conducted. They were asked about the knowledge they obtained from this course and how it changed their nursing practice, whether the course improved their patient outcomes, what they found valuable with the course, and any areas that could be improved.

Before implementing the program, a retrospective chart review of all rapid response information sheets and data from the previous month was obtained from the clinical resource educator who populates the data. Currently, the rapid response team and information technology departments are in the process of automating the data into a clinical support system. This data will be entered into an EWS spreadsheet, which will contain the patient's demographics, admitting diagnosis, the change in patient's condition, patient's vital signs, and the numerical EWS. The data will also include the primary nurses' years of experience, level of education, age, and gender caring for the patient and the unit the patient is on. Once this data is populated, it can be determined which unit has the greatest number of rapid responses. The data will be examined for a correlation in inaccuracies and the nurse's demographics and years of experience. After this information is collected, the correlation between years of nursing experience and the EWS accuracy will be examined.

The nurses on the unit with the greatest number of inaccurate EWS will be asked to participate in this continuing education program, which will be offered to 20 nurses voluntarily for three months. The nurses will be asked to sign an informed consent form.
explaining the study’s purpose, any potential risks, and benefits, and that their participation is voluntary and will remain anonymous. The training for each nurse will focus on the eight steps of clinical reasoning and incorporate simulated patient situations. The nurse will demonstrate their knowledge by completing a simulated assessment on a mannequin. After completing the course, there will be a survey for the nurses to complete that will comprise the amount of knowledge they believe they have acquired. They will also have a form to sign informing them that they will be participants in a clinical study on the implementation of critical thinking and incorporation of the clinical reasoning cycle into EWS.

Results

Due to the COVID-19 Pandemic, this pilot study was conducted with the participation of seven registered nurses working in a telemetry unit. The majority of the participants were female (5/7) with a BSN degree (5/7) and between the age of 28 and 32 years old (6/7). The participants’ nursing experience ranged between 2 to 42 years, with the majority (6/7) having between 2 and 10 years of nursing experience.

The paired t-test was used to examine the continuing education program’s effectiveness in improving nurses’ clinical reasoning skills in the context of using the EWS protocol to assess patients. The continuing education program in the clinical reasoning cycle improved nurses’ competence in the use of early warning scoring protocol. Statistically significant differences were found between nurses’ scores before and after participating in the continuing education program. The pre-program grade mean score was 26.1, and the post-program mean score was 30.7, with a p-value of 0.015. Considering the small sample size (N=7), a repeat of this pilot study with larger sample size is recommended.

Following the three-month training that is offered, the rapid responses on the unit will simultaneously be tracked for three months, utilizing the documentation that is currently in use. Comparisons will be made in the number of rapid responses that are called, the numerical scores that are applied, and the accuracy of the scores, the patient’s condition change, and the outcome of the rapid response. This data will be compared to the previous rapid response data for the unit that was collected. The goal is to observe better and more accurate scoring. In addition, an increase in positive

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patient outcomes will be tracked and documented. The necessity of a higher level of care for the patient will be observed and documented. The researcher (XX) will perform that data collection with the current resource nurses who act on rapid responses. The planned rapid response will be gradually populated by the RR teams and provide easy data access and retrieval. This collection will be over a span of three months. With this information, there will be follow up with the individual nurses that triggered a rapid response and discuss their rationale in determining the patient’s EWS. Improvement in accuracy of the patient’s assessment, the EWS, and patient’s outcome will be documented. A mixed method, larger sample size, longitudinal study could yield generalizable findings.

**Conclusion**

The goal of this pilot study is to evaluate the effectiveness of a continuing education program on improving nurses' competency in using the EWS protocol for early warning detection through clinical reasoning skills training. The CE program involved a two-hour session that included an overview of the clinical reasoning framework, three simulated patient scenarios, and a reflective dialogue. Results show that the CE program was effective in improving nurses clinical reasoning skills.

When COVID-19 restrictions are lifted, the researchers plan to obtain a larger sample size to further validate the results of this pilot study. Institutional permission will be obtained for approval of this continuing education program for teaching newer telemetry nurses as well as incorporating it into the mandatory yearly nurse competencies training. Furthermore, the researchers plan to expand the scope of future study to validate the impact of the CE program on patient outcomes.
References


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Student Perceptions of Condensed Courses and Motivations for Enrolling: Are Some Students Scared To Enroll?

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Keywords: condensed semester, summer semester, semester length, condensed courses

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Abstract

Condensed courses are now being offered at many colleges and universities. Most research indicates that condensed courses result in equal or better student learning outcomes when compared with the outcomes of full-term courses. However, because all the previous studies only examined students who self-selected to enroll in condensed courses there may be a serious selection bias and their results may not be generalizable to all students. This examined whether there are differences in willingness to enroll in, and perceptions of, condensed courses between students who have taken such a course and those who have not. A survey was given to 102 students, 45 of which had never enrolled in a condensed course. The survey measured general perceptions of condensed courses and assessed the willingness of students to enroll in a condensed course in the future. Students who had never taken a condensed course were found to be less willing to enroll in a condensed course in the future, less interested in seeing more condensed classes offered, and less willing to take a condensed course while simultaneously enrolled in a full-term course. Students who had never taken a condensed course were also found to perceive condensed courses as more difficult than students who had taken condensed courses. These results indicate that there are meaningful differences between students who have taken condensed courses and students who have never enrolled in one. The findings of this study suggest that the findings of previous studies regarding differences in outcomes between condensed courses and full term courses may be impacted by differences in the student population in each course type.
Introduction

Many colleges and universities are now offering options for condensed courses (Daniel, 2000). These courses vary in length of time and semester availability. One review of the literature found condensed courses as short as five days and as long as 11 weeks (Walsh et al., 2019). Faculty members and researchers have presented many concerns about these courses. These concerns include worries that students might not learn the information as well (Carman & Bartsch, 2017), that students might not retain the information learned (Faught et al., 2016), that professors modify the condensed courses in unacceptable ways (Lutes & Davies, 2018), and that the rigor of the condensed courses may not be equivalent to that of full-term courses (Lutes & Davies, 2013).

However, the research on condensed courses has found mostly positive outcomes for students in condensed classes. Walsh et al. (2019) reviewed 20 studies on the effects of condensed courses on student learning, retention of material, and perception of the course. Only three of the studies showed any advantage for the full-term students. The majority of the remaining studies found an advantage for students enrolled in condensed semesters. The rest of the studies found no difference between students who took condensed courses and students who took the full-term courses. Walsh et al. then conducted their own rigorous study that measured student learning outcomes, student and faculty perceptions of condensed courses, and differences in the syllabi between condensed and full-term courses. Their study found that students in the condensed courses had higher final grades and that there were widespread positive perceptions of condensed courses among students and faculty.

Other studies have found similar positive or at least equal outcomes for students in condensed classes. Carman and Bartsch (2017) found that students in condensed courses scored either higher than or equal to students in a full-term course on some exams and on the final course grade. Deichert et al. (2016) found that students in condensed classes scored significantly higher on a multiple-choice test given at the end of the semester than students in a full-term class who were given the same test. Richmond et al. (2015) used the same methodology and found similar results.

These results appear to generalize to online learning as well. Mensch (2013) examined the differences in letter grades between students enrolled in online courses.
He found that students in a five-week compressed course were more likely to receive higher grades, less likely to withdraw, and less likely to fail than students in the 14-week semester. These results suggest that even in an online format some compressed courses are more beneficial than full-term courses. In contrast, a study with more internal validity has been conducted for online learning and found no significant difference in learning outcomes (Simunich, 2016).

However, the aforementioned results showing positive or equal outcomes in condensed courses may be due to lower academic standards in those classes. Lutes and Davies (2013) found that condensed courses are slightly less rigorous than their full-term counterparts. They also found that 34% of instructors reported reducing assignments considerably, or somewhat, for condensed courses (Lutes & Davies, 2018). An analysis of course syllabi also revealed that many condensed classes have fewer graded assignments (Lutes & Davies, 2018). Walsh et al. (2019) found that although students in the condensed courses were awarded higher final grades, they did not score higher on a course-specific pre and post-test than students in the full-term courses. They suggest that reduced grading standards may be the reason for this finding.

Although these findings should not be ignored, it appears that lower grading standards in condensed courses are not the only reason for the positive and equal outcomes. Many of the studies used objective measures to assess student learning and did not rely solely on final grades. Students in condensed classes scored significantly higher than students in full-term courses on a multiple-choice test given at the end of the semester (Deichert et al., 2016; Richmond et al., 2015). Similarly, Faught et al. (2016) found no significant differences in scores on a retention quiz given to students in condensed and full-term courses. Simunich (2016) measured the grade of a large assignment and administered a post-course knowledge quiz and found no significant differences between course formats. Most tellingly, Thornton et al. (2017) examined the scores on a standard business management capstone test and found no significant differences in scores between course formats. These results suggest that student learning outcomes in condensed courses are, at a minimum, equivalent to that of full-term courses.
Research indicates that student and faculty perceptions of condensed courses are largely positive as well (Walsh et al., 2019). Students are more likely to rate their professors as more effective, contributing more to the course (Richmond et al., 2015) and better performing (Carman & Bartsch, 2017) in condensed courses. Faculty members report that students are less stressed and better able to concentrate during condensed courses (Lutes & Davies, 2018), and a majority of students report being less stressed as well (Walsh et al., 2019). Even in the studies that found some negative perceptions of condensed courses (Omelicheva, 2012; Sakalys et al., 1995; Smith, 1987), researchers still found overall positive perceptions among students and faculty.

Overall, the current research indicates that condensed classes do not disadvantage students and should not be discouraged (Faught et al., 2016; Simunich, 2016). Richmond et al. (2015) even suggest that psychology departments may wish to encourage the creation of more condensed classes. However, although most studies have found that students report positive perceptions of condensed classes they have taken, these results may not be generalizable to all students. It is highly likely that some students do not enroll in condensed courses because they anticipate performing poorly or for a number of other possible reasons. If that is the case, then every study comparing learning outcomes between course formats has a serious selection bias. The researchers only examined students who feel that they are able to succeed in conditions of condensed learning. Although researchers in some of the studies attempted to control for differences between the students in condensed courses and students in their control groups, none asked the students in the control group why they did not enroll in the condensed courses.

This study examined whether there were differences in student perception between students who had taken condensed courses and students who had not taken condensed courses. I examined the students’ general attitudes toward condensed courses and willingness to enroll in condensed courses in the future. The hypothesis of the study was that students who had taken condensed courses would be willing to enroll in another condensed course and have positive perceptions of condensed courses in accordance with the findings of earlier studies but that students who had not taken condensed courses would be unwilling to enroll in a condensed course and have negative perceptions of condensed courses.
Method

Participants and Location

The project was deemed exempt by the Kean University Institutional Review Board. All the participants were recruited from undergraduate psychology courses taught at the Ocean County location of Kean University. Seven full-term classes and one condensed class were surveyed. No reimbursement was provided for participating in the study. However, some students were enrolled in a class that required them to participate in one or more research studies and received credit for participating. A total of 112 students were surveyed. To ensure anonymity, no demographic information was collected from the participants.

Materials

Student attitudes were measured through a survey created for this study. The student attitude survey consisted of 11 questions. Two questions asked students about the number and location of the condensed courses they had taken. Two open-ended questions asked about the differences between the course formats and their reasons for enrolling or not enrolling in condensed courses. The students were then asked three questions regarding their willingness to enroll in condensed classes in the future. The survey ended with four Likert type scales measuring perceptions of difficulty, material learned, long term retention, and stress of condensed courses. The full survey can be found in the appendix.

Procedure

A researcher entered the classroom during class time and offered the students the opportunity to participate in the survey. Students who agreed to participate were given a consent form to read and sign. The students then completed the student attitude survey and were offered debriefing forms. Because condensed courses can greatly vary in terms of course length, availability, and format between colleges, an attempt was made to reduce the resulting confounding factors by focusing only on the experience of the predicted majority of students. Since a large percentage of students at Kean Ocean (KO) transfer from Ocean County College (OCC) after earning their associate degree, student perceptions were assumed to reflect their experience at KO, OCC, or both.
Therefore, any responses that indicated that students had taken condensed courses only at another institution were not included in the statistical analysis. Any surveys that were missing more than two responses were also discarded.

The responses to the surveys were inputted into SPSS version 24 and analyzed. The multiple-choice responses were analyzed as nominal data and the responses to the Likert scales were treated as interval data. The responses to the open-ended questions were searched for patterns but not statistically analyzed.

Results

A total of 112 students agreed to participate in the survey. Ten surveys were discarded because they were incomplete (n = 6) or because the responses indicated that the student had only taken condensed courses at an institution other than Kean University or OCC (n = 4). A majority of students had taken a condensed course (n = 57). Of the students who had taken condensed courses, 67% took condensed courses only at OCC, 14% took the courses only at Kean University, and 19% took condensed courses at both colleges. The average number of condensed courses taken by each student was 2.58 (SD = 2.02) though it should be noted that the mean was skewed by a small minority of students (n = 5) who took more than four condensed courses.

There were significant differences between the responses of the students who had taken condensed courses and those who had never taken a condensed course in all the Yes/No/Other questions. A majority of students who had taken a condensed course were willing to take another one whereas a majority of the students who had never taken a condensed course were unwilling to take one in the future. A chi-square test confirmed that these results were significant $X^2 (2, N = 102) = 40.45, p < .001$. A majority of students in both groups were unwilling to take a condensed course while simultaneously being enrolled in a full-term course. However, a greater percentage of students who had never taken a condensed course stated that they would not consider taking the courses simultaneously. The difference in response between the two groups was statistically significant $X^2 (2, N = 102) = 9.478, p = .009$. A majority of students who had taken a condensed course wanted to see more courses being offered while students who had never taken condensed courses were more equally split in their
opinions. The differences between these two groups were statistically significant as well

\[ X^2 (2, N = 102) = 14.692, p = .001 \]. A full record of the responses to the Yes/No/Other questions can be found in Table 1.

Table 1

**Responses to questions 5, 6, and 7**

<table>
<thead>
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<th></th>
<th>Yes</th>
<th>No</th>
<th>Other</th>
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<tr>
<td><strong>Take Again</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taken courses</td>
<td>45</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Never Taken</td>
<td>7</td>
<td>26</td>
<td>12</td>
</tr>
<tr>
<td><strong>More Offered</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taken Courses</td>
<td>43</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Never Taken</td>
<td>18</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td><strong>Take Simultaneously</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taken Courses</td>
<td>22</td>
<td>35</td>
<td>0</td>
</tr>
<tr>
<td>Never Taken</td>
<td>7</td>
<td>35</td>
<td>3</td>
</tr>
</tbody>
</table>

The Likert scales asked students to indicate their perceptions of condensed courses in relation to full-term courses. The average scores of all students indicated that they perceived condensed courses to be somewhat more difficult \( M = 2.36, \ SD = 1 \), somewhat more stressful \( M = 1.99, \ SD = .97 \), produce somewhat worse retention \( M = 2.57, \ SD = .91 \), and contain the same amount of material as full-term courses \( M = 3.07, \ SD = 1 \). Independent samples t-tests were conducted to find any differences between the two groups of students. Although the means between the groups were different in every scale, only the difference in the difficulty scale was statistically significant at the .05 level, \( t(100) = 2.733, p = .02 \).

To measure the discriminant and convergent validity of the scales, Pearson’s \( r \) was calculated for the relationship between each of the scales. There were significant positive correlations between the difficulty scale and the stress scale \( r(102) = .56, p < .001 \), the difficulty and the retention scale \( r(102) = .22, p = .03 \), and the stress and retention scales \( r(102) = .22, p = .23 \). There were significant negative correlations between the material scale and the difficulty \( r(102) = -.56, p < .001 \) and stress \( r(102) = -.29, p = .003 \) scales. Pearson’s \( r \) was also calculated to find any relationships between the Likert scales and how many courses had been taken but no significant relationships were found.
The responses to the open-ended questions were grouped together by common themes. The most common reasons that students gave for enrolling in condensed courses were to reduce the time to graduation or to meet the credit requirement to graduate by a specific time (65%), because it fit their schedule better (9%), and that they preferred the format (5%). Most of the students who had never taken a condensed course clearly indicated if they had done so intentionally or not. Forty percent of students indicated that they had actively avoided enrolling in a condensed course because they felt that they would not be able to learn the material properly in such a short period of time (22%) or because they were apprehensive about the stress caused by the condensed format (18%). Another 40% indicated that they had not been intentionally avoiding condensed courses and had never taken one due to scheduling conflicts (24%) because condensed courses were not covered by financial aid (11%) and that they never needed to take one (4%).

When asked to describe the main differences between full-term and condensed courses the most common responses among students who had taken a condensed course were that more information is learned in a shorter time (30%), less learning occurs than in a full-term class (16%), there is a heavier workload in condensed courses (14%) and that condensed courses are more laid back or require less work than full-term classes (11%). The most common responses among students who had never taken a condensed course were that more information is learned in a shorter time (51%), less learning occurs than in a full-term class (11%), condensed classes are more stressful (11%), and that condensed classes are more rushed (8%).

Discussion

The results of this study add some important nuance to the prior literature on the outcomes of condensed courses. Almost all the previous research indicates that condensed courses result in outcomes that are comparable to or better than full-term courses (Daniel, 2000; Walsh et al., 2019). However, as noted in some of the articles, none of the studies randomly assigned students to the condensed and full-term courses. In many of the studies, researchers attempted to control for differences between the two groups of students by collecting demographic information and analyzing them for statistically significant differences (Carman & Bartsch, 2017; Faught
et al., 2016; Sheldon & Durdella, 2009; Walsh et al., 2019). Some of the studies found significant demographic differences between the populations but there were no clear patterns of differences across the studies. However, even if it were to be found that there are no demographic differences, there are many other relevant aspects of the groups, such as learning styles, that can affect the results of the study. Additionally, to this author’s knowledge, only in one, older, study (Smith, 1987) were students asked about their general perceptions of condensed courses. Instead, the previous studies focused on student perceptions of specific courses that they had taken. Therefore, although many of the previous studies were valuable additions to the scientific literature, the generalizability of their results is limited.

The findings of this study mostly confirmed the hypothesis. Most students who had previously taken condensed courses were interested in taking another condensed course, and most students who had not taken a condensed course were uninterested in taking one in the future. However, when asked about their perceptions of condensed courses both groups indicated that they had somewhat negative perceptions of condensed courses and only the responses for the difficulty scale showed any significant difference between the groups. Therefore, the hypothesis that there would be differences between the two groups was supported but the prediction that students who had taken condensed courses would have generally positive perceptions of the courses was not supported by the findings. The finding that there are differences between students who have taken a condensed course and those who have not may affect the conclusions drawn by previous studies. However, the effect of this finding depends on the interpretation of the differences.

It is possible to interpret the differences between the two groups in a way that has a minimal impact on the conclusions drawn in previous studies. One could postulate that although many students are unwilling to take condensed courses and believe that the course would result in worse learning outcomes for them, their fears are unfounded. It may be that if the students were forced to take a condensed course, they would attain the same positive learning outcomes as other students. It is certainly reasonable to assume that many students in condensed courses enrolled because they had no choice yet still learned the required material. In fact, some of the open-ended responses clearly indicated that the student had not been looking to enroll in a condensed course but
were forced to do so due to circumstances out of their control. In essence, there is a possibility that student fears do not indicate an actual difference in learning ability, which means that the conclusions of the previous studies remain intact and are generalizable to all students.

However, it is also possible that the results of this study indicate that a serious selection bias occurred in all the previous studies that did not utilize random selection. The open-ended responses of the students who had never taken a condensed course indicated that a full 40% of students intentionally avoid enrolling in condensed courses because they feel that the courses would force them to learn too much information in too little time or were apprehensive about the stress it would entail. Some of the students wrote that they believed their learning styles were incompatible with condensed learning. It is certainly reasonable to assume that at least some of the students are correctly assessing their abilities and would do poorly if they were enrolled in a condensed course. If this is true, then the population of condensed courses differs from the population of full-term classes in a critical aspect; condensed courses contain more students who learn better in such environments. This would mean that every study that found equal or better outcomes for students in condensed courses was using a sample of students that was different than the general population of students. Therefore, the generalizability of their results is extremely limited.

Ultimately, more research with a larger sample size and a more comprehensive survey is needed to draw any certain conclusions. These results indicate that there is a strong possibility that the results of the previous studies are due to a selection bias. However, this does not invalidate the results of those studies. The prior findings strongly indicate that students in condensed courses tend to do as well or better than students in full-term courses. This means that condensed courses are a viable option for students who wish to enroll in them. However, the generalizability of those studies to students who are hesitant to enroll in such courses is in doubt. Since no studies have utilized random assignment, the outcomes of condensed learning on the general population is unknown. As such, until further research is conducted using random assignment, hesitant students should not be told that the research indicates that they should enroll in condensed courses despite their concerns.
The finding that even students who had taken condensed courses had somewhat negative perceptions of condensed courses was not in accordance with the findings of Carman and Bartsch (2017), Richmond et al. (2015), and Walsh et al. (2019). However, Omelicheva (2012), Sakalys et al. (1995), and Smith (1987) all found that students reported finding condensed courses very intense or difficult. A likely explanation of the findings is that students in condensed courses may feel that condensed courses are inherently more difficult and intense but worth the sacrifice. This view of student perceptions would explain the responses of the Likert scales and why the majority of students who took condensed courses are willing to take another one. This would also explain why most of the studies found generally positive perceptions of condensed courses.

The finding that a majority of students who enrolled in condensed courses did so to reduce the time to graduation and not because of any preference for the condensed format is similar to the findings of Smith (1987) and Omelicheva (2012). This finding adds a layer of nuance to the results of previous studies. Anastasi (2007) and Richmond et al. (2015) suggest that since students view condensed courses very positively, universities should consider offering more condensed courses and even consider providing entire degrees consisting of condensed courses. However, this result introduces the possibility that most students view the condensed courses very positively because taking them allows the students to graduate sooner but may not believe that they are learning as much as in a full-term course. If this is true, then colleges and universities should be wary of adding condensed courses solely based on student preferences. To justify adding more condensed courses, institutions which prioritize learning outcomes need to ensure that students in condensed courses are properly absorbing course material.

The open-ended responses may also shed some light on what seems to be a contradiction in the previous research. Some research has found that condensed courses do not contain the same amount of material as full-term courses (Lutes & Davies, 2018; Walsh et al., 2019) yet most of the studies still found objectively equal learning outcomes (Deichert et al., 2016; Simunich, 2016). At first glance, these findings seem incompatible with each other. However, some of the students who took condensed courses indicated that their classes included the same breadth of material.
but not the same depth as a full-term course. If this is true across condensed courses, it may explain the seemingly contradictory findings. It is possible that students in condensed courses learn all the main points of the subject and therefore do well on objective measures of knowledge but lack a deeper understanding of the material that is not tested by a simple written test. This explanation would be in line with the findings of Bude et al. (2011) who found that students in a condensed statistics course had a worse conceptual understanding of the material than students in full-term courses. However, it is possible that the previous research can be better explained by assuming that the reduction in assignments and assessments does not affect student learning. More research is needed to determine whether there is indeed a lack of depth in the understanding of material learned in condensed courses and whether the changes to syllabi in condensed courses affect student learning.

A point that should be made about the open-ended responses is that the students who responded that condensed courses have a heavier workload and the students who wrote that condensed courses require less work do not necessarily disagree. It may very well be that condensed courses have fewer assignments than their full-term counterparts but still result in a heavier workload due to the compressed schedule. Indeed, one participant wrote that “the information given seems to be overwhelming but professors are also more laid back when it comes to grading of assignments.”

The finding that most students in both groups did not want to take a condensed course at the same time as being enrolled in a full-time course is both unsurprising and revealing. Walsh et al. (2019) theorized that the lack of concurrent classes may be the reason for the positive learning outcomes of condensed courses and the lower levels of stress they found. The finding that a majority of all students would not be willing to take a condensed class while simultaneously enrolled in another class lends some validity to that line of thought. If it is true that student success in condensed courses can be explained by a lack of competing classes, then the results of studies conducted during intersessions should not be generalized to condensed learning as a whole. At a minimum, these results should give institutions pause in creating condensed classes during full-length semesters.
A general limitation in this area of study is that it is difficult to compare even courses of the same nature with each other. Different professors, classrooms, textbooks, course requirements, and a myriad of other details are all possible confounding factors. When attempting to compare courses that are in different formats, many more confounds are introduced. The condensed courses are generally held between semesters when students may have different work and extracurricular obligations than during the semester. As mentioned previously, condensed courses are also generally not held concurrently with other courses. This may allow students to focus exclusively on the single condensed course they are taking. These factors can affect the internal validity of the results. When attempting to generalize the results of the studies, even more confounds are introduced. Different universities have vastly different definitions of condensed and full-term courses. The studies cited in this article contained at least 12 different course lengths. A condensed semester consisting of one week is likely very different than a condensed semester consisting of eight weeks. Similarly, a condensed semester in English literature is likely to produce different results than a condensed semester in statistics. Therefore, generalizing the results of any study beyond that particular university is problematic at best.

An additional limitation of this study is the small sample size. In addition to the statistical difficulties this poses, the small number of participants meant that similar responses of just a few individuals were treated as a trend. Therefore, the smaller trends should be viewed with caution. A third limitation was that no information was collected about the demographics of the participants. A fourth limitation of this study was that no information was collected regarding the format and subject(s) of the condensed courses that students had taken. It is highly likely that online courses and courses in different subjects lead to different experiences and, by extension, perceptions of condensed courses. A fifth limitation of this data concerns drawing any conclusions about the actual course content and workload. Although the students answered questions about various aspects of the courses, these reports were subjective and more objective measures need to be used to make any claims about the difficulty, workload, and characteristics of condensed courses.

Perhaps the most severe limitation of this study was that participants consisted of students who had taken the condensed courses at Kean, Ocean County College, or
both. Although the survey was designed to assess students’ general perceptions of condensed courses it is inevitable that the participants were influenced by the exact circumstances of the courses they experienced. Therefore, the generalizability of this study to even the main campus of Kean University is questionable.

There is a great need for future research in this area. The results of this study suggest that the research needs to be more nuanced than simply comparing the learning outcomes of condensed classes and full-term classes. In order to obtain generalizable results, it is imperative that future studies utilize random assignment to ensure that there are no differences between the two classes. Student learning outcomes need to be examined in a way that assesses both the breadth and depth of their learning. Future studies attempting to assess students’ general perceptions of condensed courses should take into account the format and subjects of the condensed courses that students have previously taken. Only with more high quality research will universities and colleges be able to maximize student learning.

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References


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Appendix

Attitudes Toward Condensed Classes

For the purpose of the survey, condensed classes are defined as any class which is considerably shorter than a similar course offered at the same college in the same format. These courses are usually offered in the summer or between the fall semester and spring semester. Please circle the answer that best describes your feelings. After recording your choice, if you feel that the choice does not explain the full picture, please write a comment underneath with more details.

1. Have you ever completed any condensed courses?  Y   N

2. If yes, how many and where?
   Number of classes taken ___   Location:   Kean   OCC   Other__________

3. What were your main reasons for taking or not taking the condensed class(es)?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

4. What would you say are the main differences, if any, between full-term classes and condensed classes?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ______

5. Would you take a condensed class again?   Y   N   Other__________

6. Would you like to see more condensed classes offered?   Y   N
   Other__________

7. Would you take a condensed class during a full-term semester at the same time that you’re enrolled in full-term courses?   Y   N   Other__________

Please turn over
In the next four questions condensed courses are referred to as CC and full-term courses are referred to as FT. Please circle the statement that you most agree with. After choosing an answer, if you feel that the answer does not represent the full story please write a comment underneath with more details.

8. Difficulty of condensed courses

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<tbody>
<tr>
<td>CC are significantly more difficult than FT</td>
<td>CC are somewhat more difficult than FT</td>
<td>CC are about the same difficult as FT</td>
<td>CC are somewhat less difficult than FT</td>
<td>CC are significantly less difficult than FT</td>
<td></td>
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</tbody>
</table>

9. Amount of material in condensed courses

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<tbody>
<tr>
<td>CC contain significantly less material than FT</td>
<td>CC contain somewhat less material than FT</td>
<td>CC contain as much material as FT</td>
<td>CC contain somewhat more material than FT</td>
<td>CC contain significantly more material than FT</td>
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10. Long term retention of material learned in condensed courses (how much you will remember after the course is over)

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<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retention is significantly worse for CC than in FT</td>
<td>Retention is somewhat worse for CC than for FT</td>
<td>Retention is about equal for CC and FT</td>
<td>Retention is somewhat better for CC than for FT</td>
<td>Retention is significantly better for CC than for FT</td>
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</table>

11. Stress of condensed courses

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<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC are significantly more stressful than FT</td>
<td>CC are somewhat more stressful than FT</td>
<td>CC are about the same stressful as FT</td>
<td>CC are somewhat less stressful than FT</td>
<td>CC are significantly less stressful than FT</td>
<td></td>
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</tbody>
</table>

Thank you for participating in this study!
Using Gamification to Teach Foundational Fractions in the Third Grade: Year One

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Keywords: Gamification, gaming, education, K-12, technology, classroom, online learning, Fractionville, math,
Introduction

Ever since its inception in 1994, the Internet has provided an avenue for information gathering, data sharing, and gaming experiences at incredible speeds. The Internet has paved the way for new educational endeavors, such as online learning and gamification (Anderson & Rainie, 2012). This has led to the emergence of innovation in educational technology and has opened the door for online learning as a serious contender to traditional education (Erenli, 2013). The progression of “nationalizing” 21st-century education with new standards set by Common Core Standards and online assessments has increased the necessity for K-12 institutions to think “digitally” regarding student learning and academic success. This is even more relevant with the current scenario presented by the pandemic, and the debate about online learning for K-12 students.

The adoption of online learning has led to innovative ways to incorporate technology into the classroom. One such modality is to infuse gaming into instruction and learning. Online learning, coupled with gamification mechanics, has evolved into a multi-dimensional sophisticated platform that hinges itself on the academic success of students, instructional design, and game mechanics. The word “gamification” has emerged in recent years as a way to describe interactive online design that plays on people’s competitive instincts and often incorporates the use of rewards to drive action—these elements include virtual rewards such as points, payments, badges, discounts, and gifts; and status indicators such as friend counts, re-tweets, leaderboards, achievement data, progress bars, and the ability to progress to the next level (Anderson & Rainie, 2012; Nacke & Deterding, 2017). There have been numerous research studies on the gamification of instruction regarding post-secondary, professional institutions and industries; however, few research studies have been conducted to apply the principles of gamification in an eLearning environment on an elementary level (Anderson & Rainie, 2012). Despite this fact, training through gamification is an evident reality in primary education (Marín et al., 2015). This study explored the impact of gamification on student motivation (from a teacher perspective), problem-solving skills in mathematics, and achievement levels of third-grade students learning foundational fractions in an online learning environment.
Gamification

Gamification is a topic of interest that currently spans industries from the private to the public sector, including areas such as Education, Psychology, Game Theory and Design, Human-Computer Interaction, Digital Information Systems, Business, and Medical Science (Mora et al., 2017). Teachers have used games and gaming methods since the beginning of human history. Humans and non-humans alike learn basic knowledge and survival skills through play (Seaborn & Fels, 2015). Children learn social skills, foundational knowledge, conceptual strategies through role-play and game-based activities. Also, societal conditioning has developed people’s competitive natures by announcing the first-born baby in January of a new year, athletic competitions, the best schools, and neighborhoods, to name a few examples (Seaborn & Fels, 2015). Collectively, every facet of Western society has been gamified from Electoral College’s votes to law and order.

Gamification is a term used to describe the features of an interactive system that aims to motivate and engage the user through game mechanics and elements, in other words, the use of game elements and mechanics in non-game contexts (Seaborn & Fels, 2015). Gerber (2014) offered a variation in the definition by protesting that gamification is “the use of game mechanics and thinking to engage audiences and solve problems” (p. 45). The elements of gamification can invoke “feel-good chemical reactions, alter human responses to stimuli-increasing reactions times and in certain situations can improve learning, participation and motivation” (Anderson & Rainie, 2012, p.1). Games and gamification are not synonymous; while gaming or full-fledged games are immersive environments most often enveloped in a fantasy setting with the sole purpose of entertaining, gamification integrates the mechanics of games such as levels, badging, points, leaderboards, and rules to invoke the physiology and behavioral impulse similar to a full-fledge game to perform serious actions (Gerber, 2014).

Education has been slow to adopt the concept of utilizing gaming and gamification to deliver instruction, partly because of increased initiatives to drive academic rigor, dwindling budgets, and lack of instructional designers to implement gamification (Bruder, 2014). However, in the last 15 years, gamification has become a “trending concept in online courses,” and gamification usage has increased due to the rise in online learning technologies (Sturges et al., 2015, p. 23). Integrating
game-mechanics into instruction can motivate and engage disenfranchised learners and ignite cognition with elements such as levels, badges, achievements, and points with the opportunity to individualize learning (Cohen, 2011). Given the benefits of gamification, Cohen (2011) suggested that math and science are more accessible to being gamified than other content areas such as English Language Arts (ELA) essay-based activities. Most recently, Georgia deployed a gamified assessment program and piloted with first and second graders ("How Digital Games Take the Stress Out of Formative Tests," 2019), where the student was at the center of design and application, a critical detail in the development process. According to the initial studies, the students were unaware that they were assessed; however, the students were able to engage with the experience while also displaying competency in the concepts. In the current study also, the student was at the center of design and application of an eLearning math program, Fractionville. The Fractionville math app was developed and designed by the main author (the Assistant Principal of the school), to engage and motivate third grade students to learn fractions, which has been a critical challenge for teachers and students at this urban elementary school.

**Rationale and significance of the study**

Even as early as the 2013-2014 school year, the district in this study scored only 31% proficiency on the third-grade state assessment in the Number and Operations–Fractions cluster. Furthermore, these math deficiencies propagate to the fourth and fifth grades in the Numbers and Operations–Fractions and Operations and Algebraic Thinking clusters. The first administration of the Partnership for Assessment of Readiness for College and Careers assessment (PARCC) in 2015 also displayed the continuity of difficulties with fractions. According to the PARCC Evidence Statement Analysis Report, a 56-question analysis that measures the percentage of students who answered various items correctly, the lowest percentage were in Number and Operations–Fractions and Operations and Algebraic Thinking, with less than 20% of students being proficient in each category. Also, nationwide there is a challenge for learning fractions (Braithwaite et al., 2017). Fractions are an abstract mathematical concept that is best learned by application and visual instruction. Shin and Bryant (2015) attested that mastering algebraic concepts, such as fractions, facilitates the
leaving of more advanced mathematical ideas. In addition, the authors claim that American students underperform in mathematics; given the importance that competence with fractions represents an integral part of the learning progression for algebra (Shin & Bryant, 2015). As a result, there are two elements at play: fractions challenge children, and understanding fractions is required to learn complex algebraic mathematics. Fractions can be a challenging mathematical concept to teach to third graders because fractions essentially break all the rules of multiplication and division. For example, when fractions are multiplied, the fraction gets smaller than either multiplicand, and when fractions are divided, they get larger than either dividend, which is contradictory to the laws of multiplication (Lortie-Forgues, Tian, & Siegler, 2015). With such complexity, teachers face an instructional dilemma as to how to create a motivational environment where fractions are fun, interactive, and induce problem-solving skills through real-time application. Striking a balance between gamification, and content delivery, while also providing effective instructional learning objectives for knowledge mastery without overloading students with information and digital “noise” can be a challenge, especially at the third-grade level. Hence, the design and development of Fractionville program used the principles of “User-Centered Design,” where the student user was at the center of the design, with a focus on benefiting the user (Nicholson, 2012). The primary theory behind User-Centered Design is that the learner’s goals and needs are at the center of every stage of development of a gamified learning process. The following brief discussion focuses on the seminal features of the Fractionville program.

**Fractionville App and Development**

Fractionville uses a story about a town that has outgrown its space. The Mayor of the town decided to buy new land but needs a Fraction Master (the student) to divide the new land among the Food, Fashion, and Housing Districts. The program provides a “cheat sheet” page that informs the student about the meaning of the icons on a typical page and the location of items for future use. Once selected, the avatars remained on-screen at the top left-hand corner.

Fractionville contains three learning modules/levels: Food, Housing, and Fashion District. Each level has several types of questions ranging from matching,
drag-and-drop, and input to highlighting, and animation interaction features. Once a student successfully passes each sublevel with 70% or better, the badges and points earned appear in their award tracker at the top right of the screen, which the student can view at any time during the experience.

After the introduction in each level, there is also a short instructional animation or static page that re-teaches the fraction concept. A point structure of 100 points for correct answers and -50 points for incorrect answers was created. The points were programmed to accumulate during the experience, and there was also feedback given to students once they submitted their answers to be evaluated by the program. The question attempts in the math program were set to “Unlimited” after discussion with the team on learner fatigue, students becoming discouraged, and ultimately “giving up” on the experience from not being able to progress through levels. At the end of each level, the student received a summary and a badge. Fractionville program was delivered for three weeks during math center time in 15-minute rotations according to the district’s mandated pacing guide and instructional schedule. Students were able to continue Fractionville at home; however, the instructor did not require home use because some students did not possess Internet access.

Methodology

The project was assessed by the Kean University Institutional Review Board. The study used a quasi-experimental approach to analyze the effects of gamification on the differences in the achievement levels between students receiving traditional education on fractions and those students receiving the gamification treatment. The study used multiple data points such as district benchmark assessments, pretest, posttest, and third grade PARCC Content Standard scores on the Numbers and Operations–Fraction band.

In the study school, the classes were homogeneous according to the academic level of the students. The class levels were: Low-Response to Intervention (RTI), Low, Middle-High, and High. In the first year of implementation (2016-2017), there were two classes selected as the treatment group for the study, the Low-RTI and Low classes, while the Middle-High and High classes continued the traditional method of learning fractions (see Table 1). In the classes receiving the gamification treatment, students...
were between the ages of 8 and 9, with eight students classified with learning disabilities (mildly learning disabled; Mild LD), within an inclusion class setting. Also, 92% of students received Free and Reduced Lunch and Title I funding. Table 1 displays the class level breakdown and gender distribution for the 2016-2017 school year.

Table 1
2016-2017 Third Grade Class Levels by Gender

<table>
<thead>
<tr>
<th>Class Level</th>
<th>Low-RTI</th>
<th>Low</th>
<th>Middle-High</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 19</td>
<td>n = 16</td>
<td>n = 17</td>
<td>n = 19</td>
</tr>
<tr>
<td>Males</td>
<td>7 (37%)</td>
<td>6 (38%)</td>
<td>7 (41%)</td>
<td>8 (42%)</td>
</tr>
<tr>
<td>Females</td>
<td>12 (63%)</td>
<td>10 (63%)</td>
<td>10 (59%)</td>
<td>11 (58%)</td>
</tr>
</tbody>
</table>

Validity and Reliability of the Assessments

Pre and Post Assessment
To test the fraction assessments’ reliability, 58 fourth grade students who had already experienced the content in the previous grade, were recruited and piloted with the pre and post- tests. Cronbach’s alpha for the 26 fraction questions was .782 ($\alpha = .782$), which indicated good reliability.

Benchmark Assessment
To test the district’s benchmark assessment reliability, once again a Cronbach’s alpha test of the assessments was used. In the 2016-2017 school year, 66 third grade students took the benchmark assessment at the end of the fraction unit and the Cronbach’s alpha for the 2017 benchmark assessment was .867 ($\alpha = .867$), showing high reliability.

PARCC Assessment
According to the PARCC consortium, the average scale score reliability for third-grade mathematics was .94 for the computer-based test (CBT) and .93 for the paper-based test (PBT) (PARCC, 2018). Likewise, the mathematics full summative tests have four subclaim scores—Major Content (MC), Mathematical Reasoning (MR), Modeling Practice (MP), and Additional and Supporting Content (ASC). The reliability
estimates ranged from .67 to .89 for these subclaims. The validity measures for the
subclaims tested ranged between .70 and .90. As a result of the high intercorrelations,
the assessments are likely to be considered unidimensional, meaning that the
assessment is testing for mathematical skills on the third-grade level, which also
supports the validity of the math portion of the assessment for Grade 3.

The data analyses consisted of several analyses related to different assessments
that were used to triangulate the effectiveness of the Fractionville program. A paired \( t \)
-test, and one way ANOVAs were conducted. The paired \( t \)-test was used to compare
the pretest and posttest (fraction assessment) scores of the first cohort’s lower-level
students (Low RTI & Low groups), to elicit Fractionville’s treatment effect. One way
ANOVAs were employed to compare the differences in achievement on the benchmark
and PARCC assessments, among the different groups.

Findings

The first analysis looked at the effects on learning, understanding and applying
fraction skills, specifically for the lower-performing third-grade students from the
treatment group that received this eLearning math program. The pretest was given
before the students began the unit on fractions, and the posttest was given after the
fraction unit ended. A paired \( t \)-test analysis showed that there was a statistically
significant difference between the pretest and posttest scores of the lower performing
students who utilized Fractionville in 2017 (\( t(32) = -3.95, p = .000 \)). The significant
increase between the pretest (M=50.09 and posttest scores (M=62.45) further revealed
a mean difference of 12.36 (see Table 2). This increase in academic performance is
evidence that the Fractionville assisted lower-performing students with learning and
mastering fractions. This result is even more noteworthy that gamification benefited this
Low-RTI class with special need students.
Table 2

A Paired t-test Analysis: Pretest and Posttest Fraction Content Scores of the Lower Performing Groups

<table>
<thead>
<tr>
<th>Pair</th>
<th>Pretest Grade % - Posttest Grade %</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
<th>95% Confidence Interval of the Difference</th>
<th>Lower</th>
<th>Upper</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>-12.36</td>
<td>18.01</td>
<td>3.13</td>
<td>-18.75 - 5.98</td>
<td>-18.75</td>
<td>-5.98</td>
<td>-3.95</td>
<td>32</td>
<td>.000</td>
</tr>
</tbody>
</table>

However, a comparison of the posttest assessment performance (mastery of fractions) of the lower-performing students (treatment group) and the higher-performing students (control group) did not yield statistically significant results ($t (3, 65) = 2.38, p = 0.78$).

To further examine the mastery of these fraction skills, a one-way ANOVA was used to investigate the differences in academic performances of all the four groups on the district benchmark assessment. Table 3 provides the means and other related statistics for all the four groups.

Table 3

Descriptive Statistics: Benchmark Assessment on Fractions

<table>
<thead>
<tr>
<th>Groups</th>
<th>N</th>
<th>Mean</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-RTI</td>
<td>18</td>
<td>79.00</td>
<td>1.60</td>
</tr>
<tr>
<td>Low</td>
<td>13</td>
<td>30.15</td>
<td>4.02</td>
</tr>
<tr>
<td>Middle-High</td>
<td>13</td>
<td>56.62</td>
<td>7.13</td>
</tr>
<tr>
<td>High</td>
<td>19</td>
<td>65.47</td>
<td>4.53</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>60.22</td>
<td>3.08</td>
</tr>
</tbody>
</table>

The one way Analysis yielded a significant result, ($f (3,59) = 20.25, p = .000$). A Tukey post hoc analysis further revealed that the Low-RTI group ($M = 79.0$) significantly outperformed the Low group ($M = 30.15, p=.000$) and the Middle-High group ($M = 56.62, p=.005$) on the benchmark assessment. Once again, Low RTI students who had the gamification experience outperformed the Middle-High students who were taught...
through the traditional method. However, it is interesting to note that the High group (M=65.47) even without gamification experience performed significantly better than the Low group (M=30.15, \( p=.000 \)) which had the treatment.

To further triangulate the gamification effect, performance on the state assessment (PARCC) was analyzed for these cohort 1 third graders. Specifically, Number and Operations–Fractions strand was the measure of interest. However, a one way ANOVA did not yield any significant result (\( f(3, 66) = 2.22, p = .094 \)), showing no differences in student performance between the traditional and the online learning of fractions, on the state assessment. One can only speculate that the skills learnt did not produce the desired results on the state assessment.

**Discussion & Conclusion**

Looking at the effect of gamification of fractions on mastering fraction skills of lower-performing third-grade students clearly showed that the lowest performing students benefited the most from this eLearning math program. It is even more of the essence and encouraging to note here that gamification benefited students who were classified with special needs in the Low-RTI class, as these students usually struggle to comprehend this complex mathematical concept. These results are in alignment with the literature, which states that students who interact with a gamified learning experience tend to perform better academically and it helps to engage these students (Light & Pierson, 2014). Also, gamification allows the students to be active learners of knowledge and provides opportunities to practice problem solving, decision-making, and inquiry (Arnab et al., 2012).

Although it advanced the learning of the lowest group, and leveled the academic performance field between the Low-RTI, Middle-High, and High classes, the Low group produced the lowest average scores of all the classes on the benchmark assessment. This raises the question of how effective gamification is on this Low group? On the other hand, one could speculate that if the Low class did not have gamification, how much lower would they be without this treatment? It is valid to recognize here that the academic gap lessened with the application of gamification.

Although these differences did not carry over into the state assessments, and the academic performances did not show any significant differences among these groups,
the third graders from this school outperformed the district and state on fraction questions on the state assessment which could further evidence the effectiveness of the program, and these results are similar to the ones noted by Çeker and Özdaml (2017) in their study.

It is unrealistic to believe that a single math program will tip the scales for the lower group to outperform their higher group counterparts. However, these results are promising, and the school and district should further explore and understand the impact of gamification by expanding the research on gamification to include at-risk students learning math on all levels. Further, the district should expand Fractionville to include the next progression of fractions, which is the Algebraic Thinking standard. Approaching the math deficiencies by standard and intensive data collection, the district can sustain academic progress, as students’ advance through more difficult fraction concepts such as simplifying, dividing, and multiplying fractions in the fourth, fifth, and sixth grades. Fractionville should continue to be utilized during the math rotation center schedule daily and administered in 15-20-minute segments to ensure students have ample time to complete the levels. District should employ data analysis reporting to track user data during the usage of the gamified experience which can further throw light on the usage and time requirements in developing/modifying this program for other primary and middle grade levels.

Since the results did not show that the lower-performing students were able to transfer their skills and knowledge to the PARCC assessment, the district should incorporate PARCC-like questions and activities/interactions to match the rigor of the PARCC assessment to counter this issue. To close the performance gap even more, the district should focus on maximizing the effectiveness of the math program by evaluating the continuous models and question types used within the online math program to replicate the expectations of the math standard and the PARCC assessment. Interaction models should also promote and increase critical thinking skills required for success on the state assessment.

One of the best features of Fractionville is that the program did not require additional training and/or professional development for the teaching staff. Most of the development focus emphasized creating a user-centered environment geared toward the supplemental instruction of fractions. The program was built for easy teacher
implementation, seamlessly integrating with the math center rotation. Conversely, with the pending expansion of Fractionville, instructors will need more information regarding the features and implementation, along with solid infrastructure and security protocols, as the program expands to include student data analysis and increased assessment features.

The results of this study supplied valuable information and data that would benefit the expansion of gamification in the school district and the education field. This information is also beneficial to other academic institutions and organizations regarding the implementation of gamified learning. The study is especially instrumental in educational institutions with at-risk populations. Future research should have a broader scope to improve gamification, knowledge, practicality, and deployment. This study increased the knowledge base on gamification; however, it is encouraged that the continuity of research progress into a wider area.
References


Light in the Darkness: A Chronotopic Analysis of Joseph Conrad's Heart of Darkness

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With

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Keywords: Joseph Conrad, Heart of Darkness, colonial, imperialism, darkness, light, Bakhtin, chronotope, Marlow, Kurtz
Declaration

I, Bingxian Wu declare that this research report submitted in fulfillment of the requirements for Student Research Day at Kean University is wholly my own work, unless otherwise referenced or acknowledged.

______________________________
Bingxian Wu

Aug 23th, 2020
Abstract

Joseph Conrad’s *Heart of Darkness* is regarded as one of the greatest novellas, which reveal the darkness of humanity in colonial activities. In this novella, the character Kurtz’s experiences shed light on the nature of colonialism—he is inspired by the ideology of enlightenment and goes to Congo, and soon he becomes crazy about the ivory trade. At the end of his life, his last words are “The horror! The horror!” that are usually explained as the symbol of the “heart of darkness” of the Belgian Congo in terms of imperialism that brings violence and brutality. However, if we look at the novella from a dialogic perspective across space and time, the novella can open a “gate of light” of confessional quality into the dark period of the imperial enlightenment era. This study will explore the “light” in Kurtz’s last words from the dialogic aspect and Bakhtin’s theory of chronotope. The brand new perspective of analyzing this novella helps us understand deeper about the imperial history and human nature.
Introduction

Slavery and imperialism have existed throughout human history. At the end of the 18th century, three-quarters of people in the world were enslaved in one way or the other (Hochschild). As Hochschild documents through the abolitionist pamphlets of late 18th century England, literacy and the printing press afforded new empathetic connection to the experience of the other, through which the development of a new ideology and political movement for the liberation of slaves within the colonies became possible.

According to Bakhtin’s theory of chronotope, novels opened the possibility for dialogues that created the new awareness of the other afforded by the novel. The “darkness” of imperialism could be revealed through greater awareness of the subjective of the other, allowing for it to be transcended. The dialogic quality of Heart of Darkness sheds lights on the true meaning of the word “darkness,” expecting readers to respond to the description of darkness and suggesting the bright future of humanity without imperialism and slavery. The analysis of Kurtz, who is the crucial ivory business agent, and the narrator Marlow’s interpretations of Kurtz’s last words is the key to revealing the meaning behind the author’s depiction of the darkness in Belgian Congo.

Literature Review

Conrad’s writing skills applied in Heart of Darkness are the key to understand the core of the novella. Cooper asserts that in Conrad’s literary works, the “overall morality” suggested by the author does not appear within any characters, whether the hero or the major protagonists such as Marlow and Kurtz, contained in the book (7). To form the overall morality, Conrad uses “delayed narrative technique” (Cooper 7), which means that the first narrator interprets the story from the second narrator to readers, allowing “his characters to react about” the “overall moral outlook” (7). Merely assuming that Conrad is “only interested in how life has treated him” for using his own experiences is not proper (Cooper 9), since Conrad “bring[s] a meaning not just to the fictional existence… but to… the ‘real’ world” through creating characters (9), while it is not relevant to use “the morality of one novel” to demonstrate another (8). In fact, in Conrad’s novels, characters are created in a particular environment as non-standard moral models to tell readers that their fate “exists… in our own ‘real’ world” based on his awareness of “the implications of the relationship between reality and fiction” (10).
However, Conrad “suppresses the didacticism” in his works, while he “indicates and teaches simply” due to “the close relationship between fiction and reality which it embodies” (10). Through “symbolism and autobiographical elements” (10), Conrad was successful in turning the “world of fiction” into a symbol of “the world of reality” (11), offering a chance for the fiction to change the reality by influencing readers:

All that we can really assume is that if we act in the way A acted, we may end up in the same situation as A. We may not, of course, but the fictional warning still stands, and even if it does not influence our behavior directly, it can often give us the extra degree of moral insight into our own situations that we so much need (16).

Cooper added that this is also the impact of reading that helps readers explore their personalities and gain insight (16). Conrad accomplished his goal of forcing “moral awareness” by “making insistent comparisons between the major characters” in his novel *The Secret Agent* (13). It is hard to tell whether he applied a similar technique in *Heart of Darkness*, yet he uses the same name, Marlow, and the delayed narrative technique in both works.

The effect of the delayed narrative technique is explained by John Batchelor. He elaborated that it results in readers’ experience of a circularity of plot—the previous plots often echo with the later plot—following the change of “the dramatic focus” which was first on Marlow and secondly on Kurtz (237). Batchelor discovered that in the first part of the novella, Marlow was a conventional imperialist, who had the same value as ordinary Europeans. In contrast, in the second and the third part, his narrative focused on morality and Kurtz (237). The shifting of dramatic focus brings a sort of light of righteousness to Marlow—his encounter with Kurtz sheds lights on himself (Conrad 7). When Kurtz was dying, “binary systems”—the couple of opposite things—are “hovering” around him, such as “the African women and the white women” (Batchelor 239), “action and lying” (239), and “light and darkness” (239), providing a chance for further dialogue between these conflicting elements. The interpretation of Kurtz’s last words is supplied by Marlow's “moral presuppositions” and “a moral antithesis” that seems to purify Kurtz’s morality (240), while Batchelor disagrees that Marlow’s interpretation is the core of the novella, since it is merely an interpretation rather than Kurtz’s own explanatory words.
If Marlow’s explanation is not what Conrad tried to convey, the interpretation seems to be redundant and unnecessary. Based on Cooper’s point of view of the relationship between fiction and reality, if Marlow embodies Conrad’s awareness of the reality of imperialism, the character is responsible for responding to the fictional reality. It is possible that Marlow’s interpretation is, on the other hand, an illustration of the suggested morality or quality of the overall story. Accordingly, the question of whether readers are responsible for interpreting the meaning of the literary work is also significant in terms of shedding light on the real world. Jack Thomson states that readers produce literature through reading text (1), applying their own experience and values while interpreting the text (1) and as well as “assimilating its representations of the world” into their own or “accommodating” their “representations” to the book (1). Thus, reading enables readers to react or reply to the text. Thomson believes that Conrad “undermines our expectations and conventional ways of ‘seeing’” (6), through which readers doubt the ideology of enlightenment and evil of humanity. Thomson goes on to analyze examples in *Heart of Darkness*, in which characters, such as Kurtz’s fiancée, were attracted by “an ideal Kurtz which is a lie [and]… a great saving illusion” (7). However, Marlow does not directly illustrate the truth; instead, he “lied” to Kurtz’s intended that Kurtz’s last word is her name.

Thomson does not explain or analyze deeper about Marlow’s words to Kurtz’s intended. Conrad describes that the narrator “lie[s]” to her, whereas if analyzing the symbolic meaning behind the novella, there could be another explanation of Marlow’s response to the fiancée. Kurtz’s intended, the same as Marlow’s aunt, represents for the European ideology of enlightenment, believing that White people bring civilization to Africans without knowing the fact of African slavery and the bloody ivory trade, which was also a part of Kurtz’s work. Bruce Stark analyzes that Kurtz’s dying words might suggest the “moral victory” (536), an illumination, through which Kurtz suddenly becomes an “ironic tragic hero” of the story (553). In other words, “the horror” could be viewed as a judgment to Kurtz’s entire dark experience of his life, through which he draws a final conclusion that includes the moral restorations.¹ To examine this hypothesis, Stark mainly analyzes the last part of the novella, in which Marlow

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¹ Ashley Chantler in “Heart of Darkness: Character Studies” states that Kurtz is “an impenetrable darkness” but also sheds lights on the truth. “…he is an anti-climax, but also a climax of many of the novel’s concerns: colonialism, imperialism, race, essence and existence, nature and nurture, belief systems, dichotomies, sanity and madness, power, greed, violence, restraint, certainty and uncertainty.” (67)
encounters Kurtz’s intended. Stark takes an opposite position to view the connection between Kurtz’s dying words and Marlow’s answer that if Marlow does not lie to her, the terms “The horror! The horror!” then equal to her name. In this way, the symbolic meaning behind the intended’s name expands to a larger sinister group of the European ideology that obscures imperial capitals (554). Therefore, Kurtz’s intended represents “the essence of the European darkness” that can only be described as “the horror” (555).

Stark’s perspective is intriguing, although it is lacking in concrete evidence or theoretical support. Patrick Brantlinger in “Heart of Darkness: Anti-Imperialism, Racism, or Impressionism?” offers better textual analysis to support Stark’s symbolic interpretations. Brantlinger argues Conrad’s use of language and narrative structure brings a sense of “impressionism” or “obfuscation” that helps “mask” Conrad’s “nihilism” (Brantlinger 364). Based on impressionist techniques, *Heart of Darkness* offers “a powerful critique” of imperialism and racism. At the same time, the idealism is “fragile” since it is only maintained by Marlow’s aunt and Kurtz’s intended (370). Even Kurtz “betray” the civilization created by the white through “going native” 2 when he realizes what he believed was rooted in “false ideals” and “false religion” (370). Brantlinger thus explores the “fetishism” underlying Conrad’s universalizing “darkness” within the fictional setting (370):

If the ‘natives’ in their darkness set Kurtz up as an idol, the Europeans worship ivory, money, power, reputation. Kurtz joins the ‘natives’ in their ‘unspeakable rites,’ worshipping his own unrestrained power and lust. Marlow himself assumes the pose of an idol, sitting on a ship deck with folded legs and outward palms like a Buddha. And Kurtz’s Intended is perhaps the greatest fetishist of all, idolizing her image of her fiancé. Marlow’s lie leaves Kurtz’s Intended shrouded in the protective darkness of her illusions, her idol-worship (370).

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2 Anne McClintock elaborates in “Unspeakable Secrets: The Ideology of Landscape in Conrad’s Heart of Darkness” that African is “the purest expression” of the “primitive emotions” laying behind rational human society (50). This is probably the reason why Kurtz abandoned civilization to go into the wild before his death—he is tired of the ideology of enlightenment, attracting by purity rather than fakeness.
The “ideals” become “idols” (370). Inevitably, Kurtz’s going native also represents worship of wild, the evilness brought by “Victorian imperialism” that “painted an entire continent dark” (371). Conrad draws the story between Kurtz and Marlow in ambiguity (372). Marlow interprets Kurtz’s character as a devil idol or as a tragic hero (372). The “illumination” of the European ideology is a lie, while the “truth” lies in the “darkness” in the story (376).

Accordingly, Lionel Trilling illustrates in his criticism that Kurtz is a “hero of the spirit” (17-18). Although the character is regarded as sinned against by human beings, his “regression to savagery” makes him reach the heart of darkness, from which he comes to “illumination” (18).

Marlow sees Kurtz as the model that reached the bottom of human civilization. The character has the illumination quality to reveal the truth, the “innermost core” of nature and human society. However, Brantlinger regards Marlow’s paradoxical admiration of Kurtz in his last moment as an irony of horror. There is also a possible explanation that Kurtz’s last words are “an outcry” against the ideal “civilization” lies behind bloody slaying in Congo. Brantlinger sees the dying words not merely as “an outcry of guilt” or “fear of death,” but “referring to the … idealism” that “rationalize[s]” any crimes they have done (381). Kurtz’s “moral bankruptcy” is probably complemented by Marlow.

The structure and writing technique of the novella, and the contestable meaning of Kurtz’s dying words, tend to be analyzed separately. The possible significance of Kurtz’s last words is related to Marlow and the first narrator’s perceptions about the past story and the present, rather than the core of the work as a whole. Consequently, Kurtz as a character seems to have a sense of brokenness from the whole story about Congo.

This research focuses on a dialogic analysis of Heart of Darkness in the chronotopic context. The research questions are:

1) How does the past story about Congo interact with the present space/time in Heart of Darkness?

2) What is the meaning behind Kurtz’s dying words “The horror! The horror!” from a chronotopic perspective? How does it intertwine with the metaphysical meaning behind the novella?

3 Brantlinger explains with the concept of cannibalism in Africa: “…evil is African in Conrad’s story; if it is also European, that’s because some number of white men in the heart of darkness behave like Africans” (371). Accordingly, Europeans are likely to be assimilated by the locals who worship cannibalism, which implies not only the change of living habits but also the fact that people who come to Africa for imperial reasons are evils.
Methodology

*Bakhtin: Theory of Chronotope*

Bakhtin’s theory of chronotope explains the inseparability of time, space, and meaning in a novel. Time as flesh fuses and thickens space, making the space concrete and visible, while the chronotope materializes time with meanings in the space. Time and space cannot be separated from meaning, which is dialogic and contestable. The chronotope is always colored by values and emotions. The experience or understanding of space and time cannot be separated from the meanings attached to it. Also, meaning cannot be separated from the ongoing dialogues and people’s responsibility in situated space or time.

The chronotope united and tied the narrative knots in a place. Bakhtin believes that literary works and images are all chronotropic, as well as the plots, the image of characters, the background history, etc. The chronotope defines literary genres, situating generic distinctions in time, which is the primary category in the chronotope in literature. There is an unlimited number of minor chronotopes in each such kind of chronotope. The organic cohesion of time, space, and meaning of a particular historical or social issue provides a source of images at different aspects in the development of the literature.

There are several different chronotopes within a single literary output of an author, and the complicated interactions among the chronotopes exist merely within the literature. Chronotopes are usually mutually inclusive. They coexist with each other and maybe replace, contradict, or are interwoven with one another, composing more complicated interrelationships, which cannot enter into any relationships contained within chronotopes (Bakhtin 252). Bakhtin states that these interactions are dialogical, yet they cannot enter into the chronotopes or represent the world in the literature. It is outside the represented world, while still a part of the whole work. For instance, the chronotope of the threshold, which includes the motif of encounter as the chronotope of sudden change and crisis in life, is highly charged with emotions and value and often metaphorical and implicit in the literature (Bakhtin 248). In the chronotope of the threshold, time is instantaneous, as if it falls out of the regular track of biographical time.

A chronotopic analysis would straddle periods and different spaces. It would allow for an analysis of the plot that encompasses people’s sense of history and their
situatedness in the present. Another chronotopic analysis could focus on people’s “horizon” or their understanding of the future, which is about people’s visions of the future, spaces they sense they will inhabit, or what their valuations of that future may be. An individual’s prior experiences are in dialogic interaction with those of present chronotope. To Bakhtin, we encounter our past and our situatedness in the present through our encounters with the words of others.

Research Design

This research is a case study based on the chronotopic analysis of Conrad’s *Heart of Darkness* as a dialogue about the past and its meaning in the present situation in the novella to the first narrator and Marlow, and the dialogue between Marlow as a chronotope and Kurtz as another. The whole novella is the main subject for this research, and textual analysis is applied for the opening scene, the last paragraph, and Marlow’s interpretation of Kurtz’s dying words (See Appendix). The theory of chronotope is applied to explain the analysis and draw the conclusion.

Result and Discussion

1.1 Light and Darkness

In the opening of the novella, the description of light and darkness is harmoniously balanced in terms of variations of the words, while “light” is overall more than “darkness” (see fig. 1).

<table>
<thead>
<tr>
<th>Forms</th>
<th>Light</th>
<th>Darkness</th>
</tr>
</thead>
<tbody>
<tr>
<td>n.</td>
<td>Gleams; brilliance; light++++; flush; spark; stars; glow; glow; halos; illumination; moonshine; flames+++</td>
<td>Gloom +; haze</td>
</tr>
<tr>
<td>adj.</td>
<td>Luminous +; radiant; brilliant</td>
<td>Dark+; somber+; profound; misty; spectral</td>
</tr>
<tr>
<td>phr.</td>
<td>the torch; the sacred fire</td>
<td>Dull red without rays and without heat</td>
</tr>
<tr>
<td>v.</td>
<td>Shone+; flashing; glare</td>
<td>Deepening night; brooding gloom+; broom glooming</td>
</tr>
</tbody>
</table>

Tip: + means the extra number of the appearance of the word

Fig. 1. The variations of light and darkness
The variation of light and darkness is a motif, which symbolically leads to the imagination of the glorious history of the British Empire. Before Marlow's interruption, there is a clear boundary and comparison between the description of light and dark, mainly when the first narrator "I" depicts the scene on the Thames. However, light and darkness are mixed when "I" was attracted by Marlow:

But Marlow was not typical (if his propensity to spin yarns be expected), and to him the meaning of an episode was not inside like a kernel but outside, enveloping the tale which brought it out only as a **glow** brings out a **haze**, in the likeness of one of these **misty halos** that sometimes are made visible by the **spectral illumination of moonshine** (5).

There is a sense of mysticism and impressionist painting, as Brantlinger stated. Light becomes misty, while darkness is illuminated. The splendid history seems to be a kind of light, yet Marlow's words "and this also has been one of the dark places of the earth" (Conrad 5) bring up doubt of the "light" and make the past mysterious. Everything becomes less absolute, whether illumination or gloom; even the image of Marlow is not clear enough to be illustrated as light or dark.

Marlow goes on to tell about the European ideology of enlightenment, which Europeans believe is a sacred sacrifice that brings civilization to the savage world. The light on the Thames becomes clearer:

He broke off. **Flames** glided on the river, small green **flames**, red **flames**, white **flames** pursuing, overtaking, joining, crossing each other—then separating slowly or hastily. The traffic of the great city went on in **the deepening night** upon the sleepless river (7).

There are four “flames” in one sentence, corresponding with the enlightenment idea mentioned above. The night is deepening, and thus the flames are brighter, creating a scene of light in the darkness. However, the light disappears at the end of the novella:

Marlow ceased and sat apart, indistinct and silent, in the pose of a meditating Buddha. Nobody moved for a time. "We have lost the first of the ebb," said the Director suddenly. I raised my head. The offing was barred by a **black** bank of clouds, and the tranquil waterway leading to the uttermost ends of the earth flowed **sombre** under an **overcast** sky—seemed to lead into the heart of an immense **darkness** (77).
There is no more light on the river, nor any flames or moonshine. The idea of enlightenment, so-called “light,” is not permanent. The promised glory of civilizing Africans is a fig leaf of imperialist business. Once an individual uncovers the fakeness of the ideology, everything about the “glory” becomes dark, so as the great empire.

1.2 Past vs. Present

To Bakhtin, people encounter their past and their situatedness in the present through the encounter with the words of others. The chronotope of the present situation on the Thames includes the chronotope of the past, which is Marlow’s story of Congo. The space of the ship where the first narrator “I” and the second narrator Marlow stay unites the knots of the narrative. Dialogue comes when the chronotope of a past encounters the present.

The first layer of the dialogue happens when the splendid view on the Thames reminds the first narrator about the great history of the empire, which echoes all the flames and lights. The second aspect of the dialogue is when Marlow speaks about darkness, which begins his story in Congo.

Fig. 2. Layers of dialogues

Marlow is not only a character existing in the present chronotope, but also in the chronotope of the past—the space of empire. This makes it possible for him to bring the past to the present. The meaning of dialogue between the past and present is suggested by the change of light and darkness on the river. To the first narrator, the past or the history is glorified at first, whereas at the end of the novella, Marlow’s story changes his perception about the past—the darkness of imperialism painted everything dark around them.

The chronotope of the present with biographical time makes the novella a closed
circle. However, merely drawing a conclusion by analyzing the general chronotope of the present is not fair, since literary characters are also chronotopes. The dialogue between characters, or characters and their experiences, could convey the core meaning of the work as well.

### 2.1 Marlow's interpretation

The “penetrating words” that invade the dialogue in the present from the past are Marlow’s interruption of the first narrator’s reminder about the history. “Dark” is the first impression for Marlow to describe his experience in Congo. However, not everything in his story is dark, since his experience “throw[s] a kind of light on everything about [him], and into [his] thoughts” (Conrad 7). One of the most important characters that impact Marlow’s perception of the imperialist ideology is Kurtz, who died with the words “The horror! The horror!” (69). Marlow’s interpretation of Kurtz’s dying words is contestable in many studies.

From the interpretation, Marlow seems to pierce the gorgeous surface of enlightenment by regarding Kurtz’s words as a judgment of imperialism:

> It takes place in an impalpable greyness with nothing underfoot, with nothing around, without spectators, without clamour, without glory, without the great desire of victory, without the great fear of defeated, in a sickly atmosphere of tepid skepticism, without much belief in your own right, and still less in that of your adversary. If such is the form of ultimate wisdom, then life is a greater riddle than some of us think it to be (69-70).

This is a denial of all the supposed glory and honor brought by enlightenment, which is a belief, a religion to most Europeans like Marlow’s aunt. However, Kurtz’s sacrifice does not give him any glory or celebration of his achievement. He died with misery in Congo, the dreamland. Such a death confused those who still believe in the ideology.

> I was within a hair’s-breadth of the last opportunity for pronouncement, and I found with humiliation that probably I would have nothing to say. This is the reason why I affirm that Kurtz was a remarkable man. He had something to say. He said it (70).

Marlow has realized the dark truth behind Kurtz’s words. At the beginning of the novella, the first narrator “I” has stated that Marlow is not an ordinary seaman who regards the sea as home. He does not fully belong to the imperialist group, though he is
one of them. Kurtz is, to some degree, the same kind of person as Marlow. He is not an ordinary imperialist as the manager or a hero among Africans. He is a wanderer, the same as Marlow. This possibly explains why Marlow understands Kurtz, following him even after his death. However, the difference between Marlow and Kurtz is that Kurtz dares to cry “the horror” out, while Marlow admits he might have nothing to say if he was in a similar situation.

Kurtz’s dying words, according to Marlow, are a judgment of the darkness of the whole imperialism—the conquering activities, slavery, and ivory trade and the abuse of violence to the locals. He claims the words in “a vibrating note of revolt in its whisper” (70), revealing “a glimpsed truth” (70).

True, he had made that last stride, had stepped over the edge, while I had been permitted to draw back my hesitating foot. And perhaps in this is the whole difference; perhaps all wisdom and all truth and all sincerity are just compressed into that inappreciable moment of time in which we step over the threshold of the invisible (70).

Kurtz steps over the edge which he is not permitted to cross in the world of darkness, revealing the factors of enlightenment are the “true light,” which is outside the dark world but is also a risk threatening the imperial system. Kurtz is the first one who won the victory in the psychological battle between his previous belief—the imperial ideology, vanity, and selfishness—and the reality caused by the enlightenment ideology. He struggled but finally chose righteousness. Although his voice was weak, it struck Marlow as an illumination in the heart of darkness.

The victory can also be seen as redemption or salvation through suffering. Marlow compares Kurtz’s voice to the echo from “a soul as translucently pure as a cliff of crystal” (70), which is shiny if there is a glimpse of light. Symbolically, if the heart of darkness is still dark, it is impossible for Kurtz’s words to echo like crystal. One way to explain this is that his words are the light from the outside world, the hopeful future, expecting further response. The sense of purifying the soul presents the theme of salvation, which corresponds with the description of Marlow—“Buddha”—at the end of the novella. In this regard, Marlow is not only an interpreter but also a redeemer of Kurtz.
2.2.1 Time vs. Timelessness

From the chronotopic perspective, time and meaning are the primary elements that determine the image of the character. The decline of religion and the dynastic realms lead to the rise of empire, in which the perception of time is coherent and quite different from Middle Ages when stories of heroes happen simultaneously without the sense of sequence (Anderson 22). In Marlow’s story, time is seemingly stopped compared with the biographical time in the chronotope of the present. Most characters, including Marlow’s aunt, Kurtz’s fiancée, and the manager, do not change. They remain still in a time and space where most people strongly believe in the imperialist ideology, regarding civilization as a divine task that requires self-sacrifice; and another group of people who actually went to Africa grew selfishness-based fetishism of money and power. In this vein, time in Marlow’s story was perceived more episodically as it was in the Middle Ages. The two extremities of the chronotope of Congo and Europe stretch the space and time of the imperialist chronotope, keeping the whole story world in a subtle balance. However, Marlow and Kurtz are the breakers of the balance. The encounter between Marlow as a chronotope with the time and space in Congo provides a chance for revealing the darkness.

![Fig. 3. The imperialist chronotope](image)

As fig. 3. shows, the imperialist chronotope constructs with the time and space in Africa and Europe, containing the two sub-chronotopes, Marlow and Kurtz. The change between the two characters embodies another time and space in the story, breaking the homogenous timelessness of the narrative. In essence, the chronotope of the story narrative “breaks” through the dark, colonial, imperialist chronotope. In this regard, they do not entirely belong to the imperialists’ group or the regular Europeans. They at the
beginning of their journey to Congo believed in enlightenment yet doubt it after realizing the darkness there. They have the imperialist identity, yet they are not like other invaders. A typical example of the imperialist is the manager, who said that “Men who come out here should have no entrails” (22). However, both Marlow and Kurtz have a certain degree of humanity. Marlow told himself to be “civil” (34), which differentiates him from others. Kurtz tried to abandon the civilizing idea by going into the wild, which might suggest the process of restoration of humanity. When Marlow went to the dark place where Kurtz lived, Kurtz was struggling with disease, the suffering that finally leads him to redemption. In other words, Marlow moves from the “fake light” of enlightenment to the “darkness” of Belgian Congo, and at the same time Kurtz leaves “darkness” to “true light”—the realization—and has an encounter with Marlow at the edge of “darkness.” Marlow’s interpretation is the dialogue with Kurtz, assigning the meaning of the supposed “future time” with moral order.

2.2.2 Confessional Quality

Marlow’s explanation of Kurtz’s dying words “The horror! The horror!” could be regarded as a moment of catharsis that restores morality. Kurtz’s life is mostly interpreted by others. Readers know about Kurtz from Marlow, whose understanding about Kurtz was generally from the manager, the Russian boy, and his experience with Kurtz in the jungle. The visitors after Kurtz’s death supplement his knowledge about Kurtz’s life before going to Congo. Generally, Kurtz’s life is presented as a whole—he was like a renaissance person who was simultaneously a poet, a musician, and a journalist. He was deeply influenced by the idea of enlightenment and went to Congo, aiming to bring civilization there, but inevitably became a criminal of mankind. The interpretation, as it appears after Kurtz’s death, solidifies the story of Kurtz as a confession, which is not done by Kurtz himself but the people around him. Through the crying of the last words, Kurtz’s morality was finally restored.
The confessional quality of Kurtz uncovers the core of the novella, making the structure of the narrative chronologically symmetrical. Within the frame of the chronotope of the present, minor chronotopes of characters are inclusive in the past chronotope, while Kurtz’s death is the heart of the overall chronotope.

Fig. 5. Chronological relationship among different chronotopes
The circle of the narrative brings readers back to the beginning when Marlow admitted that the experience in Congo sheds light on everything about him. According to Figure 5, the source of the light is Kurtz’s death which achieves the restoration of moral order with the help of Marlow. Accordingly, the new chronotope of the new moral order includes Kurtz’s implicit and non-traditional confession, accomplished by people around him and sublimated through Marlow’s interpretation. Comparing with the broken morality of the chronotope of the established imperial world, the new morality suggests the light of humanity, the sense of hope for moral nihilism, and the redemption from suffering and inhumanity of brutal violence through reflection and confession, expecting further response and reflection from the reader to finally eliminate “the horror.” While the overall quality of the imperialist chronotope is dark, Kurtz’s last words are the sword that pierces the darkness.

Conclusion

Joseph Conrad’s *Heart of Darkness* is regarded as one of the most outstanding anti-imperialist literary works in the Victorian period. The author does not directly offer critiques of imperialism and slavery, yet merely presenting the dark fact caused by human beings is powerful enough to attach the public attention to the disastrous issue in the distant land. While many scholars view Conrad as a white racist, he does reveal in his novella the moral darkness of European imperialism as experienced by the imperialists. The fakeness of European ideology covers the dark reality in Africa where both black and white people died for the grievous ivory trade, such as Kurtz. The chronotopic analysis of the novella uncovers the dialogue between the past and present, revealing the competing values and meanings across the space and time of the Congo and the possibility for moral and ethical dialogue between them. Within the frame of the chronotope of the present, the temporal and spatial dimensions of Europe and Conga in Marlow’s story consist the enlightenment-era chronotope, in which Marlow and Kurtz as sub-chronotopes encounter one another, breaking the stillness of time and bringing dialogic meanings of expected moral order. Marlow’s explanation of Kurtz’s dying words implicitly suggests the theme of confession and redemption, which is the possible “true light” of humanity and future society. After reading the novella, the reader experiences a challenge to the dominant timeless chronotope of imperialism. Therefore,
in the heart of darkness is light that is wished to be acknowledged and seen, an idea that opens the dialogue to readers, inspiring them to respond with action.
References


Appendix: Textual analysis of Heart of Darkness

Chart 1: The opening scene:

**Words about light**
- Between us there was, as I have already said somewhere, the bond of the sea. Besides holding our hearts together through long periods of separation, it had the effect of making us tolerant of each other’s yarns—and even convictions. The Lawyer—the best of old fellows—had, because of his many years and many virtues, the only cushion on deck and was lying on the only rug. The accountant had brought our already a box of dominoes and was toying architecturally with the bones. Marlow sat cross-legged right aft, leaning against the mizzenmast. He had sunken cheeks, a yellow complexion, a straight back an ascetic aspect, and with his arms dropped, the palms of hands outwards, resembled an *idol*. The Director, satisfied the anchor had good hold, made his way aft and sat down amongst us. We exchanged a few words lazily. Afterwards there was silence on board the yacht. For some reason or other we did not begin that game of dominoes we felt meditative and fit for nothing but placid staring. The day was ending in a serenity of still and exquisite *brilliance*. The water *shone* pacifically; the sky, without a speck, was a benign immensity of unstained *light*; the very mist on the Essex marshes was like a gauzy and *radiant* fabric, hung from the wooded rises inland and draping the low shores in diaphanous folds. Only the *gloom* to the west, brooding over the upper reaches, became more *somber* every minute, as if angered by the approaching of the sun. (3-4)

**Words about darkness**
- An interesting word—“ideal” becomes “idol.”
- Everything is splendid, expect for the west, where the European empire is.

<table>
<thead>
<tr>
<th>An interesting word—“ideal” becomes “idol.”</th>
<th>Everything is splendid, expect for the west, where the European empire is.</th>
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<tbody>
<tr>
<td>And at last, in its curved and imperceptible fall, the sun sank low, and from glowing white changed to a dull red without rays and without heat, as if about to go out suddenly, stricken to death by the touch of that <em>bloom brooding</em> over a crowd of men. (4)</td>
<td>The light is going to disappear</td>
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<tr>
<td>Forthwith a change came over the waters, and the serenity became less <em>brilliant</em> but more <em>profound</em>. The old river in its broad reach rested unruffled at the decline of day after ages of good service done to the race that peopled its banks, spread out in the tranquil dignity of a waterway leading to the uttermost ends of the earth. We looked at the venerable stream not in the vivid <em>flush</em> of a short day that comes and departs for ever, but in the august <em>light</em> of abiding memories. And indeed nothing is easier for a man who has, as the phrase goes, “followed the sea” with reverence and affection, than to evoke the great spirit of the past upon the lower reaches of the Thames. The tidal current runs to and fro in its unceasing service, crowded with memories of men and ships it had borne to the rest of home or to the battles of the sea. it had known and served all the men of whom the nation is proud, from Sir Francis Drake to Sir John Franklin, knights all, titled and untitled—the</td>
<td>The memory of the empire is glorious.</td>
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</tbody>
</table>

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great knights-errant of the sea. It had borne all the ships whose names are like jewels flashing in the night of time, from the Gloden Hind returning with her round flanks full of treasure, to be visted by the Queen's Highness and thus pass out of the gigantic tale, to the Erebus and Terror, bound on other conquests—and that never returned. It had known the ships and the men. They had sailed from Deptford, from Greenwich, from Erith—the adventurers and the settlers; kings' ships and the ships of Eastern trade, and the commissioned “generals” of East India fleets. Hunters for gold or pursuers of fame, they all had gone out on that stream, bearing the sword, and often the torch, messengers of the might within the land, bearers of a spark from the sacred fire. What greatness had not floated on the ebb of that river into the mystery of an unknown earth!... The dreams of men, the seed of commonwealths, the germs of empires. (5)

The history of the empire is full of glory. Everything in the past seems to be illumination.

"The torch" represents the ideology of enlightenment, which is regarded “sacred”.

The sun set; the dusk fell on the stream, and lights began to appear along the shore. The Chapman lighthouse, a three-legged thing erect on a mudflat, shone strongly. Lights of ships moved in the fairway—a great stir of lights going down. And farther west on the upper reaches the place of the monstrous town was still marked ominously on the sky, a brooding gloom in sunshine, a lurid glare under the stars. (5)

The sun set, but there are still lights in the darkness.

And this also," said Marlow suddenly, “has been one of the dark places of the earth.” (5)

After the description about the great empire, Marlow states that it is also a dark place, which makes a dramatic comparison with the glorious memories of the empire.
He was the only man of us who still “followed the sea.” the worst that could be said of him was that he did not represent his class. He was a seaman, but he was a *wanderer* too, while most seamen lead, if one may so express it, a sedentary life. Their minds are of the stay-at-home order, and their home is always with them—the ship—and so is their country—the sea. One ship is very much like another, and the sea is always the same. In the immutability of their surroundings the foreign shores, the foreign faces, the changing immensity of life glide past, veiled not buy a sense of mystery but by a lightly disdainful ignorance; for there is the mistress of his existence and as inscrutable as Destiny.

For the rest, after his hours of work, a casual stroll or a casual spree on shore suffices to unfold for him the secret of a whole continent, and generally he finds the secret not worth knowing. The yarns of seamen have a direct simplicity, the whole meaning of which lies within the **shell of a cracked nut**. But Marlow was not typical (if his propensity to spin yarns be expected), and to him the meaning of an episode was not inside like a kernel but outside, enveloping the tale which brought it out only as a *glow* brings out a *haze*, in the likeness of one of these *misty halos* that sometimes are made visible by the *spectral illumination* of *moonshine*. (5)

<table>
<thead>
<tr>
<th>Marlow is not a typical seaman. He does not regard sea as his home. He makes a living on sea, while he does not belong to sea. He is lonely.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamen’s life is simple</td>
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</tbody>
</table>

The description of Marlow is ambivalent and mysterious, like an impressionist painting. He is not merely “light”, nor “dark”, but “misty”.

This interpretation of impressionism is quite revealing for how the enlightenment narrative of colonialism may be too static, fixed, idealistic, and pre-planned (almost like the difference between an Ingres painting and a Monet). In essence, in the chronotope of colonialism, the meaning of what the colonizer does is arguably set in Brussels. The time and place of the action is situated in the Congo, but also in board rooms thousands of miles away. It’s interesting that the narrator’s description begins to reveal Marlow’s humanity (he is not just a sent emissary anymore…)
“...They were conquerors, and for that you want only brute force—nothing to boast of, when you have it, since your strength is just an accident arising from the weakness of others. They grabbed what they could get for the sake of what was to be got, it was just robbery with violence, aggravated murder on a great scale, and men going at it blind—as is very proper for those who tackle a darkness. The conquest of the earth, which mostly means the taking it away from those who have a different complexion or slightly flatter noses than ourselves, is not a pretty thing when you look into it too much. What redeems it is the idea only. An idea at the back of it; not a sentimental pretence but an idea; and an unselfish belief in the idea—something you can set up, and bow down before, and offer a sacrifice to...”

He broke off. Flames glided on the river, small green flames, red flames, white flames pursuing, overtaking, joining, crossing each other—then separating slowly or hastily. The traffic of the great city went on in the deepening night upon the sleepless river. We looked on, waiting patiently—there was nothing else to do till the end of the flood; but it was only after a long silence, when he said in a hesitating voice, “I suppose you fellows remember I did once turn fresh-water sailor for a bit,” that we knew we were fated, before the ebb began to run, to hear about one of Marlow’s inconclusive experience. (7)

“I don’t want to bother you much with what happened to me personally,” he began, showing in this remark the weakness of many tellers of tales who seem so often unaware of what their audience would best like to hear; “yet to understand the effect of it on me you ought to know how I got out there, what I saw, how I went up that river to the place where I first met the poor chap. It was the farthest point of navigation and the culminating point of my experience. It seemed somehow to throw a kind of light on everything about me—and into my thoughts. It was sombre enough too—and pitiful—not extraordinary in any way—not very clear either. No, not very clear. And yet it seemed to throw a kind of light.

This is a description of the ideology of enlightenment, which Europeans believe they sacrificed themselves to bring civilization to the savage, and the sacrifice was “sacred.”

There are four “flames” in one sentence, which correspond with the description above, implying that enlightenment is “light.”

This is the beginning of Marlow’s narration, while it can also be regarded as the conclusion of the Congo story. Marlow seems to gain a sort of “light” in his experience in Congo.
**Chart 2: The ending paragraph**

<table>
<thead>
<tr>
<th>Original Text</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marlow ceased and sat apart, indistinct and silent, in the pose of a</td>
<td>Buddha usually represents redemption.</td>
</tr>
<tr>
<td>meditating <strong>Buddha</strong>. Nobody moved for a time. “We have lost the first of</td>
<td></td>
</tr>
<tr>
<td>the ebb,” said the Director suddenly. I raised my head. The offing was</td>
<td>There is no “light” anymore, only “darkness.”</td>
</tr>
<tr>
<td>barred by a <strong>black</strong> bank of clouds, and the tranquil waterway leading to</td>
<td></td>
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<tr>
<td>the uttermost ends of the earth flowed <strong>sombre</strong> under an <strong>overcast</strong></td>
<td></td>
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<tr>
<td>sky—seemed to lead into the heart of an immense <strong>darkness</strong>. (77)</td>
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**Chart 3: Marlow’s interpretation of Kurtz’s dying words**

<table>
<thead>
<tr>
<th>Original Text</th>
<th>Analysis</th>
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</thead>
<tbody>
<tr>
<td>“However, as you see, I did not go to join Kurtz there and then. I did not.</td>
<td>This is a denial of all the expected glory</td>
</tr>
<tr>
<td>I remained to dream the nightmare out to the end and to show my loyalty to</td>
<td>brought by enlightenment.</td>
</tr>
<tr>
<td>Kurtz once more. Destiny. My destiny! Droll thing life is—that mysterious</td>
<td></td>
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<tr>
<td>arrangement of merciless logic for a futile purpose. The most you can hope</td>
<td></td>
</tr>
<tr>
<td>from it is some knowledge of yourself—that comes too late—a crop of</td>
<td></td>
</tr>
<tr>
<td>unextinguishable regrets. I have wrestled with death. It is the most</td>
<td></td>
</tr>
<tr>
<td>unexciting contest you can imagine. **It takes place in an impalpable</td>
<td></td>
</tr>
<tr>
<td>greyness with nothing underfoot, with nothing around, without spectators,</td>
<td></td>
</tr>
<tr>
<td>without clamour, without glory, without the great desire of victory,</td>
<td></td>
</tr>
<tr>
<td>without the great fear of defeat, in a sickly atmosphere of tepid</td>
<td></td>
</tr>
<tr>
<td>skepticism, without much belief in your own right, and still less in that</td>
<td></td>
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<td>of your adversary.</td>
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<td>If such is the form of ultimate wisdom, then life is a greater <strong>riddle</strong></td>
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<td>than some of us think it to be.</td>
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<td>For most Europeans, it is hard to imagine the truth/life without the</td>
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<td>“fake light” of enlightenment. The chronotopic analysis helps to reveal a</td>
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<td>bit of the “imaginary” element of the imperial truth. The fact that it is</td>
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<td>based in a mystified sense of time and space not really enlivened or</td>
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<td>enlightened by the experience of being in the present (a Buddha-like</td>
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<td>presence in the moment).</td>
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I was within a hair’s-breadth of the last opportunity for pronouncement, and I found with humiliation that probably I would have nothing to say. This is the reason why I affirm that Kurtz was a remarkable man. He had something to say. He said it.

Marlow actually has the same thought as Kurtz. He also things that everything in Congo, whether it is ivory trade or something else, is the horror. The difference between Marlow and Kurtz is that Kurtz says the words, but Marlow does not (or dare not). Kurtz have said what Marlow wanted to say, and probably no one is dare to say that, or people seldom figure out the darkness, which brings them wealth and “glory.”

Since I had peeped over the edge myself, I understand better the meaning of his stare that could not see the flame of the candle but was wide enough to embrace the whole universe, piercing enough to penetrate all the hearts that beat in the darkness.

The flame of the candle symbolizes “true light.” The enlightenment is “fake light,” which brings all the “darkness.” The “true light” still exists and could defeat “darkness.”

He had summed up—he had judged. ‘The horror!’ He was a remarkable man. After all, this was the expression of some sort of belief. It had candour, it had conviction, it had a vibrating note of revolt in its whisper, it had the appalling face of a glimpsed truth—the strange commingling of desire and hate.

“The horror!” is a judgment. Kurtz was claiming the truth—the reality behind the ideology is dark. The judgment itself is “candour,” “conviction,” “a vibrating note of revolt.” The judgment also expects for the future response, the light in the heart of darkness.

And it is not my own extremity I remember best—a vision of greyness without form filled with physical pain and a careless contempt for the evanescence of all things—even of this pain itself. No. it is his extremity that I seem to have lived through. True, he had made that last stride, had stepped over the edge, while I had been permitted to draw back my hesitating foot. And perhaps in this is the whole difference; perhaps all wisdom and all truth and all sincerity are just compressed into that inappreciable moment of time in which we step over the threshold of the invisible.

The difference between Marlow and Kurtz is that Kurtz says the words, but Marlow does not. Kurtz makes the “last stride” to express that he feels wrong about the reality he saw.

The words Kurtz said were trifle, but revealed the essence of the reality—the ideology is a lie, an excuse that covers its “ambition” of fulfilling vanity and gaining wealth.

Kurtz steps over the edge, which is not permitted. The “true light” is outside the world, but we all live in darkness. Marlow feels responsible to reveal the truth of reality. Since Kurtz already said that, the
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<th>Perhaps. I like to think my summing-up would not have been a word of careless contempt. <strong>Better his cry—much better. It was an affirmation, a moral victory paid for by innumerable defeats, by abominable terrors, by abominable satisfactions. But it was a victory.</strong></th>
<th>narrator does not have to risk himself to say it again. If there were defeats, there must be battles. The battle happens in Kurtz's mind. It was the conflict between his world view and what he saw in Congo. In other words, it is the battle between the European enlightenment and the devastating consequence in Congo. The “fake light” vs. darkness. If finally he figures out “the horror”, then in the past he must lie to himself that all these horror was fine. But now, since he was dying, he cannot cheat himself anymore. “The horror” ultimately defeats the “fake light”/illusion of enlightenment. This is a victory of his righteousness. The victory can also be seen as the redemption through suffering, or the victory of salvation in seeing the “light” in the accepting God’s will rather than from the imperial myth.</th>
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<td>That is why I have remained loyal to Kurtz to the last, and even beyond, when a long time after I heard once more, not his own voice, but the echo of his magnificent eloquence thrown to me from a soul as translucently pure as a cliff of crystal.</td>
<td>His dying words were whispered but stroke Marlow. It seems that Kurtz’s soul is purified/redeemed. Crystal is shining if there is light, implying the hope lied behind Kurtz’s voice. The theme of salvation echoes the last paragraph of the novella, when the first narrator describes Marlow as “Buddha.” It is Marlow’s interpretation that helps redeem Kurtz, whose last words restore his morality.</td>
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Tip: Key sentences/words are **bold in red**