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Editors

Prof. Dr. Valarie Akerson

Prof. Dr. Mack Shelley





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Student Perspectives of Hands-on Experiential Learning's Impact on Skill Development using Various Teaching Modalities

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Abstract: Due to the Coronavirus pandemic, traditional university classes, and any associated experiential hands-on learning laboratories, adapted to comply with safety standards for public health, transitioning from a traditional classroom environment to a virtual one. This paper discusses the impact hands-on experiential learning laboratories have on both technical understanding and soft skill development utilizing different teaching modalities: completely asynchronous online delivery or a hybrid delivery incorporating synchronous virtual lectures and in-person hands-on building activities. Hands-on experiential learning laboratories have been used in conjunction with other instructional delivery methods, helping students connect the dots between theory and application. These hands-on laboratories provide opportunities for students to “learn by doing” by building full-scale assemblies, developing both technical and soft skills. A survey was conducted to determine students’ perspectives on how hands-on experiential exercises impacted both technical and soft skill development, and responses were analyzed for the different teaching modalities employed. Overall, all technical skills and most soft skills were positively impacted by these activities under both modalities, with hybrid courses having higher ratings than both asynchronous courses and traditional pre-COVID course delivery. This information may assist construction management programs that are interested in developing hands-on experiential laboratory exercises using various teaching modalities.

Keywords: Experiential learning, Hands-on, Project-based, Curricula, Construction management

Introduction

Higher education institutions often utilize lecture-style course to deliver management theory (Pratt, 1998). Construction management educators employ the lecture format to deliver foundational knowledge for subjects

such as estimating, scheduling, and contracts (Chinowsky et al., 2006), which develops specialized knowledge within that subject area. However, since problems are rarely presented in silos, construction educators are charged with preparing students who can lead and manage the overall construction process (Davis & Cline, 2009), not just discrete components. In response, some higher education institutions have developed capstone courses in the student's senior year to "integrate multiple, interdisciplinary skills and abilities" (Benhart et al., 2017). Alternatively, some universities have developed and incorporated these integrated project-based classes across the curriculum giving students multiple opportunities to solve complex problems (Benhart et al., 2017).

In addition to technical skills such as estimating and scheduling, construction management education also teaches soft skills. Technical skills, also known as hard skills, are subject-based competencies which are required to complete a specific task, process, or procedure, and can typically be measured by a tangible end result (Hendarman & Cantner, 2018). Soft skills, alternatively, are more frequently related to skill development in social contexts (Cappelli & Won, 2013). Mahasneh and Thabet (2019) found that the most important soft skills for construction management graduates included communication skills, workplace thinking skills and workplace ethics skills.

Students perceive that hands-on building activities positively impact both technical and soft skill development (Kline et al., 2020). However, with the arrival of the Coronavirus Disease (COVID) in the United States in the first quarter of 2020, over 1300 universities and colleges cancelled in-person classes in the spring term. In fall, "44% of institutions developed fully or primarily online instruction, 21% used a hybrid model and 27% offered fully or primarily in-person instruction" (Smalley, 2020). Since construction management students find hands-on building activities to be the most effective and preferred way to learn (Kolegraff et al., 2019), construction management educators were challenged to develop new ways to deliver these types of experiences. To continue with these activities, educators either had to adapt these experiences to a virtual learning environment, or provide in-person exercises that met COVID-19 safety standards for public health.

This paper documents students' perceptions of skill development, both for technical skills and soft skills, comparing student perceptions from typical pre-COVID hands-on building activities with those of students taking classes in the midst of COVID modifications, both in-person and virtually, synchronously and asynchronously. A description of the exercises will be provided for two project-based laboratory courses that utilize hands-on building activities for instructional delivery. Survey results will be presented from both courses to gain students' perspectives on how participation in these hands-on building exercises reinforced or developed both their technical and soft skills, with additional analysis comparing virtual instructional exercises, in-person exercises with COVID safety measures in place, and pre-COVID perceptions.

Research Questions

The following research questions were investigated in this study:

1. How did students perceive hands-on experiential exercises impacted their technical skills?
2. How did students perceive hands-on experiential exercises impacted their soft skills?
3. How did students perceive the value of hands-on experiential exercises as part of their construction management education?
4. Did students' perceptions of skill development for technical and/or soft skills differ when different teaching modalities were employed?

Methodology

An anonymous online survey was developed to assess students' perceptions of experiential learning and its impact on skill development. A total of 16 questions were included in the survey, which was distributed electronically to students at the end of the term. These surveys were distributed to 83 students in four separate construction management course sections, and the data was extracted for analysis. The survey included four types of questions: demographic information, skill development, instructional learning methods, and free response. This paper focuses on skill development.

Skill development was investigated with ten questions developed by Kline and colleagues (2020) offering 5-point Likert scale responses, ranking student perception of the activity's impact on skill development, in the following order: strongly agree, agree, neutral, disagree, and strongly disagree. These rankings were coded to quantify perceptions, with a five corresponding to strongly agree and strongly disagree a one. Of the ten questions, three questions asked about soft skills exclusively, four questions asked about technical skills, and the remaining three questions combined both soft and technical skills. Instructional delivery modality was differentiated using one single selection question listing the modalities.

Course Formats

The residential construction course and the commercial construction course are two project-based laboratory courses that utilize hands-on building activities for instructional delivery. Both courses are structured into weekly topic areas to reinforce sequencing of installed components on an actual project. Classes were delivered using two separate modalities: (1) synchronously with both virtual class meetings and face-to-face, in-person building activities (hybrid format), and (2) asynchronous online course delivery with independent building activities (asynchronous format). Both modalities utilized a learning management system (LMS) to deliver course materials.

The hybrid format utilized video conferencing for virtual, synchronous class meetings and lecture multiple days per week. The hands-on building activities, which varied by course; residential or commercial, took place at certain points throughout the ten-week quarter and were designed to augment learning achieved by the students through reading assignments, lectures, video content, class activities, discussions, and homework assignments. Only the hands-on building exercises were delivered face-to-face; all other instruction and meetings were

delivered virtually.

The asynchronous format utilized recorded video content, reading assignments, activities and online asynchronous video discussions. The hands-on building activities took place each week during the final six weeks of the quarter, and utilized a kit of materials, delivered to students, which provided opportunities for students to utilize different building components, expanding on the material learned through assignments, reading, discussions, homework assignments, and video lectures.

Residential Construction Course

The residential construction course is typically taken at the end of the student's second year. Two different residential course sections met during the study period; one utilized the hybrid format while the other employed the asynchronous format. The course combined estimating, scheduling, residential methods, and contracts into one project-based integrated lab, immersing students in all aspects of residential construction. Classes were structured into weekly topic areas to reinforce the sequencing of installed components on an actual project. The following teaching methods were used in the class: reading assignments, activities and discussion (online), lectures (live or recorded), quizzes, exams, homework assignments, working in a team, final project, and hands-on building.

Hybrid Course Format

The hybrid section had twenty students, with students divided into teams of four to six people for team assignments and building activities, with virtual synchronous lectures held several times each week for a ten-week quarter. Students prepared for virtual lectures through reading assignments then faculty reinforced main concepts through online lectures and discussions. For two weeks each quarter, students transitioned from the virtual classroom to an in-person hands-on building project to apply and reinforce their knowledge learned from the previous weeks' assignments and discussions. During week four, students worked in teams to set anchor bolts and frame the floors, walls and roof of a small wood structure. During week seven, students completed the structure by applying house wrap, installing windows and a door, installing roofing materials, and completing exterior wood siding.

Asynchronous Course Development

The asynchronous section had twenty-three students, with students divided into teams of three to four students for team assignments. All course content was delivered through the LMS. Optional times for students to meet synchronously online with the instructor were also provided to review content and ask questions, but there were no regularly scheduled times for the entire class to meet and discuss content for the course. For the final six weeks of the quarter, students completed independent building activities in their own space to reinforce the knowledge learned each week. The six different building activities included (1) a formwork assembly; (2) a

framing exercise for stud layout and shear wall nailing; (3) a plumbing and electrical installation; (4) exterior waterproofing; (5) the installation of batt insulation; and (6) drywall installation. Students recorded their completed work utilizing an online video discussion board, inspecting the necessary code required items for construction as well as quality control items at the end of each exercise.

Commercial Construction Course

The commercial construction course is typically taken towards the beginning of a student's third year, with the residential course being a prerequisite. Two sections of the commercial course met during the study period; both sections utilized the hybrid format. The course combines estimating, scheduling, construction means and methods, project planning, and contracts into one project-based integrated lab, immersing students in all aspects of large commercial and institutional construction operations.

Students were divided into teams of four or five students for group assignments and building activities, with virtual synchronous lectures held several times each week for a ten-week quarter. Students prepared for virtual lectures through reading assignments then faculty reinforced main concepts through online lectures, discussions, and activities. For ten days each quarter, students transitioned from the virtual classroom to an in-person hands-on building project to apply and reinforce their knowledge learned from previous assignments and discussions. During weeks four through seven, students alternated in-person building with virtual instruction, meeting on campus twice per week where each group built a ten-foot-long, ten-foot-tall commercial exterior wall system including forming and pouring concrete, installing CMU, metal studs, exterior sheathing, waterproofing, siding, stucco, and trim, with at least one corner and one window system, braced to an existing structural steel frame. In week nine, students deconstructed their wall section and reclaimed, recycled, or disposed of the materials.

Survey Results

Survey data was conducted over one quarter in two separate classes, each with two sections. Surveys were distributed to 83 students, with 36 responses received, a response rate of 43%. The number of responses received by course and teaching modality are summarized in Table 1. The survey items are listed below, and are sorted by the course delivery modality.

Table 1. Survey Responses Received by Course and Instructional Delivery Modality

Course	Hybrid Delivery	Asynchronous Delivery	Total
Residential Course	8	13	21
Commercial Course	15	N/A	15
Total	23	13	36

Survey results for technical skills are presented below in Table 2, with the percentage of responses for each Likert-scale category listed as well as the mean response rating.

Table 2. Students' Perceptions of Technical Skill Development

Technical Skill Assessed	Course Delivery	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean Rating
Understanding of different building systems and components.	<i>Hybrid</i>	87%	13%	0%	0%	0%	4.87
	<i>Asynch.</i>	78%	22%	0%	0%	0%	4.78
Application of knowledge of the different systems.	<i>Hybrid</i>	78%	17%	4%	0%	0%	4.74
	<i>Asynch.</i>	67%	22%	11%	0%	0%	4.56
Understanding of how things are put together.	<i>Hybrid</i>	91%	9%	0%	0%	0%	4.91
	<i>Asynch.</i>	62%	38%	0%	0%	0%	4.62
Understanding the sequencing of activities for different construction project components.	<i>Hybrid</i>	91%	9%	0%	0%	0%	4.91
	<i>Asynch.</i>	62%	38%	0%	0%	0%	4.62

As shown in Table 3, students agreed that experiential learning helped with the development of soft skills but asynchronous delivery had the lowest mean rating in this category, with less than half of all respondents agreeing that building activities enhanced their relationship with their team or other students. In contrast, hybrid course responses were almost all positive, with only 4% being neutral when asked if building activities helped them develop a stronger relationship with their instructor.

Table 3. Students' Perceptions of Soft Skill Development

Soft Skill Assessed	Course Delivery	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean Rating
Appreciation of the different trades that complete the work.	<i>Hybrid</i>	83%	17%	0%	0%	0%	4.83
	<i>Asynch.</i>	47%	38%	15%	0%	0%	4.31
Enhanced my relationships with my team and other students	<i>Hybrid</i>	83%	17%	0%	0%	0%	4.83
	<i>Asynch.</i>	15%	31%	31%	15%	8%	3.31
Developed a stronger relationship with my instructor	<i>Hybrid</i>	79%	17%	4%	0%	0%	4.74
	<i>Asynch.</i>	46%	31%	8%	15%	0%	4.08

Finally, three questions combined both soft and technical skill development (see Table 4). From this, 95% of students in the hybrid courses and 100% in the asynchronous course either agreed or strongly agreed that experiential learning activities were a valuable part of their construction education. One of the lowest ranked items from the survey, development of professional workplace skills, falls into this category, with a mean rating of 4.57 in the hybrid delivery and 3.77 in the asynchronous course.

Table 4. Students' Perceptions of Combined Technical and Soft Skill Development

Combined Tech. & Soft Skill Assessed	Course Delivery	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean Rating
Greater confidence in my building abilities.	<i>Hybrid</i>	87%	13%	0%	0%	0%	4.87
	<i>Asynch.</i>	38%	54%	8%	0%	0%	4.31
Development of professional workplace skills.	<i>Hybrid</i>	70%	17%	13%	0%	0%	4.57
	<i>Asynch.</i>	23%	46%	23%	0%	0%	3.77
Building is a valuable part of my construction management education.	<i>Hybrid</i>	91%	4%	4%	0%	0%	4.87
	<i>Asynch.</i>	69%	31%	0%	0%	0%	4.69

Discussion of Survey Results

Using Olbina (2008), “values of 4 and 5 were considered positive, 3 neutral, and 1 and 2 negative” (p. 55), students’ perceptions of experiential learning activities on skill development were mostly considered positive, with all skills from hybrid courses receiving a mean rating over 4, and eight of ten skills ranked above 4 for the asynchronous course. Each of the different skill groups are analyzed below. Results will also be compared to the pre-COVID standard in-class course delivery, which were analyzed in six separate traditional project-based courses (Kline et al., 2020).

Technical Skills

Technical skills received mostly positive ratings across all four questions. When compared to the pre-COVID in-class delivery results, as shown in Figure 1, the hybrid method has the highest overall ratings, and the asynchronous delivery has very similar ratings that vary within one-to-two tenths of a mean rating. This category received the highest overall ratings in all course modalities, showing that students agreed that the experiential learning activities helped with their understanding of the different systems and components presented in class, could apply their knowledge, and helped with the understanding of activity sequencing. This information indicates that experiential learning helps students connect the dots between classroom theory to application in real world environments.

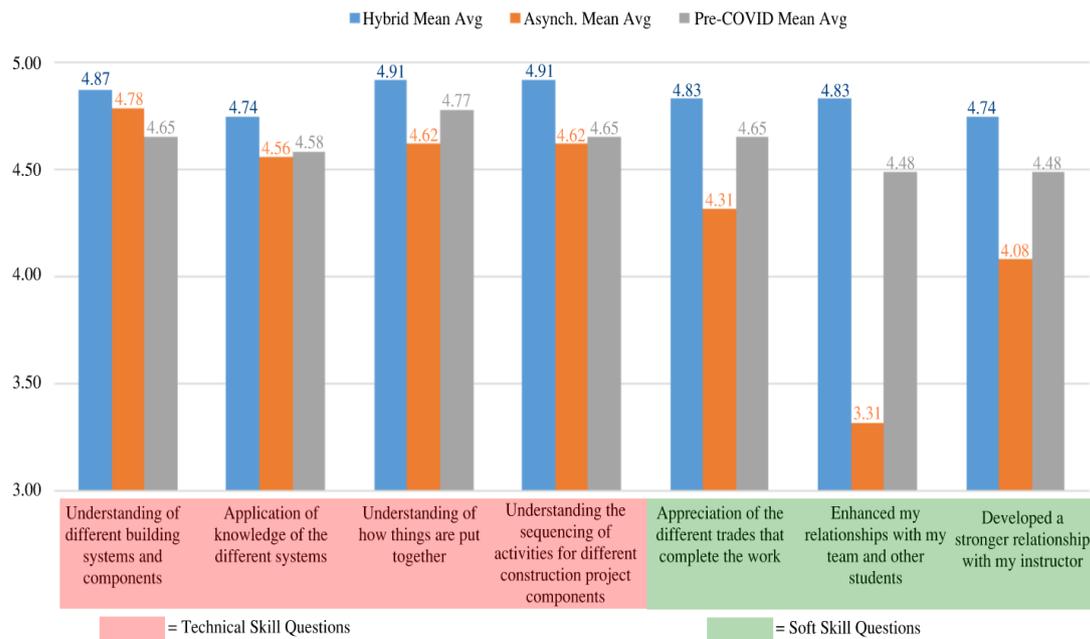


Figure 1. Technical and Soft Skills by Mean Score and Teaching Modality

Soft Skills

Soft skills received mostly positive rating across all three questions for hybrid and pre-COVID in-class delivery, but received the lowest averages for asynchronous delivery. This indicates that face-to-face interaction is important when developing soft skills. In the hybrid course, 100% of students, and 85% in the asynchronous course agreed that the activities gave them an appreciation of the different trades that complete the work. However, the activities' impact on relationship building with both their team members and the instructor were slightly lower in the hybrid course, and the asynchronous course received the lowest mean rating overall in developing relationships with team members.

Combined Soft and Technical Skills

This category yielded both the highest and lowest mean ratings for hybrid course delivery. An overwhelming 95% of students in the hybrid course and 100% in the asynchronous course agreed that experiential learning was a valuable part of their construction management education. However, only 87% in the hybrid course and 69% in the asynchronous agreed that it helped with the development of professional skills. This response may be due to different interpretations by the students on the definition of professional skills; no definition was provided so this open interpretation could lead to varied results. Additionally, although 100% in the hybrid course and 92% in the asynchronous course agreed that building gave them greater confidence in their building abilities, only 83% in the hybrid course and 38% in the asynchronous course strongly agreed with this statement. Similar to previous categories, the hybrid's average ratings were the highest, followed by traditional pre-COVID delivery, with asynchronous delivery receiving the lowest rankings. Reviewing this indicates that the experiential learning

environment aids with the development of both skill sets, but students perceive greater development of technical and soft skills with these hands-on activities in all course deliveries.

Conclusion

Previous studies indicated that students prefer hands-on experiential learning opportunities, and find them effective as an instructional delivery method (Kolegraff et al., 2019). Additionally, students perceived that these in-class hands-on building activities improved both their technical and soft skills (Kline et al., 2020). However, with the arrival of the COVID-19 pandemic in 2020, construction management programs pivoted instruction to either fully asynchronous delivery or hybrid course formats. This study compared students' perceptions of skill development – both for technical skills and soft skills – in typical pre-COVID hands-on building activities with perceptions of students taking classes in the midst of COVID, both in hybrid courses and asynchronous courses.

The survey offered reviewed students' perceptions of these activities on both technical and soft skill development. Overall, skill development was mostly positive with both modalities, but the hybrid format with in-person building activities had higher mean rankings for all skills surveyed. An overwhelming 99% of students agreed that hands-on building improved their technical skill development, with little difference in students' perceptions across the different modalities. For soft skill development, 88% of students agreed that hands-on building improved their soft skill development, but there were noticeable differences across the modalities; 99% of hybrid students agreed compared to only 62% of students enrolled in an asynchronous course. Of the soft skills measured, the greatest difference was the impact of relationship building with other members of the class. Additionally, an overwhelming 97% considered the activities a valuable part of their construction management education, which is consistent with pre-COVID survey results.

The results from this study may be useful for construction management or technical training programs that are interested in developing hands-on experiential laboratory exercises using various teaching modalities. Upon review of the data, several areas became apparent for future research. First, since students complete these activities in sequential courses, do responses differ through course maturity? Additionally, is there a difference in technical and soft skill development through hand on building by gender? Finally, follow-up surveys could be gathered to determine what specific activities led to positive and negative results or account for the differences experienced between the modalities.

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Hispanic Serving Institution: Gender, Major, and Technology Influences on Academic Success during a Pandemic

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Abstract: This paper focuses on the impact COVID-19 has on students attending a Hispanic Serving Institution. Data retrieved from the Latinx student population was limited, which initiated this study. The research study includes a survey that was previously used, prior to the pandemic. Variables focused on are success rates of students attending a Hispanic Serving Institution, gender, major, technology, and attending a higher education institution during a pandemic. Conflict theory was used to understand how upper-class students would have more resources needed to successfully complete courses in a Hispanic Serving Institution during a pandemic. The impact the pandemic had in the response rate was drastically seen. Due to the limited response rate, nonparametric tests were used. However, insignificant results were seen. This study shows how the researcher needs to become more resourceful in collected data using an instrument or resort to qualitative methods. The limitations were seen in the limited responses attained.

Keywords: Hispanic serving institution, Gender, Major, Technology, Pandemic

Introduction

Understanding how students in a Hispanic Serving Institution during a pandemic is very important (Marshall, Moody-Marshall, & Roache, 2020; Miller, 2020). Negative effects are seen among faculty (Boyer-Davis, 2020; Ghazi-Saidi, Criffield, Kracl, McKelvey, Obasi, & Vu, 2020) and students (Aristovnik et al., 2020; Gaeta & Rodriguez, 2021). Higher education administration must be more collaborative in such a time (Marshall et al., 2020; Miller, 2020). This study will specifically focus on gender, major, and technology use. Gender has been found to impact the success rates in students attending a higher education institution (Engstrom, 2018; Escaname et al., 2020; Piloti, 2021). Student majoring in a specific field also have shown advantages (Escaname et al., 2020). Lastly, technology use has been known to positively impact students in a higher education institution (Escaname et al., 2020; Flores & Flores, 2018). The purpose of this study is to better understand how the success rates of students attending a Hispanic Serving Institution are influenced by their gender, major,

technology, during a pandemic are influenced.

Literature Review

The purpose of this study is to better understand students in Hispanic Serving Institutions and gender, major, and technology effects on student success during a pandemic. First, it is important to understand the impact of the pandemic from the top to the bottom to better understand the importance of this study. For example, Marshall, Moody-Marshall, and Roache (2020) and Miller (2020) both found an importance in better understanding the leadership in higher education systems during a pandemic. It is important to point out, leadership was found to be lacking in collaboration during these critical times (Marshall et al., 2020; Miller, 2020). Marshall et al. (2020) specifically, pointed out the need for higher education leaders to provide clear direction, work collaboratively, communicate effectively, and be adaptive in approaches to address new issues as leaders prepare to manage the re-opening of schools. Miller (2020) adds, administration should also discuss the roles and missions, not demand student compliance, and efficiency and financial stability may be found in a system driven by a shared mission. Hughey and Kirk-Jenkins (2021) added, leaders who are more communicative, flexible, and who offer institutional support through the ever-changing needs during a pandemic would make faculty feel more supported.

Faculty specifically felt stress and anxiety in the midst of all the changes during the pandemic (Boyer-Davis, 2020; Ghazi-Saidi et al., 2020). Some faculty ran into issues when it came to technology (Kirk-Jenkins & Hughey, 2021; Makhasane & Sasere, 2020). Hughey and Kirk-Jenkins (2021) found faculty lacked trust in the institution for forcing the quick transition to virtual or hybrid learning. The lack of choice also created challenges for faculty who were trying to balance work life and personal life challenges. Makhasane and Sasere (2020) found lecturers in developing countries lacked the technical know-how and experience with virtual instruction and assessments. Other challenges that arose during the pandemic for faculty include gender differences with women and mothers having issues with time management with lack of childcare. Boyer-Davis (2020) and Ghazi-Saidi et al. (2020) suggested some interventions to minimize the negative effects on faculty. Ghazi-Saidi et al. (2020) found faculty and students navigated through their courses smoothly if they had prior experience with online and had online material ready before the pandemic. This complements Boyer-Davis (2020) recommendations to expand instructional designs, professional development, counseling services budgets, and staffing in order to support faculty coping with their health issues and technological stressors. Lastly, it is important to repeat, Hughey and Kirk-Jenkins' (2021) recommendation to increase communication, flexibility, and institutional support to help decrease the negative effects of the pandemic on faculty.

Students also experienced stress during the pandemic and the challenges that were imposed (Aristovnik, Kerzic, Ravselj, Tomazevic, & Umek, 2020; Gaeta & Rodriguez, 2021). Students reported being concerned about their future careers and study issues (Aristovnik et al., 2020). Students were mainly bored, anxious, and frustrated (Aristovnik et al., 2020; Gaeta & Rodriguez, 2021). Loneliness was also an effect seen among students in higher education (Bedenlier, Glaser-Zikuda, Handel, Kopp, Stephan, & Ziegler, 2020; Gaeta & Rodriguez, 2021).

Gaeta and Rodriguez (2021) found loneliness negatively impacted self-regulated learning. Additionally, some students were not equipped for online learning (Bedenlier et al., 2020; Aristovnik et al., 2020). Aristovnik et al. (2020) found, in a global study, the transition to online lectures impacted undergraduate male students, attending part-time, majoring in applied science, with lower living standards, and in less developed regions (Africa and Asia). While the pandemic had an impact on undergraduate female students, who attended higher education institutions full-time, had financial issues, emotional issues, and personal issues. Assistance with coping was seen as a need during the pandemic while being a student in higher education (Bedenlier et al., 2020; Gaeta & Rodriguez, 2021). Coping strategies were found to mediate emotions and self-regulated learning (Gaeta & Rodriguez, 2021). Bedenlier et al. (2020) suggested Lecturers should also provide students opportunities to interact and communicate with other students in order to increase group cohesion and possibly discuss stressors.

Gender, Major, and Technology

Gender differences in success rates have been found among students in higher education institutions (Engstrom, 2018; Escaname et al., 2020; Piloti, 2021). In general women were more successful than men academically (Flores et al., 2020; Piloti, 2021). Female students were found to have well-educated parents, had positive attitudes about their profession, enjoyed typical traditions at the college, and socially integrated which were deemed important for academic success (Engstrom, 2018). The major a student decides to complete also seems to influence success rates in higher education institutions (Coltharp, 2020; Escaname et al., 2020). Specifically, the criminal justice majors seemed to be successful in a Southern region of Texas (Escaname et al., 2020). While STEM majors were more successful in a public, four-year, rural, university located in the Midwest (Coltharp, 2020). Lastly, technology is also a major component that assists students in successfully completing their academic goals (Escaname et al., 2020; Flores & Flores, 2018). Some researchers found the hours student sought information from their instructors and the number of videos they watched increased academic success rates (Duart, Hinojosa-Becerra, & Torres-Diaz, 2018). Other researchers found student's academic success rates increased through web technologies and applications offering liberties, allowing one to choose their own learning space and time spent online with other students (Brink & Ohei, 2019). Lastly, it is important to point out researchers have recommended future studies focus on the online delivery of an education during a pandemic (Cheong, Ho, & Weldon, 2021; Johnson, Seaman, & Veletsianos, 2020). Additionally, higher education institutions must also come to understand successful strategies, views, and experiences between males and females to better assist them in higher technical education (Engstrom, 2018). Escaname (2020) recommended using a random sample to further understand how gender, major, and technology contribute to the success of Latinx students. Alternatively, Brink and Ohei (2019) warns future researchers to focus on how technology supports the learning process as a supplemental option rather than replacing traditional methods.

Conflict Theory

Henslin (2017) refers to conflict theory as a theory that focuses on the upper and lower class members always fighting for the scarce resources that keep one in a position in power. So, in this research project we focus on the

upper class students compared to the lower class students competing for a higher education to attain or maintain one's position of power. During a pandemic, the class differences increase impacting the lower class students more than other socio economic class (Aristovnik et al., 2020). Conflict theory addresses the focus of this study, to better understand students in Hispanic Serving Institutions and gender, major, and technology effects on student success during a pandemic. Being that only one peer-reviewed article was found focused on Mexican students in higher education during the pandemic (Gaeta et al., 2021), the need to further assist the Latinx students in higher education in order to increase the success rates is evident (Escaname, 2020).

Method

Design

The purpose of this study is to better understand how students in Hispanic Serving Institutes are successful, while monitoring gender, major, and technological use during a pandemic. This research study took place in a Hispanic Serving Institute located in South Texas during a pandemic (see Appendix B). The Internal Review Board (IRB) approval was sought out first before collecting any data (see Appendix C). Additionally, the proper paperwork was completed to retrieve a random sample. According to a power analysis, the goal was to attain 80 responses in order to run a chi-square test with a large effect size and an alpha level of .05. The survey was administered via online, using randomly selected student emails, over the spread of three consecutive weeks. An initial invitation was sent with two follow-up reminders (see Appendix A). The randomly selected student emails and emails sent out were deleted after the data collection process in order to maintain anonymity. Only nine responses were retrieved.

Population and Sample

The research study focused on students who attend a Hispanic Serving Institution. The sample was set at 80 randomly selected students recommended by Escaname et al. (2020). A total of three-hundred students were randomly selected and received an online invitation with two reminders to complete the online survey. The majority of the respondents were of Mexican-ethnic descent. Students were attending a Hispanic Serving Institution during a pandemic. Students were assumed to have access to technology and their email accounts.

Results and Discussion

Descriptive data showed all variables, gender, major, questions addressing technology use, gpa, being affected by COVID, having a relative being affected by COVID, being negatively impacted emotionally by COVID, being negatively impacted psychologically by COVID, being negatively impacted financially by COVID provided skewed data. This was a given being that the response sample was a total of nine students out of three-hundred. The descriptive data showed the respondents were primarily from Mexican-ethnic Female students in higher education, who had a Grade Point Average (GPA) of 2.0-2.9, majored in Business, Health, and Social Sciences, had an overall positive outlook about technology use in the classroom but also believed technology

slows down the learning process and takes time away from class, had a family member with COVID, were negatively impacted by the pandemic emotionally and financially at a point in their academic year. Instead of a chi-square test, due to the small sample size, a nonparametric test called the Kolmogorov-Smirnov test was applied using Partner Support Program Plus (PSPP). The data did not yield any significant results.

Table 1. Are you of Latinx Origin?

Responses	Frequency	Percentage	Cumulative Percentage
No	2	22.2%	22.2%
Mexican	5	55.6%	77.8%
Chicano/a	2	22.2%	100.0%
Total	9	100.0%	

This table discusses the Latinx Origin of students attending a Hispanic Serving Institute during a pandemic.

Limitations

This research study was limited to using PSPP. The research was limited to accessing students who were living through a pandemic in some form, preventing them from dedicating time to this study.

Conclusion

Again, this research study was focused on better understanding how gender, major, technology, and attending a Hispanic Serving Institution during a pandemic influenced success rates. The goal was to attain a large random sample. The random sample would have been limited to an online survey. However, the response rate was so low one can only presume students are impacted the effects of the pandemic. The data yielded high response rates from Mexican-ethnic female students in higher education, who majored in Business, Health, and Social Sciences, who were in favor of technology use but believed it took time away from learning, who had a family member with COVID, and were negatively affected emotionally and financially by the pandemic. Lastly, based off of the descriptive data, the majority of students were passing with a Grade Point Average of 2.0-2.9.

Recommendations

Future researchers should resort to qualitative research during the pandemic in Hispanic Serving Institutions. This approach would better assist with retrieving a small number of participants while gathering important information needed to better understand the students in Hispanic Serving Institutions during a pandemic. The significant relationships found in quantitative research are important but being that the pandemic impacts these groups at higher rates (Aristovnik et al., 2020), the focus of research including the Latinx students in higher

education must focus on understanding the negative influences and effects brought on by the pandemic. This approach would better delve into influences that bring out success rate in Latinx students in higher education institutions during a pandemic.

Acknowledgements

I would like to thank South Texas College for their continued support.

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Appendix A. Survey Instrument

ICT Integration into Teaching Survey

This survey explores your perception and practice of ICT integration into teaching and your perception of ICT use to improve teaching. This survey will require 10 minutes or less of your time. Please note that this survey is completely anonymous and voluntary.

Section 1: Background Information

Are you 18 years old or older?

Yes

No

Please select an answer for each question.

1. Gender:

Male

Female

Other (please specify)

2. Major Discipline (check all that apply):

Arts

Business

Humanities

Health

Sociology

Technology

Criminal Justice

Social Sciences (Communications, Education, History,
Political Science, Anthropology, Psychology, Social Work)

Natural & Applied Sciences

Biology

Other, Please Specify: _____

3. Average number of courses enrolled per semester at all colleges where you've enrolled in over the past three years (select one)

1

2

3

4

5

6+

4. Years enrolled in college: (Please round to the nearest whole number)

5. Current Overall Grade Point Average (GPA):

—

6. Are you of Latinx origin?

No

Yes, Mexican, Mexican-American

Yes, Chicano/a

Yes, Puerto Rican

Yes, Cuban

Yes, Other (please specify)

7. Please indicate the race with which you identify.

African American or Black

American Indian or Alaska Native

Asian

Pacific Islander or Native Hawaiian

White

More than one of these

8. Have you been ill with the Coronavirus?

Yes

No

9. Has a family member been ill from the coronavirus?

Yes

No

10. Have you been negatively affected psychologically due to coronavirus events?

Yes

No

11. Have you been negatively affected psychologically due to coronavirus events?

Yes

No

12. Have you been negatively affected emotionally due to coronavirus events?

Yes

No

13. Have you been negatively affected Financially due to the coronavirus?

Yes

No

Section 2: Current Practice of ICT Use in Teaching

Please select the answer that best describes your current practice of technology use to support your teaching. (1) Never, (2) Sometimes (Few times per semester/quarter), (3) Often (1-3 times per Month), (4) Very Often (1-3 times per Week).

ICT Tools/Applications

a. Productivity tools (e.g., Word Processing, Spreadsheet, Database)

 (1) Never

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 (2) Sometimes (3) Often (4) Very Often

b. Multimedia presentation tools (e.g., PowerPoint, Flash, Video etc.)

 (1) Never (2) Sometimes (3) Often (4) Very Often

c. Internet, web applications

 (1) Never (2) Sometimes (3) Often (4) Very Often

d. Web Authoring Tools (e.g., Dreamweaver)

 (1) Never (2) Sometimes (3) Often (4) Very Often

e. Content specific software

 (1) Never (2) Sometimes (3) Often (4) Very Often

f. Podcasting/Vodcasting/Screencasting

 (1) Never (2) Sometimes (3) Often (4) Very Often

g. Reference software

 (1) Never (2) Sometimes (3) Often (4) Very Often

h. Drill and practice

 (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

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i. Games and simulations

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

j. Desktop publishing

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

k. Wireless handheld devices (e.g., PDA, iPhone, etc.)

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

l. Course website

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

m. Learning management system (e.g., Moodle, BlackBoard, WebCT)

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

n. Imaging Devices (e.g., scanners, digital cameras, video cameras)

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

o. Computer projection device

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

p. Email or other Internet communication tool for assignment/project feedback.

___ (1) Never

___ (2) Sometimes

___ (3) Often

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___ (4) Very Often

q. Teach in computer classroom

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

r. Ask students to use technology to demonstrate learning

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

s. Ask students to use technology for communication

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

t. Ask students to use technology for collaboration

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

u. Ask student to use technology to create content

___ (1) Never

___ (2) Sometimes

___ (3) Often

___ (4) Very Often

Section 3: Perception of ICT Use in Teaching

Please select the answer that best describes your perception of technology use in teaching:

(1) Strongly Agree, (2) Agree, (3) Disagree, (4) Strongly Disagree.

a. Technology helps me to get more involved into teaching.

___ (1) Strongly Agree

___ (2) Agree

___ (3) Disagree

___ (4) Strongly Disagree

b. Technology integration is an important aspect of teaching career.

___ (1) Strongly Agree

___ (2) Agree

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___ (3) Disagree

___ (4) Strongly Disagree

c. Technology can be integrated to foster effective teaching and learning environment.

___ (1) Strongly Agree

___ (2) Agree

___ (3) Disagree

___ (4) Strongly Disagree

d. Technology integration can be a positive change agent in student learning.

___ (1) Strongly Agree

___ (2) Agree

___ (3) Disagree

___ (4) Strongly Disagree

e. Technology integration provides greater access to learning resources.

___ (1) Strongly Agree

___ (2) Agree

___ (3) Disagree

___ (4) Strongly Disagree

f. Technology integration makes teaching and learning more exciting.

___ (1) Strongly Agree

___ (2) Agree

___ (3) Disagree

___ (4) Strongly Disagree

g. Technology integration makes teaching and learning more interactive.

___ (1) Strongly Agree

___ (2) Agree

___ (3) Disagree

___ (4) Strongly Disagree

h. Technology integration improves communication between students and instructor.

___ (1) Strongly Agree

___ (2) Agree

___ (3) Disagree

____ (4) Strongly Disagree

i. Technology integration disrupts teaching especially if the computer system crashes or there is general computer network congestion.

____ (1) Strongly Agree

____ (2) Agree

____ (3) Disagree

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____ (4) Strongly Disagree

j. Technology integration creates learning problems, such as trying to find information from the World Wide Web (www).

____ (1) Strongly Agree

____ (2) Agree

____ (3) Disagree

____ (4) Strongly Disagree

k. Technology integration takes time away from actual classroom instruction.

____ (1) Strongly Agree

____ (2) Agree

____ (3) Disagree

____ (4) Strongly Disagree

l. Technology integration slows my teaching process for various reasons.

____ (1) Strongly Agree

____ (2) Agree

____ (3) Disagree

____ (4) Strongly Disagree

Section 4: Perceived Major Barriers that Limit Faculty Use of Computer

Technologies: For each statement, please indicate the extent to which you agree or disagree with the statement.

____ (1) Strongly Disagree

____ (2) Disagree

____ (3) Neither agree nor disagree

____ (4) Agree

____ (5) Strongly Agree

Some of the barriers that limit faculty use of computer technologies include:

1. Increase workload for instructors.

____ (1) Strongly Disagree

____ (2) Disagree

____ (3) Neither agree nor disagree

___ (4) Agree

___ (5) Strongly Agree

2. Lack of equipment and infrastructure.

___ (1) Strongly Disagree

___ (2) Disagree

___ (3) Neither agree nor disagree

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___ (4) Agree

___ (5) Strongly Agree

3. Lack of software.

___ (1) Strongly Disagree

___ (2) Disagree

___ (3) Neither agree nor disagree

___ (4) Agree

___ (5) Strongly Agree

4. Lack of time of learning about computer technologies.

___ (1) Strongly Disagree

___ (2) Disagree

___ (3) Neither agree nor disagree

___ (4) Agree

___ (5) Strongly Agree

5. Lack of effective training.

___ (1) Strongly Disagree

___ (2) Disagree

___ (3) Neither agree nor disagree

___ (4) Agree

___ (5) Strongly Agree

6. Lack of technical support.

___ (1) Strongly Disagree

___ (2) Disagree

___ (3) Neither agree nor disagree

___ (4) Agree

___ (5) Strongly Agree

7. Lack of administrative support.

___ (1) Strongly Disagree

___ (2) Disagree

___ (3) Neither agree nor disagree

___ (4) Agree

___ (5) Strongly Agree

8. Lack of collegial support and interaction.

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

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9. Lack of designing interaction activities between instructors and students in my course.

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

10. Lack of self-confidence.

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

11. Lack of personal interest.

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

12. Reduced course quality.

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

Appendix B. Permission to Use Survey

Re: Permission Request to use 'ICT Integration Into Teaching Survey'

Musabbir Chowdhury <musabbir@axiomadvice.com>
Mon 12/7/2020 6:21 PM

To: Sylvia L. Flores <slflores@southtexascollege.edu>

CAUTION: This email originated from outside South Texas College. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Dr. Flores,

I hope this email finds you well and thanks for your email. Please feel free to use the instrument for your future study.

Best regards,

Musabbir
--
Dr. Musabbir Chowdhury
Dean, School of Business and Information Technology
Fleming College

M. 289-208-0801
E. musabbir@axiomadvice.com
W. www.axiomadvice.com

On Fri, Dec 4, 2020 at 2:49 PM Sylvia L. Flores <slflores@southtexascollege.edu> wrote:
Hello Dr. Chowdhury,

I hope all is well with you and your family and you are found in good health. I am contacting you again, because you granted me permission to use your survey titled 'ICT Integration Into Teaching Survey' two years ago and I am hoping you would grant me permission again.

Attached you will find a paper my colleagues and I put together with your survey. We are hoping to do more with it this year. Please let me know if I may proceed.

Best...

Sylvia L. Flores, PhD
Assistant Professor
Building T 1.342
(956) 872-5615

Appendix C. IRB Approval

[Redacted]
[Redacted]
[Redacted]
[Redacted] *Research & Analytical Services*
[Redacted] [Redacted]

Memo

To: Sylvia Flores
From: [Redacted]
Dean of Institutional Research, Effectiveness & Strategic Planning
Institutional Review Board (IRB) Liaison
RE: *Latinos: Gender, Major, & Technology Use Influences on Academic
Success in a Pandemic*
Date: February 2, 2021

After reviewing all pertinent information regarding your research proposal, [Redacted] Institutional Review Board has determined that this project is Exempt from review as per stipulations set forth under federal regulation 45 CFR 46.101(b)(2) (the 'survey' exemption).

Site approval is granted for a one-year timeframe.

Should your project need to be extended or changes are found to be necessary, an IRB Continuation/Change Form must be filled out, filed, and approved before you may continue. This document is available online at the Research & Analytical Services (RAS) website [Redacted]

At the completion of your study, please submit a copy of your final report to our office. Also, please keep us posted on any developments and let us know how we can be of help to you.

If you should have any questions, comments or concerns regarding this letter or your proposal please feel free to contact me. [Redacted] You can also contact [Redacted]

Best of luck in your current endeavors, and we look forward to hearing from you in the future.

Dispelling the Myth of Elitism and Establishing the Evidence of Inclusion: A Case of CLIL in Online English Education Amid COVID-19 Pandemic

Hengzhi Hu

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Abstract: Educational elitism is an issue to be tackled, the necessity of which has already been widely established but reinforced amid COVID-19 pandemic given that learning has been greatly disrupted; elitism in Content and Language Integrated Learning (CLIL) is a matter of debate, the settling of which still awaits more empirical studies in different educational contexts. Conducted in a particular Chinese higher education provider, this mixed-methods study examined the effects of CLIL in an online English teaching programme and indicated that when teaching practices were appropriately designed and enacted in response to learners' differing needs, students of different academic capabilities could make remarkable achievement in both language learning and content learning. This makes a contribution, though small, toward dispelling the myth of elitism in CLIL and establishes some evidence on the promotion of inclusive education in the time of COVID-19 crisis. However, a critical view should be held to elitism in either online education or CLIL with a much wider research agenda in various educational contexts to be explored.

Keywords: Online learning, English language education, CLIL, Inclusive education

Introduction

The outbreak of COVID-19 pandemic since 2020 continues to pose radical challenges to education beyond the impact of the disease itself, creating enormous disruption to educational systems and aggravating the already-existing educational disparities by depriving innumerable students of their right to education. Even after over a year of upheavals and fragmented lockdowns, the pandemic situation is still evolving and giving rise to very unpredictable trends. Although governments around the world have made prompt responses with honest endeavours to promote inclusive education characterised by “a focus on (removing) systemic barriers that deny opportunities for presence, participation and achievement” in education and are keeping revising their contingency plans (Johnstone et al., 2020, p. 99), chances are that countless learners are still having disrupted and unsatisfactory learning experiences (Bozkurt et al., 2020; Reimers et al., 2021), necessitating the re-examination of the efficiency of education, especially distance education, under the circumstance of COVID-19 pandemic.

In the field of education, elitism is interpreted by Börjesson and Broady (2016, p. 112) as a social process characterised by “highly selective recruitment of students based on scholastic merit” in programmes and marginalisation of disadvantaged learners aimed at contributing “to the intra-generational reproduction of the current dominant groups by educating and training their offspring”. In the time of COVID-19 crisis, elitism seems to be aggravating rather than calming down, reinforcing educational inequalities caused by “a lack of strong pedagogic support for students from disadvantaged and marginalised spaces” (Devkota, 2021, para. 1). This essentially reflects the nature of exclusion which obstructs the full participation of all learners in educational activities (Loreman et al., 2011). Content and Language Integrated Learning (CLIL), a pedagogical approach that emphasises both language learning and content learning in a single educational programme (Coyle et al., 2010), has also long been considered to be elitist, which favours and is assumed to be the most beneficial for the learners who are evaluated to be advanced and advantaged in intelligence, academic performance and all the other socio-educational factors (Bruton, 2015; Broca, 2016; Rumlich, 2014). Opposite to this exclusive view, a number of scholars state that CLIL is open to all learners regardless of the skewed composition of learner population and is thus more egalitarian in essence (Coyle et al., 2010; Hüttner & Smit, 2014), though few empirical studies are available to further confirm this.

With this brief introduction in mind, the author of this paper wishes to focus on the context of an online CLIL programme offered by a particular Chinese higher education provider during COVID-19 lockdowns with an attempt to rectify online learning elitism and examine whether CLIL is elite or not. By adopting mixed-methods research designs, the author focuses on the comparison of the learning outcomes of the academically advanced and academically weak cohorts involved in the same online CLIL programme as well as on the teaching and learning activities in which students were engaged, aimed at answering the following questions:

- 1) To what extent do online CLIL instructions affect the English learning and content learning achievement of the learners who have differing academic levels?
- 2) What online learning context does CLIL provide for the learners?

Literature Review

Elitism and COVID-19: A Focus on China

Elitism is a topic frequently discussed in Chinese academia with special to education and social justice. For the past few decades, the development of education and the distribution of educational resources have been somewhat controlled and determined by elite social groups, such as “those who are rich or powerful”, “hold professional positions in China” or attempt to take advantage of education to maintain their class superiority into the next generation (Wang, 2007, p. 111; see also, Jin, 2000; Wang & Yang, 2016; Wu et al., 2020). Some scholars argue that elite education characterised by the optimisation of teaching process for advanced learners via high-level educational management and significant distribution of educational resources and facilities can help to train high-quality talents with the required skills to enhance China’s national power and role in the world (Hao, 2016; Liu, 2018; Xiao, 2010; Zeng, 2013), whereas a national endeavour has been made to abolish the label of elitist education and “to promote educational equity in admission criteria, resources input and

performance standards” (Zhou et al., 2007, p. 14), reflecting the nature of equality-oriented education with a focus on ensuring access and right to education for every student (Huang et al., 2016). However, it cannot be denied that elitist education still exists in all levels of education in today’s China, leading to the monopolisation of elite educational opportunities by the upper class and failing to attain the ideal of inclusive education (Wu et al., 2020).

According to Jash (2020), since the outbreak of COVID-19 pandemic in China, the monopolisation of the elitist coalition seems to be aggravating. Although Jash (2020) holds a rather sceptical and questionable attitude to China’s political responses to COVID-19, he does more or less spotlight the elitist issue in Chinese society. However, a critical view must be held to elitism in the field of online learning. On the one hand, the efficiency of China’s prompt educational responses to COVID-19, such as the immediate organisation and offer of online courses, cannot be denied, which has ensured “the physical and mental health of teachers and students”, “the supply of epidemic prevention materials and educational resources...(and) the quality of students’ learning” (Xue et al., 2020, p. 1; see also, Cen et al., 2020; Gulati, 2020; Huang et al., 2020). This national endeavour, to a large extent, has ensured the continuity, quality and equality of learning. On the other hand, Xue et al. (2020) also mention that despite the effort that has been made, chances are that online learning could severely affect educational inclusion and equality and that disadvantaged students’ learning could be particularly disturbed, which reflects some sense of elitism characterised by the marginalisation of less advantaged learners. Unfortunately, this assumption has only been confirmed in a few studies, such as the ones conducted by Hu et al. (2021), G. Chen et al. (2020), Y. Chen et al. (2020), Liu and Chen (2020), Ma (2020) and Zuo et al. (2021) who more or less disclose that disadvantaged learners may have unsatisfactory online learning experiences and highlight the need for teachers to re-examine their teaching practices. Nevertheless, it is necessary to revise online teaching practices during this special period in response to the need proposed by Huang et al. (2020, pp. 39-40) that effective methods to organise instructions should be worked out and employed by adopting appropriate teaching strategies and providing “support for learners with special needs...in order to provide an inclusive online learning experience for them”. This is also acknowledged by Zhang et al. (2020, p. 58) who argue that there is still much ambiguity of and disagreement over the government policies with regard to how to teach and that “it remains unclear what teaching mode and pedagogy may best work for online education”, which further highlights the compelling need to support academic research on online education aimed at better engaging students with learning difficulties. Currently, after over one year since the initial massive outbreak of COVID-19 virus in China, it is still safe to say that the need to examine online teaching and learning in research is not obviated but reaffirmed due to the recurrent COVID-19 outbreaks and lockdowns in some parts of China, forcing students back to online learning.

CLIL and Elitism

CLIL is a pedagogical approach originated from Europe and now widely utilised in bilingual programmes, which is characterised by a “dual-focused educational context in which an additional language, thus not usually the first language of the learners involved, is used as a medium in the teaching and learning of non-language

content” (Marsh, 2003, para. 3). Therefore, CLIL focuses on both language learning and content learning in a single classroom (Coyle et al., 2010). Despite the positive words describing the substantial benefits of CLIL to promote language acquisition, content learning, cognitive development and cross-cultural understanding (Coyle et al., 2009), a longstanding debate always centres on whether CLIL is selective in nature and merely beneficial for advanced learners or is inclusive of all.

Advocates maintain that CLIL is inclusive of all learners, even those who may be less advantaged or privileged, and is thus more egalitarian in essence than other kinds of bilingual programmes, such as the ones offered in private schools (Coyle et al., 2010; Hüttner & Smit, 2014). This view has been confirmed in empirical studies, such as the ones done by Pladevall-Ballester (2014) and McDougald (2015) which indicate that both high achievers and low achievers could benefit from CLIL. In contrast, other scholars assume that CLIL is selective in nature and only attracts and benefits the learners who are academically advanced and motivated (Bruton, 2011; Mehisto, 2007; Paran, 2013), and evidence shows that “many CLIL programs are de facto selective in one way or another” in various educational contexts (Bruton, 2015, p. 124; see also, Van Mensel et al., 2020). This assumption has also been confirmed in empirical studies, cautioning educators against the opening of CLIL programmes for all learners. For instance, Apsel (2012, p. 54) concludes from his study of the reasons for students to drop out of CLIL programmes that there should be a threshold of “a combination of factors including language, learning skills, content language and commitment” for CLIL admission, below which learners could easily have problems with their learning. Likewise, Zydatið (2012, p. 26), based on the research findings that there was a strong correlation between the participants’ initial academic competence with their learning outcomes in CLIL, states that “adequate levels of academic discourse proficiency...are dependent on rather high level of linguistic competence...and/or general proficiency in the working language”. This finding corresponds to the one generated in Mewald’s (2007) study which indicates that less advanced learners could not improve language competence in the same way as their more advanced peers involved in the same CLIL class.

There does not seem to be a one-size-fits-all answer to the question whether or not CLIL should be selective, though the fact is that it is indeed selective in practice and reflects the nature of elitism in some educational contexts. From a neutral perspective, Cañado (2019, p. 1) maintains that the “commonly harboured beliefs vis-à-vis the elitism of bilingual programmes need to be re-examined and (that) a possible future research agenda is suggested to continue advancing in this area”. Although Cañado (2020, p. 16) further argues “that elitism in CLIL is increasingly a thing of the past” in the current research agenda, Hu (2021) believes that the challenges posed by COVID-19 to foreign language education have necessitated the re-examination of elitism in CLIL application. In this sense, a critical view should be held, and whether CLIL should be selective or inclusive depends on certain educational contexts and even how teachers address learners’ different needs. This necessitates the organisation of empirical research in certain contexts to settle the highly context-dependent issue of elitism.

Method

Research Designs

This study was conducted in a particular Chinese higher educational provider, University X (pseudonym), which is famous for its CLIL programme integrating College English (CE), a compulsory course for undergraduates whose majors are not related to English studies, with American law. A sequential explanatory mixed-methods approach was employed in this study, including both quantitative and qualitative methods in order to answer the aforementioned research questions and offer “rich insights into various phenomena of interest that (could not) be fully understood using only a quantitative or qualitative method” (Liebenberg et al., 2015, p. 224).

From a total number of 85 students enrolled in this CLIL unit, 70 year-three students from the Faculty of Law were selected purposively with informed consent, and all the names appearing in this text are pseudonyms. They were selected based on the criteria that: First, they were not taking any other classes of English or American law other than this specific CLIL unit so that their academic progress could be largely attributed to the pedagogical approach used in this study; Second, they had not taken any courses related to American law before the study.

Based on the Grade Point Average (GPA) of previous English courses and law courses that the participants had completed, 38 participants were categorised into the less advanced group with relatively lower academic level (L-Group), and 32 participants were categorised into the more advanced group with higher academic performance (H-Group). Their GPA data were computed into Software Statistical Package for the Social Sciences (SPSS) 25.0. Based on the prerequisite that the Shapiro-Wilk test indicated the normal distribution of data for both the H-Group ($p > .05$) and the L-Group ($p > .05$), an independent samples t test was run, with descriptive and inferential data recorded in Table 1 and Table 2 respectively. It suggested that there was a significant statistical difference between the L-Group’s GPA ($M = 2.91$, $SD = .03$) with the H-Group’s ($M = 3.50$, $SD = .09$), $p < .001$, with the latter having higher academic proficiency than the former.

Table 1. Group Statistics of GPA

Group	N	Mean	Std. Deviation	Std. Error Mean
L	38	2.910	.033	.005
H	32	3.496	.086	.015

The participants were put into two classes taught by the same teacher to ensure that all of them were instructed by the most unified methodology. In the quantitative part of this study, two instruments were utilised to measure the participants’ English learning proficiency and content learning proficiency. The first one was College English Test Band-6 (CET-6), a standard nationalised test that could measure undergraduate students’ English proficiency of listening, speaking, reading and writing in a valid, reliable and fair way (Zheng & Cheng, 2008). It was organised as both pretest and posttest, the papers and booklets of which were adapted from authentic test batteries. The tests were scored by professionally trained examiners in accordance with official regulations and marking rubrics to ensure the assessment validity and reliability.

Table 2. Independent Samples Test of GPA

	Leven's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	9.844	.003	-38.826	68	.000	-.586	.015	-.616	-.556
Equal variances not assumed			-36.424	39.032	.000	-.586	.016	-.619	-.554

A pilot study completed before this research indicated that the CET-6 pretest and posttest instruments had an acceptable level of reliability. The Cronbach's alpha for the objective assessment of listening and reading pretest and posttest was .93 and .87 respectively. The Cohen's Kappa was .74 and .71 respectively for the subjective writing pretest and posttest and .77 and .76 for the subjective speaking pretest and posttest.

The second instrument was American Law Knowledge Test and Portfolio Task, which was developed by the teachers from the research site to measure students' content learning proficiency and consisted of both objective multiple-choice items and subjective case analyses. As the participants had not taken any courses about American law before this study, this instrument was only administered at the end of the research to measure their content knowledge proficiency. The pilot study suggested that both the objective (Cronbach's alpha = .83) and subjective (K = .79) assessment tasks had a reasonable level of reliability.

In the qualitative part, in order to collect evidence about the learning context in CLIL, non-participant observation as a "non-judgmental description of classroom events that could be analysed and given interpretation" (Gebhard, 1999, p. 35) was done to the CLIL classes with notes taken. 10 cases were evenly recruited from the L-Group and H-Group for more in-depth study, and the observation data were triangulated with the ones collected from semi-structured interviews with the selected cases to probe into the "subjects' opinions, beliefs and feelings about the situation in their own words" (Ary et al., 2010, p. 438).

Data Collection and Analysis

The study was conducted online when the participants had to take online classes because of the local recurrence of COVID-19. The university's temporary closure lasted for about over two months. The study began in early 2021 and lasted for 8 weeks until the lockdown was removed. Before the study, the English proficiency pretest had been organised on an online examination system with strict invigilation. The observation data were collected during the intervention. On the first week of students returning to campus, the English proficiency

posttest and content knowledge test were administered, and the selected cases were interviewed. The gathered quantitative data were then computed into SPSS 25.0, and both descriptive and inferential data analyses were done.

In original CET-6, the total score for listening, reading and writing is 710 marks with each of them occupying 35%, 35% and 30% respectively, and the speaking test weighs 15 marks and is scored separately. The raw data of each section as well as the total scores were kept in the following analysis. The American Law Knowledge Test and Portfolio Task weighs 100 marks in total, and in this paper, only the total scores were reported. The collected qualitative data were transcribed and input into NVivo 12.0, the thematic analysis of which followed Braun and Clarke's (2006) six-step framework of familiarising the data, generating initial codes, searching for themes, reviewing themes, defining themes and producing the report. Since the selected students used Chinese in the interviews, their responses were translated to English by professional translators who deployed the back-to-back translation technique devised by Sperber (2004).

Results and Discussion

Improved English Proficiency

The L-Group's ($n = 38$) and H-Group's ($n = 32$) pretest and posttest of English proficiency data were firstly analysed through independent samples t test based on the prerequisite that the Shapiro-Wilk test indicated that the data were normally distributed ($p > .05$). The descriptive and inferential data of t test can be seen in Table 3 and Table 4 respectively.

Generally, the t test of the pretest total score was statistically significant, with the H-Group ($M = 500.84$, $SD = 23.63$) reporting 41.02 points higher than the L-Group ($M = 459.82$, $SD = 12.48$), $p < .001$, two-tailed, $d = 2.23$. Similarly, there was also a significant statistical difference between the subgroups with respect to the listening ($p = .011$), reading ($p < .001$), writing ($p = .005$) and speaking ($p < .001$) performance in the pretest. This indicated that the H-Group had much higher level of English proficiency at the beginning of this study than the L-Group.

After the treatment of CLIL, the t test of posttest data was still statistically significant. In terms of the posttest total score, the H-Group ($M = 516.08$, $SD = 24.60$) reported 47 points higher than the L-Group ($M = 469.08$, $SD = 10.74$), $p < .001$, two-tailed, $d = 2.64$. Also, the H-Group had higher scores of listening ($p = .001$), reading ($p < .001$), writing ($p < .001$) and speaking ($p < .001$) than the L-Group in the posttest. This suggested that there was still a gap in language proficiency between the advanced learners and the less advanced ones after the intervention.

Table 3. Group Statistics of Pretest and Posttest

	Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest-Total Score	L	38	459.816	12.477	2.024
	H	32	500.844	23.629	4.177
Pretest-Listening	L	38	158.447	11.255	1.826
	H	32	166.5	14.613	2.583
Pretest-Reading	L	38	153.237	10.462	1.697
	H	32	173.297	7.748	1.370
Pretest-Writing	L	38	140.421	14.261	2.314
	H	32	151.625	17.837	3.153
Pretest-Speaking	L	38	7.711	0.913	0.148
	H	32	9.422	1.530	0.270
Posttest-Total Score	L	38	469.079	10.737	1.742
	H	32	516.078	24.603	4.349
Posttest-Listening	L	38	160.513	13.631	2.211
	H	32	172.188	13.920	2.461
Posttest-Reading	L	38	158	11.012	1.786
	H	32	176.906	8.405	1.486
Posttest-Writing	L	38	142.474	12.461	2.021
	H	32	157.063	18.555	3.280
Posttest-Speaking	L	38	8.092	0.761	0.124
	H	32	9.922	1.232	0.218

Table 4. Independent Samples Test of Subgroups' Pretest and Posttest

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower		Upper
Pretest-Total Score	Equal variances assumed	6.615	0.012	-9.284	68	.000	-41.028	4.419	-49.846	-32.210
	Equal variances not assumed			-8.839	45.179	.000	-41.028	4.642	-50.376	-31.680
Pretest-Listening	Equal variances assumed	2.805	0.099	-2.603	68	.011	-8.053	3.094	-14.226	-1.879
	Equal variances not assumed			-2.546	57.653	.014	-8.053	3.163	-14.386	-1.720
Pretest-Reading	Equal variances assumed	0.63	0.43	-8.968	68	.000	-20.06	2.237	-24.524	-15.596
	Equal variances not assumed			-9.198	66.98	.000	-20.06	2.181	-24.413	-15.707

	variances not assumed									
Pretest- Writing	Equal	0.691	0.409	-2.92	68	.005	-11.204	3.837	-18.860	-3.548
	variances assumed									
	Equal			-2.865	59.028	0.006	-11.204	3.911	-19.030	-3.378
	variances not assumed									
Pretest- Speaking	Equal	9.988	0.002	-5.785	68	.000	-1.711	0.296	-2.302	-1.121
	variances assumed									
	Equal			-5.551	48.699	.000	-1.711	0.308	-2.331	-1.092
	variances not assumed									
Posttest- Total Score	Equal	30	.000	-	68	.000	-46.999	4.416	-55.810	-38.188
	variances assumed			10.644						
	Equal			-	40.861	.000	-46.999	4.685	-56.462	-37.537
	variances not assumed			10.032						
Posttest- Listening	Equal	0.58	0.449	-3.535	68	.001	-11.674	3.302	-18.264	-5.085
	variances assumed									
	Equal			-3.529	65.497	.001	-11.674	3.308	-18.281	-5.068
	variances not assumed									
Posttest- Reading	Equal	0.082	0.775	-7.952	68	.000	-18.906	2.377	-23.650	-14.162
	variances assumed									
	Equal			-8.137	67.4	.000	-18.906	2.324	-23.544	-14.269
	variances not assumed									
Posttest- Writing	Equal	10.199	0.002	-3.913	68	.000	-14.589	3.728	-22.028	-7.149
	variances assumed									
	Equal			-3.786	52.654	.000	-14.589	3.853	-22.318	-6.860
	variances not assumed									
Posttest- Speaking	Equal	12.378	0.001	-7.599	68	.000	-1.830	0.241	-2.310	-1.349
	variances assumed									
	Equal			-7.309	49.812	.000	-1.830	0.250	-2.333	-1.327
	variances not									

assumed

Then, paired samples *t* tests with an α of .05 were run to examine the changes of English proficiency for each subgroup. For the L-Group, the data recorded in Table 5 indicated that there was a significant statistical difference between the pretest total score ($M = 459.82$, $SD = 12.38$) and posttest total score ($M = 469.08$, $SD = 10.74$), 95% confidence interval [-12.33, -6.19], $t(37) = -6.11$, $p < .001$, $d = .80$. Similarly, significant statistical difference between pretest and posttest could also be seen in the assessment of listening ($p = .015$), reading ($p < .001$), writing ($p = .001$) and speaking ($p < .001$). This revealed that the L-Group made considerable progress of English proficiency under the treatment of CLIL in the online context. Equally, for the H-Group, the inferential data in Table 6 indicated a statistically significant difference between the total score of pretest ($M = 500.84$, $SD = 23.63$) and posttest ($M = 516.08$, $SD = 24.60$), 95% confidence interval [-18.76, -11.71], $t(31) = -8.83$, $p < .001$, $d = .63$. In addition, a significant statistical difference could also be detected from the pretest and posttest scores of listening ($p < .001$), reading ($p < .001$), writing ($p < .001$) and speaking ($p < .001$), which demonstrated that the H-Group also made substantial progress in English learning with CLIL instructions.

Table 5. Paired Samples Test of L-Group's Pretest and Posttest

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Total Score	Pretest - Posttest	-9.263	9.345	1.516	-12.335	-6.192	-6.111	37	.000
Listening	Pretest - Posttest	-2.066	4.976	0.807	-3.701	-0.430	-2.559	37	.015
Reading	Pretest - Posttest	-4.763	5.883	0.954	-6.697	-2.830	-4.991	37	.000
Writing	Pretest - Posttest	-2.053	3.318	0.538	-3.143	-0.962	-3.813	37	.001
Speaking	Pretest - Posttest	-0.382	0.457	0.074	-0.532	-0.232	-5.151	37	.000

Table 6. Paired Samples Test of H-Group's Pretest and Posttest

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Total Score	Pretest - Posttest	-15.234	9.764	1.726	-18.755	-11.714	-8.826	31	.000
Listening	Pretest - Posttest	-5.688	3.724	0.658	-7.030	-4.345	-8.64	31	.000
Reading	Pretest - Posttest	-3.609	3.773	0.667	-4.970	-2.249	-5.411	31	.000
Writing	Pretest - Posttest	-5.438	6.582	1.164	-7.810	-3.065	-4.673	31	.000
Speaking	Pretest - Posttest	-0.5	0.440	0.078	-0.659	-0.341	-6.429	31	.000

Considerable Content Knowledge Proficiency

An independent samples *t* test was run to compare the content knowledge proficiency of the L-Group ($n = 38$) and H-Group ($n = 32$), with the descriptive data recorded in Table 7 and inferential data recorded in Table 8. Levene's test was non-significant ($p > .05$), indicating that the data were normally distributed. It is interesting to

note that although the average of content assessment for the H-Group ($M = 81.16, SD = 5.08$) was 1.72 points higher than that for the L-Group ($M = 79.44, SD = 3.93$), the t test was not statistically significant, $t(68) = 1.56, p = .123$, two tailed, 95% confidence interval $[-.48, 3.92]$, $d = .37$. This demonstrated that the L-Group's performance in content knowledge assessment was as good as the H-Group's at the end of this study. Based on the fact that all the learners had the same starting line of having little knowledge about the content subject prior to this study, the effect of CLIL on content learning could be considered to be equally positive for the participants who had rather differing academic proficiency.

Table 7. Group Statistics of Content Knowledge Assessment

Group	N	Mean	Std. Deviation	Std. Error Mean
H-Group	32	81.16	5.075	.823
L-Group	38	79.44	3.934	.696

Table 8. Independent Samples Test of Content Knowledge Assessment

	Leven's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	3.205	.078	1.562	68	.123	1.720	1.101	-.477	3.918
Equal variances not assumed			1.596	67.576	.115	1.720	1.078	-.431	3.871

A Differentiated and Inclusive Learning Context

The qualitative data suggested that differentiation, namely a teacher's responsiveness to learners' differing needs (Tomlinson, 2000), was a key feature of this online CLIL programme and that the teacher attempted to differentiate online teaching in various ways. The observation data firstly indicated that the content, namely "how the student (would) get access to the information" (Tomlinson, 2000, para. 2), was differentiated for the learners having differing levels of academic proficiency. Despite the routine lectures delivered by the classroom teacher with the aid of teacher-made PowerPoint slides that illustrated all the key language and content points, the H-Group and L-Group learners were also asked to prepare or given different learning materials for the class to achieve the same teaching objective of developing proficiency in both English and content knowledge. For instance, in the unit of Principles of American Law, the H-Group was required to read the first chapter of *An Introduction to American Law* written by Rosen et al. (2017), while the L-Group was asked to watch several videos which covered the same key points of learning (e.g., adversarial system, executive privilege, federalism, inquisitorial system) as the H-Group had but explained them in a more understandable way. Similarly, in the

unit of Criminal Law and Case Analyses, the learners were encouraged to search for different law cases that they were interested in and could understand and to bring their prepared materials to class for discussion.

Besides, the process, namely the activities in which students could engage “in order to make sense of or master the content” (Tomlinson, 2000, para. 3), was also differentiated. The classroom teacher often put students into different chatrooms on the online learning software and organised tiered activities in which all the learners worked with the same understandings but did it with different levels of support and scaffolding. An example here could be that in the unit of Criminal Law, both the H-Group and L-Group learners were required to analyse a larceny case to practice what they had learned previously. By dividing the students into different groups, the teacher could monitor their learning more efficiently and provide more scaffolding to those who had less strong academic competence. Meanwhile, students in the L-Group were given more time to finish this task, while some of the H-Group learners were given an additional case for analysis in order to well stretch them.

Another aspect of differentiation was that the learners having different levels of academic proficiency were allowed to complete differing projects to demonstrate what they had learned in this programme (Tomlinson, 2000). For example, the students were invited to present their understandings in any format, such as writing a case report or bibliography, doing a role playing between a suspect with a judge, recording a presentation, etc. When learners were allowed to decide on the formats of their assignment products, they could choose the one that they were confident with to apply what they had learned with the same ultimate learning objectives achieved.

Although the participants did not mention the term of differentiation in interviews, they did highlight how this online CLIL programme was different from other classes they were taking. Some learners from the H-Group considered this unit to be individualised. For example, Student Bai maintained:

We had different learning materials and tasks. For example, we were allowed to show our understanding of criminal law in many ways like role playing and presentation. This was different from other classes wherein we could only do the same learning tasks. I felt much engaged when I was given a choice for my own learning.

This was also acknowledged by Student Li who explained:

We had different learning paces and levels of proficiency in this class, and there was no one-size-fits-all teaching for all of us. However, the teacher gave us a great deal of autonomy for our own learning to make it personalised. I think this was where learning occurred.

The interviewees from the L-group gave higher praise to the differentiated instructions of this programme, and all of them noted that this programme had offered them more opportunities to learn efficiently in their own paces and learning styles. The excerpt from Student Zhao was a typical one:

I do not have outstanding academic performance. I was afraid at the beginning that this programme was only suitable for those overachievers, but later on, I realised that I could also make a progress

with the teacher providing different learning materials, processes and tasks to us...We were doing different things, but all of us were moving towards the same learning objectives...I could learn at my own pace, and indeed, I have learned a lot!

According to Devkota (2021), elitism in online learning amid COVID-19 could derive from the lack of instructional support for those disadvantaged learners, and this essentially reflects exclusion in education rather than inclusion and highlights the need to respect individual learner's needs, eliminate marginalisation and promote engagement (Loreman et al., 2011). When elitism tends to be the norm, low student achievement could be commonplace in online classrooms in the time of COVID-19 crisis (Beck & Beasley, 2020), and this could be the same case when language learners' needs could not be fully met by inappropriate instructions or pedagogical approaches (Mahyoob, 2020). Differentiation is inclusive in nature and facilitates inclusive education that engages "all learners by ensuring that each individual has an equal but personalised opportunity for learning...(and) aims at supporting educators to address the full range of learners' needs so as to overcome barriers to learning" (Boulkroun, 2020, p. 2104). Previous research findings indicate that differentiation has a positive effect on student achievement, either in on-campus education (Kotob & Arnouss, 2019) or in online learning (Beck & Beasley, 2020). This could be one of the reasons for learners' improvement in the studied CLIL programme. The implication drawn here is that when a teacher's instructions are well planned for learners having different levels of academic proficiency, the myth of elitism in online learning can be dispelled. Besides, this further reinforces that CLIL is a pedagogical approach that embraces the utilisation of different instructional techniques (Coyle et al., 2010) and that when learners' needs are well taken into account and addressed by teachers, the elitist view towards CLIL could also be abandoned.

An Authentic and Meaningful Learning Context

Despite an inclusive approach to online learning, the learners' progress in language learning could not be separated from the authentic and meaningful context that the teacher created, one key feature of which was an abundant amount of comprehensive input. Observation data showed that a wide variety of authentic learning materials were provided, such as TV programmes, journal articles, books, newspaper articles, video clips, etc. All the materials were updated and prepared by both the teacher and the students themselves. The participants involved in the interview also acknowledged that it was these authentic instruction materials that facilitated their learning. For example, Student Wang from the H-Group said:

Learning materials are important, and our teacher mentioned that we needed somewhat new learning materials except for traditional textbooks. Thus, he often prepared some updated materials for us, such as news articles and videos, and sometimes required us to collect materials for the class...These materials are our likes and interests...I think they did provide us with a meaningful learning context with a lot of authentic input.

This was also acknowledged by Student Hu from the L-Group, who maintained:

I like the learning materials...They are more interesting and meaningful than old-fashioned textbooks.

They rightly offered me a chance to acquire the language closely related to my field of study and interest... I am sure that my English has improved a lot with so much input.

Student Liu from the same group also highlighted the role that meaningful materials and input played in facilitating online English learning. Comparing the English courses, she had taken before, she asserted:

In previous English classes, we used old textbooks a lot and found it useless and boring to learn the language that we would never use in our life. However, in this class, we have used a lot of meaningful learning materials, such as articles and audio-visual materials...I must say these learning materials and input did help me a lot with my English.

Moreover, learners were offered a variety of opportunities and activities to practice English and apply what they had learned, such as oral presentation, case analyses, debate, role playing, etc. This indicated that this CLIL programme was also rich in comprehensive and authentic output. The interviewees further confirmed that it was these various output tasks that facilitated their learning. For instance, Student Wu from the H-Group rated these activities highly and asserted:

These activities are different from the tedious drills we used to do in English textbooks, such as multiple-choice questions and form filling which were closely related to what we had learned about the language but not connected with my major or life. But the output activities in this unit are colourful so that I could apply what I had learned in a meaningful context related to my major.

Similarly, Student Zhao from the L-Group also praised the diverse output activities as one of the key motivators for learning, maintaining:

I can practice what I have learned in many different kinds of speaking and writing activities, and they have presented a valuable context related to my field of study in university. In this case, I feel more engaged in and motivated for learning.

This was also acknowledged by Student Liu from the same group, who believed:

The various output activities have helped me improve my language proficiency. In the process of output, I could receive feedback on my learning from my teacher and classmates...I also feel more confident thanks to the opportunities to experiment with language in different activities.

Krashen (1985) suggests that learners could make progress in language acquisition through exposure to comprehensive input, and in his Input Hypothesis, he assumes that if a learner's current language level is regarded as 'i', acquisition occurs when they are exposed to abundant, comprehensive and natural input which contributes to level 'i + 1'. From this perspective, the productive effects of CLIL on language proficiency could be explained by the assumption that this pedagogical approach provides not only the exposure to the target language (TL) but also a quality one. This is described by Mehisto et al. (2008, p. 26) as that the natural use of language "replicates the conditions to which infants are exposed when (acquiring) their first language". Krashen (1985) also assumes that since all the learners may not be at the same level of linguistic competence, natural

input is necessary to ensure that each learner could receive some ‘i + 1’ input that is suitable for their current ‘i’ level. Again, this reflects that CLIL is characterised by the natural input of language, which is meaningful and relevant for the learners. In this sense, “language acquisition could run its course naturally under meaningful and...positive conditions” (Dalton-Puffer, 2007, p. 259). In the meanwhile, a differentiated approach to input is also activated in CLIL, which reflects Roiha’s (2014) idea that differentiated CLIL is important for both academically strong and weak students in order to achieve the anticipated learning outcomes.

Language input is interwoven with language output (Saville-Troike, 2012), and in the Output Hypothesis, Swain (1985) assumes that the opportunities to produce language are highly valuable, which could help learners enhance language proficiency, gain feedback on their language accuracy, experiment with language structures and improve metalinguistic awareness. According to Meyer (2013, p. 301), “task design is at the heart of every CLIL lesson”, and output is triggered by meaningful activities that could allow learners to use language in an engaging manner. This is in line with Muñoz’s (2007, p. 20) argument that CLIL “learners should have numerous and varied opportunities to speak and write in different contexts and with different aims”, and “to achieve this, activities and teaching methods have to be adapted to the needs and interests of the learners...(and) be meaningful.” Thus, it could be said that the studied CLIL programme was well designed with a variety of learning tasks that invited learners to produce output by stimulating the use of the TL and providing learners with ample opportunities to communicate in the TL, do written practice and receive feedback. These indicators reflected effective teaching performance in a CLIL classroom (de Graaff, Koopman et al., 2007). Also, the different output activities allowed of the differentiation of products created by learners to demonstrate their levels of mastery of the learning content, and this could be an effective way for teachers “to meet students’ needs in a mixed-level classroom” (Chien, 2012, pp. 281-282).

Additionally, the positive content learning outcomes cannot be separated from the discussion of interdisciplinary teaching, which “refers to the coming together of two or more subject areas...without unduly disturbing subject area boundaries” (Kansas State Board of Education, 1995, p. 40). Some participants mentioned in the interviews that the combination of CE with law had greatly triggered their interest in the subject area. For example, Student Huang from the H-Group claimed:

We regard this programme as a legal English one, and indeed, the teacher has placed lots of emphasis on English teaching. However, we have also gained a lot of knowledge about American law. I mean, content learning is not at the cost of language learning...Such a combination is interesting, and I can always find a purpose to learn the language and the content.

This view was also confirmed by Student Liu in the L-Group, who believed:

I feel more motivated to learn. Law, which is my major, provides a meaningful context for me to develop my English proficiency. This combination is much better than isolation. Although the teacher has focused on English, content learning has also occurred effectively and naturally.

It is interesting to note that some interviewees mentioned that this CLIL programme was language-driven, and

this was also found in classroom observation which demonstrated that the proportion of language learning outweighed that of content learning in the manner that the teacher had mostly used the content subject to theme CET. This reflects the view that although CLIL has a dual focus in nature, there could be different levels of emphasis on language and content in practices (Coyle et al., 2010). However, content learning was not at the expense of language learning. Instead, both quantitative and qualitative data showed that the participants were engaged in the learning of subject content. This could be explained from the perspective of cross-curricular teaching, which could provide “a meaningful way in which students (could) use knowledge learned in one context as a knowledge based in other contexts” and enable them “to apply, integrate and transfer knowledge” (Darn, 2006, p. 2). This is in line with Aslan’s (2016, p. 1798) assumption that when language is combined with any other subject area in a meaningful and thematic way, learners would be invited to “acquire, communicate and investigate worthwhile knowledge in depth”, “apply what they learn in meaningful and ‘real world’ contexts” and “participate and learn regardless of ability”.

Harrop (2012) as well as many other scholars (Coyle et al., 2010; Hüttner & Smit, 2014) states that CLIL is an entitlement for learners of all abilities and explains this from the perspective of the relationship between language and content as well as the ‘double processing’ in CLIL. First of all, the fact that CLIL has a dual focus on both content and language renders the relationship between them transparent to teachers and learners. “Language is seen as a tool for learning and one that needs scaffolding and progression as much as content” (Harrop, 2012, p. 64). In this regard, CLIL brings to light the language issues in the subject area in a manner that is frequently overlooked in subject area education, facilitating teachers’ awareness of learners’ needs and effective instructional practices to ensure comprehension (Harrop, 2012). According to Lasagabaster (2008), this approach could address inclusion and equity in education, and if education is regarded as language socialisation of learning, CLIL could also have a potential social equalising effect. Secondly, the ‘double processing’, which “refers to how CLIL learners process speech in a foreign language in order to take in new information while at the same time integrating the new knowledge in an existing corpus” (Harrop, 2012, p. 64), helps learners to engage more actively with the learning materials to overcome linguistic barriers and deepen understanding of content knowledge (Dalton-Puffer, 2007). In this sense, CLIL has the potential to achieve language and content learning for all in a context that both language development and content development are scaffolded as much as possible. For learners of differing capabilities, the learning outcomes may be different, while they are generally positive and reflect inclusion in education.

Limitation

A major limitation of this study is that it only presented a small picture of the studied CLIL programme. Within the border of Chinese academia, Hu (2021) asserts that any CLIL study should involve the examination of performance evidence, affective evidence, process evidence and materials and task evidence to extend the scope of the CLIL research agenda and deepen the understanding of CLIL application. This idea is in line with the one put forward by Coyle et al. (2010) who argue that the lack of any type of evidence from research may create suspicion about the effectiveness of CLIL. However, the study presented in this paper only focused on

performance evidence with respect to learners' language and content learning proficiency and learning process evidence integrated with some materials and task evidence, with affective evidence characterised by learners' emotions under CLIL instructions excluded from the research. In this sense, it cannot be said that this study was comprehensive enough, and more thorough research designs should be taken into account in future studies to collect and examine a wider range of empirical evidence.

Conclusion

The inspiring findings generated from this study that learners of different academic abilities made remarkable achievements both in language and content learning in an online CLIL context shed light on the evidence against an elitist view to online learning and CLIL and establish some proof for the possibility to include and engage all learners in the classroom. At least from this study, it can be concluded that CLIL has the potential to benefit all learners and that when special attention is paid to their different needs and levels of learning, inclusion can be achieved. This offers some implication, especially to educators, that their teaching practice can have a substantial role to play in facilitating effective learning and inclusive education for all. However, a critical view should be held towards elitism either in online learning or CLIL, as this study was organised only in a specific educational context, out of which there may be rather different findings and implications. Elitism is a complex issue either in general education or language education. More empirical research studies in various educational contexts are in need to further approve of elitism or dispel it with evidence to be established on any possible effects that teaching exerts.

A final note of this paper is that in the time of COVID-19 crisis, students may have interrupted learning experiences. This is still the case in many parts of the world which are still suffering from this pandemic. When disadvantaged learners who are experiencing more barriers to learning than their advanced peers cannot receive the support they need, the disadvantage gap between them may widen. However, differentiation is the key to effective and inclusive learning, and the implication drawn from the research findings is that when teaching instructions are well organised and implemented in response to learners' different needs in a heterogeneous class, all of the students, whether they are academically strong or not, can be embraced, developed, supported and inspired to be their best with an equal chance to succeed in online learning.

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Individual-Intellectual Integrations on the Commonality Criterion in Russian Undergraduates

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Abstract: The commonality is one of underlying conditions that provide the individual-intellectual integrations. Three forms identify the commonality. The first is the causal commonality, the second is the generalizing commonality, third is the intertwining commonality. Confirmatory one- and two- factor analysis (CFA) and path analysis (PA) specified the operationalization of the commonality. 235 undergraduates at universities in Perm city (Russia) involved in this study. Participants were 178 women and 57 men, age 17 to 22 years ($M = 18.61$, $SD = 0.88$). The set of variables entered individuality traits (nervous system, temperament, and personality), fluid and crystallized intelligence, and creativity. The main results were as follows. (1) The variables of individuality provide individual-intellectual integrations and function as the causal commonality. (2) Variables of individuality and creativity provide individual-intellectual integrations and function as two forms of causal commonality. (3) The generalizing commonality did not arise by means of one- or two- factor CFA. (4) The intertwining commonality of the variables of individuality and the variables of intelligence and creativity has not found empirical support by means of PA. The recommendation proposes that although constructs of individuality and intelligence with creativity differ, researchers may apply to the commonality criterion.

Keywords: Individual-intellectual integrations, Commonality, Causal commonality, Generalizing commonality, Intertwining commonality

Introduction

The Commonality Criterion

Educational research is often relying on several and various theories (Fleenor & Eastman, 1997; Furnham,

Monsen & Ahmetoglu, 2009; Kokkinos, 2007; Wilson, Woolfson, Durkin & Elliott, 2016; Van der Zee, Thijs & Schakel, 2002). Scholars incline to cover the issue from distinguishing viewpoints. However, this approach is not without drawbacks, because their common basis skips. To solve this theoretical clash, of particular attention is the commonality criterion.

The commonality criterion assumes the opportunity to integrate theories according to some systemic options, namely, system—subsystem, system—system, intertwining systems. The first option suggests that one theory embeds another theory similar to a common includes its part. The second option proposes that several theories relate as a whole and a whole. Then they come to a new commonality that is rather wider than theories apart. Finally, the third option considers each theory simultaneously as an independent system and as a subsystem of another theory. Thus, each theory functions both the system and the subsystem of another theory. In doing so, they intertwine.

Further, the system—subsystem option can be a basis to combine theories like a causal commonality. It means that one theory enables changes in another theory and the latter relies on the former. The system—system option implies that theories are functionally equivalent. Initially, they differ but there is a higher, broader and abstract level at which they generalize. One can entitle this level as the generalizing commonality. The intertwining systems option suggests that theories intersect. Then the intertwining commonality can arise.

Confirmatory factor analysis (CFA) and path analysis (PA) can operationalize the commonality criterion, thereby transferring it from a theoretical reasoning to an empirical form. The three empirical forms of commonality give rise.

One-factor CFA can detect the causal commonality this way. In a latent factor, the factor loadings of variables that identify one theory (“system 1”) are significant and highest whereas the factor loadings of variables that identify another theory (“system 2”) are moderate or small. Then, the factor loadings of the system 1 are markers of the latent factor. They indicate the “causal” commonality for systems 1 and 2.

One-factor CFA can also detect the generalizing commonality. Imagine that the factor loadings of variables that identify one and another theory (“system 1” and “system 2”) are equal approximately. Then the latent factor explains their similar variance. Apparently, the factor loadings of variables that identify the systems 1 and 2 indicate the generalizing commonality. The latter appears beyond the factor loadings but may explain them. There are no clear rules to compare statistically the amount of factor loadings. Meanwhile the “rule of thumb” (e.g., the Chaddock scale) would help.

Two-factor CFA can detect the causal commonality and generalizing commonality to some extent of other way. In one latent factor, the factor loadings of variables mark the system 1 and the factor loadings of variables mark the system 2 in another latent factor. Then the “causal” commonality looks two-fold. The both systems produce investments to “causal” commonality. The generalizing commonality adds to the causal commonality if the

latent factors correlate. As a result, the causal commonality and the generalizing commonality supplement each other.

PA can detect the intertwining commonality. Some variables of the system 1 look as exogenous variables; they pass to some variables of the system 2 as endogenous variables. Conversely, some variables of the system 2 look as exogenous variables; they pass to some variables of the system 1 as endogenous variables. The same variable cannot be either exogenous or endogenous. Exogenous or endogenous function should not coincide. Then the variables of the systems 1 and 2 intertwine but their mix does not arise.

Individual-Intellectual Integrations

Psychologists attempted repeatedly to study the relationship of different features in respect with to the human mind and behavior. For example, they have studied how personality traits enable intelligence and creativity (Baker & Bichsel, 2006; Chang, Peng, Lin & Liang, 2015; Furnham & Nederstrom, 2010; Moutafi, Furnham & Crump, 2006; Moutafi, Furnham & Paltiel, 2005; Rammstedt, Lechner & Danner, 2018; Simon, Lee & Stern, 2020). Another area is to examine how personality traits and intelligence make investments in creativity (Batey, Chamorro-Premuzic & Furnham, 2009; Batey, Furnham & Safiullina, 2010; Furnham & Bachtiar, 2008). Of particular attention are promotions of intelligence and creativity on personality traits (Furnham & Cheng, 2017; Furnham & Treglown, 2018; Gorgol, Stolarski & Matthews, 2020). In fact, scholars studied the relationships of several systems (personality traits, intelligence, and creativity), but they did not produce correlations according to the commonality criterion. Researchers initially set the direction of the relationship, a priori assuming which of the systems was the cause and which was the effect. The commonality criterion though can cover this gap.

Three theories arise as integrable on the commonality criterion. V. S. Merlin's theory of integral individuality (Merlin, 1986), D. V. Ushakov's structural-dynamic theory of intelligence (Ushakov, 2003, 2011), and J. Guilford's theory of divergent (creative) thinking (Guilford, 1967). Russian famous psychologist V. S. Merlin has developed the theory of individuality as a hierarchical system. In particular, it entered the levels of the nervous system, temperament and personality (Merlin, 1986). To some extent, this approach is similar to that personality trait theorists developed (DeYoung, 2015; McAdams, Pals, 2006; McCrae, Costa, 2008). Crystallized and fluid intelligence gives rise of the structural-dynamic theory of D. V. Ushakov. Fluency, flexibility, and originality indicate divergent thinking by J. Guilford (1967).

Research Hypotheses

The theoretical analysis of the commonality criterion and its operationalization arrived at the following research hypotheses.

1. An integral individuality can parsimoniously represent through a part of its variables with the most loadings.
2. In one-factor CFA of individuality, intelligence and creativity variables, the individuality variables

bring the highest factor loadings.

3. In one-factor CFA, the variables of individuality, intelligence and creativity have approximately equal factor loadings.
4. In two-factor CFA, individuality variables enter one latent factor, and variables of intelligence and/or creativity another latent factor. These latent factors correlate.
5. Path analysis shows that there are polymorphic relationships between the variables of individuality with the variables of intelligence and creativity. Then the intertwining commonality appears.

Method

Participants

The study involved 235 students of higher educational institutions of Perm city (Russia), studying in the fields of humanities. Participants were 178 women and 57 men, age 17 to 22 years ($M = 18.61$, $SD = 0.88$). The gender composition in the sample reflects the gender ratio in the humanity area of universities.

Measures

Individuality Traits

The Pavlovian Temperament Survey (Strelau, Angleitner, & Newberry, 1999; Russian adaptation: Danilova & Shmelev, 1988) indicated the nervous system traits. The survey includes the following scales: Strength of excitation, Strength of inhibition, and Mobility of nervous processes.

The Formal Characteristics of Behaviour – Temperament Inventory (Strelau & Zawadzki, 1995); Russian adaptation: Strelau et al., 2009) indicated the temperament traits. The inventory includes the following scales: Briskness, Perseveration, Sensory sensitivity, Emotional reactivity, Endurance, and Activity.

The Big Five Inventory-2 (Soto & John, 2017; Russian adaptation: Shchebetenko et al., 2020) indicated the personality traits. The inventory includes the following scales: Extraversion, Agreeableness, Conscientiousness, Negative emotionality, and Open-Mindedness.

Intelligence

Raven's Progressive Matrices intended to measure the fluid intelligence (Raven, Raven, Court, 2012). A common scale was in use.

The Universal intelligence test (Baturin & Kurganskiy, 1995) intended to measure the crystallized intelligence. The subscales were as follows: Awareness, Missing words, Comprehensibility, Analogies, Inferences, and Word learning. The results of these subscales were summing up and a common scale indicated the above subscales.

Divergent (Creative) Thinking

Alternate Uses test (Wallach & Kogan, 1965; Russian adaptation: Averina, Shcheblanova, 1996) intended to measure divergent thinking. Three scales were calculating: Fluency, Flexibility, and Originality.

Data Analysis

PA, CFA, and principal component analysis (PCA) detected the integrations of individuality, intelligence, and creativity variables on the commonality criterion. PCA reduced the individuality variables to their small number with high loadings.

One-factor and two-factor CFA detected the causal and generalizing forms of commonality. The one-factor CFA intended to define a latent factor and manifest variables of individuality, intelligence, and creativity. The two-factor CFA intended to define two latent factors. The manifest variables of individuality suggested to engage in the first latent factor and the manifest variables of intelligence and creativity to engage in the second latent factor.

PA intended to define the intertwining commonality. Three models were in use. In the first model, the paths passed from the individuality variables (using the entire set, not a reduced one) to variables of intelligence and creativity. In the second model, paths passed from intelligence and creativity to individuality variables. Finally, the third model entered a combining model that included the first and second models under condition exogenous and endogenous variables do not coincide.

To assess the fit of CFA and PA models with empirical data, the following fit indices were in use: chi-square statistics, ratio of chi-square statistics to degrees of freedom (χ^2/df), comparative fit index (CFI), and root mean square error of approximation (RMSEA).

The data were preliminarily standardizing and converting into T-scores ($M = 50$, $SD = 10$). The SPSS Statistics v. 27 and SPSS AMOS v. 27 of IBM Corporation provided data processing.

Results

PCA of Individuality Variables

The PCA indicated one component with loadings of individuality variables. Table 1 shows the results of the PCA.

Table 1. Principal Component Analysis of Individuality Variables

Individuality variables	Component 1
Strength of excitation	.86
Briskness	.81
Extraversion	.78
Negative emotionality	-.77
Mobility of nervous processes	.76
Emotional reactivity	-.75
Endurance	.67
Activity	.67
Perseveration	-.62
Strength of inhibition	.47
Agreeableness	.46
Conscientiousness	.43
Open-Mindedness	.42
Sensory sensitivity	.22
Eigenvalue	5.88
Explained variance (%)	41.99

Note: variables arrange on loading magnitude.

Loadings ranged from .22 to .86. For further analysis, 4 variables with the highest loadings and reflecting different levels of individuality took into account: Strength of excitation (nervous system), Briskness (temperament), Extraversion and Negative emotionality (personality).

Factor scores detected each respondent. The correlation of entire set (14 variables) and the set that decreased (4 variables) of individuality variables was $r = .96, p < .001$.

Causal and Generalizing Commonality

The factor loadings of individuality, intelligence, and creativity variables entered a one-factor CFA (Table 2). The model included residual covariance: Extraversion—Crystallized intelligence, Fluid Intelligence—Crystallized intelligence, Crystallized Intelligence—Flexibility, Fluency—Originality, Fluency—Flexibility, and Originality— Flexibility.

Table 2. Factor Loadings of Individuality, Intelligence, and Creativity in One-Factor CFA Model

Variables of individuality, intelligence, and creativity	Factor 1
<i>Individuality</i>	
Strength of excitation	.86***
Briskness	.78***
Extraversion	.81***
Negative emotionality	-.67***
<i>Intelligence</i>	
Fluid intelligence	.11
Crystallized intelligence	.05
<i>Creativity</i>	
Fluency	-.01
Originality	.05
Flexibility	.07

Note: *** p < .001.

The individuality variables had all significant loadings in the factor: Strength of excitation (.86), Briskness (.78), Extraversion (.81), and Negative emotionality (-.67). The variables of intelligence and creativity were non-significant: Fluid intelligence (.11), Crystallized intelligence (.05), Fluency (-.01), Originality (.05), and Flexibility (.07). Table 5 summarizes the fit indices. Figure 1 shows a diagram of the model.

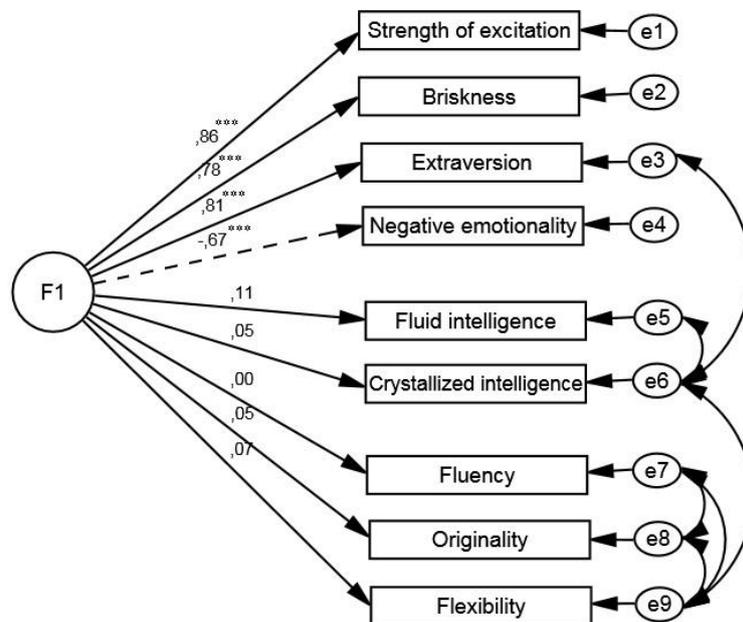


Figure 1. The One-Factor CFA Model

Note: continuous lines with arrows – paths with significant positive coefficients; discrete lines with arrows – paths with significant negative coefficients; continuous arcs with arrows – significant positive covariance between residuals;

*** $p < .001$.

The fit indices of the one-factor model indicated its fit with empirical data: $p(\chi^2) > .05$, $\chi^2 / df < 2$, CFI $> .95$, RMSEA $< .05$. The one-factor model emphasizes that the traits of individuality can function as the causal commonality in individual-intellectual integrations.

A two-factor CFA model (M_2) detected two latent factors. One latent factor included variables of integral individuality with most significant loadings. The manifest variables consisted of Strength of excitation (.85), Briskness (.80), Extraversion (.81), and Negative emotionality (-.66). Another latent factor included variables of creativity with most significant loadings. The manifest variables consisted of Fluency (.81), Originality (.98), and Flexibility (.92). The intelligence variables were non-significant: Fluid intelligence (.05) and Crystallized intelligence (.06). The model entered residual covariance: Briskness—Crystallized intelligence, Extraversion—Crystallized intelligence, Fluid intelligence—Crystallized intelligence, Crystallized intelligence—Flexibility. Latent factors did not correlate (Table 3). Table 5 shows the fit indices of the M_2 model. Figure 2 shows a diagram of the model.

Table 3. Factor Loadings of Individuality, Intelligence, and Creativity in The Two-Factor CFA Model

Variables of individuality, intelligence, and creativity	Factor 1	Factor 2
<i>Individuality</i>		
Strength of excitation	.85***	
Briskness	.80***	
Extraversion	.81***	
Negative emotionality	-.66***	
<i>Intelligence</i>		
Fluid intelligence		.05
Crystallized intelligence		.06
<i>Creativity</i>		
Fluency		.81***
Originality		.98***
Flexibility		.92***

Note: *** $p < .001$.

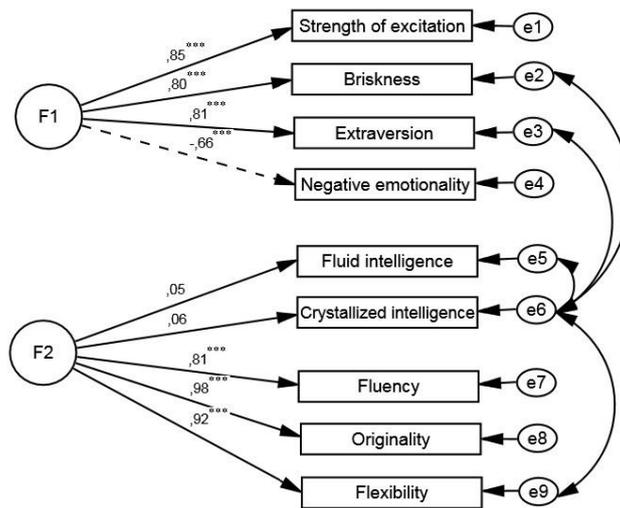


Figure 2. The Two-Factor CFA Model

Note: continuous lines with arrows – paths with significant positive coefficients; discrete lines with arrows – paths with significant negative coefficients; continuous arcs with arrows – significant positive covariance between residuals;

*** $p < .001$.

The fit indices of the two-factor model indicated its fit with empirical data: $p(\chi^2) > .05$, $\chi^2 / df < 2$, CFI $> .95$, RMSEA $< .05$. The two-factor model emphasizes that the traits of individuality and creativity function as two forms of the causal commonality in individual-intellectual integrations. The intelligence variables removed from a refining two-factor CFA model (M_3) because they received low and non-significant loadings in the second factor (Table 4).

Table 4. Factor loadings of the refining two-factor CFA model

Variables of individuality, intelligence and creativity	Factor 1	Factor 2
<i>Individuality</i>		
Strength of excitation	.84***	
Briskness	.80***	
Extraversion	.81***	
Negative emotionality	-.67***	
<i>Creativity</i>		
Fluency		.81***
Originality		.98***
Flexibility		.92***

Note: *** - $p < .001$.

The manifest variables of the first latent factor represented individuality traits with significant loadings: Strength of excitation (.84), Briskness (.80), Extraversion (.81), and Negative emotionality (-.67). The creativity variables received significant loadings in the second factor: Fluency (.81), Originality (.98), and Flexibility (.92). Entirely, the loadings of the manifest variables in the M_3 model did not differ from the loadings of the manifest variables in the M_2 model. The exception was in that of a Strength of excitation loading slightly reduced (-.01) and a Negative emotionality loading slightly increased (.01). Table 5 shows the fit indices of the M_3 model. Figure 3 shows a diagram of the model.

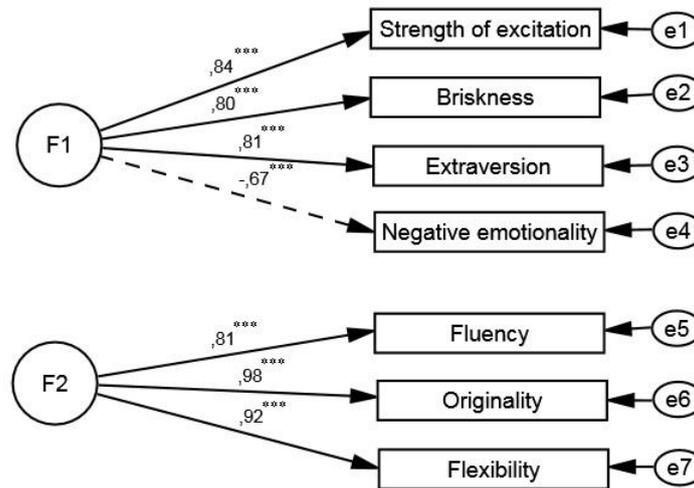


Figure 3. The Refining Two-Factor CFA Model

Note: continuous lines with arrows – paths with significant positive coefficients; discrete lines with arrows – paths with significant negative coefficients; continuous arcs with arrows – significant positive covariance between residuals;

*** $p < .001$.

The fit indices of the refining two-factor model indicated its fit with empirical data: $p(\chi^2) > .05$, $\chi^2 / df < 2$, CFI $> .95$, RMSEA $< .05$. The refining two-factor model emphasizes that the traits of individuality and creativity function as two forms of the causal commonality in individual-intellectual integrations.

The results showed that the latent factors did not significantly correlate ($r = .05$, $p > .05$), and their common factor did not arise (no general variance of primary latent factors appeared).

Intertwining Commonality

Testing the fifth hypothesis involved three stages. First, the model of paths (M_4) from individuality to intelligence and creativity arose. The significant paths passed from Strength of excitation to Crystallized intelligence ($\beta = .25$; $p < .001$), from Emotional reactivity to Flexibility ($\beta = -.07$; $p < .01$), from Extraversion to Crystallized intelligence ($\beta = -.25$; $p < .001$), from Agreeableness to Fluid intelligence ($\beta = .13$; $p < .05$), from

Agreeableness to Flexibility ($\beta = -.09$; $p < .001$), and from Conscientiousness to Crystallized intelligence ($\beta = -.17$; $p < .01$). Table 5 shows the fit indices of the M_4 model.

Second, the model of paths (M_5) from intelligence and creativity passed to individuality variables. The paths were significant from Crystallized intelligence to Strength of excitation ($\beta = .16$; $p < .001$), from Flexibility to Emotional reactivity ($\beta = -.30$; $p < .001$), and from Originality to Emotional reactivity ($\beta = .27$; $p < .01$). Table 5 shows the fit indices of the M_5 model.

Third, the model (M_6) of intertwining commonality indicate polymorphic paths. They passed from Extraversion to Crystallized intelligence, from Agreeableness to Fluid intelligence and Flexibility, from Conscientiousness to Crystallized intelligence, and back from Originality to Emotional reactivity. Fig. 4 illustrates the polymorphic paths.

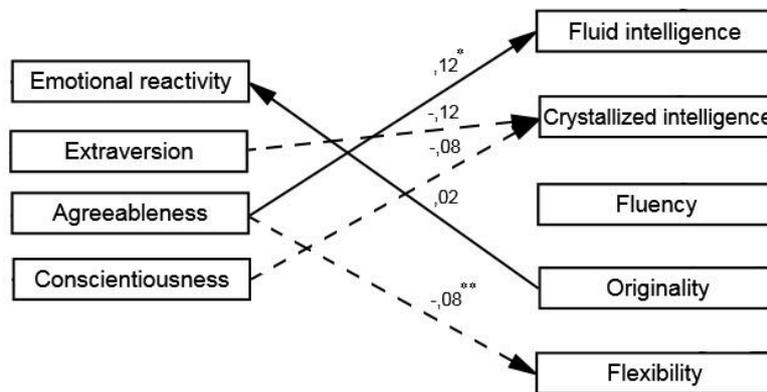


Figure 4. The path model of intertwining variables

Note: continuous lines with arrows – paths with significant positive coefficients; discrete lines with arrows – paths with significant negative coefficients; covariance between variables and residuals skip;

* - $p < .05$.

The fit indices of the path model of intertwining variables indicated its fit with empirical data: $p(\chi^2) > .05$, $\chi^2 / df < 2$, CFI $> .95$, RMSEA $< .05$.

The paths were non-significant from Extraversion to Crystallized intelligence ($\beta = -.12$; $p > .05$), from Conscientiousness to Crystallized intelligence ($\beta = -.08$; $p > .05$) and from Originality to Emotional reactivity ($\beta = .02$; $p > .05$). The paths were significant from Agreeableness to Fluid intelligence ($\beta = .12$; $p < .05$) and from Agreeableness to Flexibility ($\beta = -.08$; $p < .01$). Because the significant paths from individuality to intelligence and creativity remained, but from intelligence and creativity to individuality were non-significant, the intertwining of variables by polymorphic kind did not acknowledge. Table 5 shows the fit indices of the M_6 model.

Table 5. Fit Indices of Models

Model	χ^2	df	p	χ^2 / df	CFI	RMSEA
M ₁ . The one-factor CFA model	27.2	21	.164	1.30	.99	.036
M ₂ . The two-factor CFA model	22.1	23	.515	0.96	1.00	< .001
M ₃ . The refining two-factor CFA model	12.5	14	.565	0.89	1.00	< .001
M ₄ . The path model from individuality to intelligence and creativity	362.9	172	< .001	2.11	.93	.069
M ₅ . The path model from intelligence and creativity to individuality	388.8	176	< .001	2.21	.92	.072
M ₆ . The path model of intertwining variables	30.9	20	.057	1.54	.99	.048

Note: χ^2 – chi-square statistic; df – degrees of freedom; p – significance level; χ^2 / df – relative chi-square; CFI – Comparative fit index; RMSEA – Root mean square error of approximation

Discussion

Testing the first hypothesis showed that the most loadings of individuality variables can parsimoniously identify the individuality. The high correlation of the entire and decreasing set of individuality variables supports this assumption. In doing so, the decreasing set of variables refers to all the levels of individuality, namely, nervous system, temperament, and personality.

Testing the second hypothesis supported the assumption that in one-factor CFA of individuality, intelligence, and creativity the individuality variables received the most factor loadings. These data point to the individual-intellectual integrations under guidance of the individuality. The term "individual-intellectual integration" reveals the meaningful relationships of the traits of individuality, intelligence, and creativity. In the first approximation, they indicate the causal commonality.

The third hypothesis, that in one-factor CFA the variables of individuality, intelligence, and creativity have approximately equal factor loadings, have not received empirical support. This may mean that individuality, intelligence and creativity are not functionally equal and do not suggest the generalizing commonality.

The fourth hypothesis, that in two-factor CFA individuality variables enter one latent factor, and variables of intelligence and/or creativity enter another latent factor, has received empirical support. Indeed, results were consistent with above hypothesis. Individuality variables initiated the first latent factor. They suggest the causal commonality under guidance of the individuality. In turn, creativity variables initiated the second latent factor. They suggest the causal commonality under guidance of the creativity. However, these latent factors did not significantly correlate, and a common factor combining them did not arise. This means that two forms of the

causal commonality have received empirical support although their common factor did not appear. That is, the two-factor CFA was poor to find the generalizing commonality. Nevertheless, other criteria permit to get evidences in favor of the generalizing commonality in individual-intellectual integrations. For instance, the mediation criterion indicates that the generalizing commonality can still arise due to mediating links between the variables of individuality and creativity (Dorfman, Kalugin, 2021).

The fifth hypothesis that there are polymorphic relationships between the variables of individuality and the variables of intelligence and creativity has not received empirical support on our data. However, the model was statistically fit. This may mean that with a different set of variables of individuality, intelligence, and creativity, their intertwining could occur.

Conclusions and Limitations

The above results permit to come to the following conclusions.

1. Individuality variables provide individual-intellectual integrations and, in this capacity, function as the causal commonality.
2. Variables of individuality and creativity provide individual-intellectual integrations and, in this capacity, function as two forms of causal commonality.
3. The assumption of the generalizing commonality did not receive empirical support neither by one-factor nor two-factor CFA.
4. The assumption of the intertwining commonality by a polymorphic kind did not receive empirical support in respect with the variables of individuality and the variables of intelligence and creativity.

This study has some limitations. In particular, a set of individuality variables derives from different theories. They can introduce an eclectic and lead to statistical errors. For example, it is questionable about using a survey to measure traits of the nervous system. Similar doubts can emerge when the personality studies depart from the trait theory because it does not propose to make clear distinction between personal and temperamental traits. Likewise, the Raven test intends to measure the fluid intelligence whereas the questionnaire of Baturin and Kurgansky intends to measure the crystallized intelligence. The creative thinking takes into account divergent thinking by Guildford but other approaches to creativity are withdraw. Being aware of these clashes, the authors are cautious about the empirical data they received and try not drastic to reject the theoretical assumptions, even if currently their empirical support is outside.

For example, the generalizing commonality of individuality variables and the variables of intelligence and creativity by polymorphic kind suggests receiving the empirical support if the set of variables change. Besides, turning the view can enable to bring a predictable effect. Dorfman and Kalugin (2021) applied the mediation criterion. They found that the generalizing commonality of individuality variables and the variables of intelligence and creativity by polymorphic kind receive the empirical support through the mediation links.

Recommendations

The commonality criterion permits to identify the relationships between constructs that come from different theories. The commonality opens up the ways to find their relationships at the theoretical and empirical level and to develop relevant models. In particular, the individual-intellectual integrations may overcome gaps between theories and make them integrable due to the criterion of commonality. Thus, a new perspective arises with respect to Russian undergraduates' learning and education at universities.

Acknowledgements

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Simulation-Based Instructional Materials on Central Dogma of Molecular Biology

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Abstract: The essence of Genetics lies in the understanding of the concepts of Central Dogma of Molecular Biology. Although these ideas are fundamental to the field, they are notoriously difficult to understand and visualize. While simulation-based instructional materials are found to improve the teaching-learning process in science education, little has been done to assess their effectiveness in teaching and learning the concepts of Central Dogma of Molecular Biology. Hence, this study aimed to examine the effectiveness of simulation-based instructional materials towards the learning performance of Grade 12 learners on the concepts of Central Dogma of Molecular Biology. This study utilized a mixed-method approach. Results of the pretest and posttest showed that the learners demonstrated from approaching proficiency to advanced mastery level on the concepts of Central Dogma of Molecular Biology. Furthermore, it was revealed that the pretest and posttest mean scores of the learners on the concepts differed significantly ($p < .05$). The result of the semi-structured interview revealed that the learners were engaged in experiential learning with the use of simulation-based instructional materials. An action plan was designed based on the study to utilize the simulation-based instructional materials in the teaching-learning process.

Keywords: Central dogma, Computer simulations, Genetics, Instructional materials, Molecular biology

Introduction

Science is regarded as a vital topic in the Philippine education due to its direct connections to technology and industry. Despite the complexity of its contents and high cost of implementation in the curriculum, it still remains a central topic in both primary and secondary schools. Picardal and Pano (2018) posited that the rationale for the inclusion of science in school curricula is to elevate learners' level of "scientific literacy" in order to produce citizens who can engage successfully in the contemporary society. However, the COVID-19 pandemic crisis has ushered educational institutions across the globe to new technology-based modalities of instructional implementations (Dukes, 2020; Masoud & Bohra, 2020; Mahaffey, 2020). The changes in the educational landscape posed constraints to teachers with the emergence of new technological challenges, and instructional strategies (Sunasee, 2020) in teaching science concepts that have highly abstract mechanisms (Arrieta, Dancel, & Agbisit, 2020; Huang, 2020), such as Genetics.

Genetic education is considered necessary in schools to develop citizens of the society who can understand issues on the applications of Genetic technologies (Change & Anderson, 2020). However, the essence of Genetics lies in understanding the concepts of Central Dogma of Molecular Biology. Understanding this topic at the secondary level is essential and precursor to other higher concepts in biology, and to be able to connect biological processes happening at the cellular and organismal levels (Picardal & Pano, 2018). While this topic is regarded as core to the discipline, many teachers and learners are facing the burden of understanding its highly abstract concepts. Hence, it remains difficult to teach, and least mastered among teachers and learners, respectively (Kate Wright et al., 2014). Many authors conveyed that this is due to the complexity of the topic's underlying concepts that are not available for direct observations (Reddy & Mint, 2017; Picardal & Pano, 2018; Change & Anderson, 2020).

Consequently, the status quo of the Philippine education in the field of science showed a downward trend in the national and international standardized assessments (Adarlo & Jackson, 2017; Department of Education, 2020). The shortcomings in the school curriculum, the teaching learning process, teachers' preparation, instructional resources, and learners' difficulties in interpreting concepts that include complex thoughts and abstract logics are the key reasons that can be cited to account for the poor performance of the Filipino learners in science (Guerrero, 2009; Department of Education, 2020). Moreover, the congested curriculum is also associated with this depressing scenario as learners do not get adequate time on task (Department of Education, 2020). Although there are many identified factors associated in the downward trend of the academic performance in science of Filipino learners, Arrieta, Dancel, and Agbisit (2020) in their literature review on the attitudes of learners on science have argued that, one striking factor is the quality of teaching. They have insisted that science teaching has to be engaging to the learners, and the classroom environment and activities have to be learner-centered in order to raise learners' interest in science.

Although decades of studies have shown that there are various innovative approaches to education that are cited to increase conceptual understanding of difficult topics in science (Novak, 1990; Marbach-Ad et al., 2008; Ross et al., 2008; Barab et al., 2009; Nogaj, 2013; Quillin & Thomas, 2015), Rivera (2017) posited that there is a need to develop robust teaching pedagogies to elevate the country's scientific literacy by devising innovative learner-centered teaching techniques, such as the integration of technology-based instructional tools in the teaching-learning process. Likewise, Huang (2020) pointed out that the use of appropriate technology-based instructional materials to support the teaching-learning process in the COVID-19 pandemic period is deemed necessary to mitigate its constraints in education. These technology-based instructional materials come in many forms such as computer simulations. These tools can be integrated in the experiential learning which is a comprehensive approach designed to engage learners to investigate authentic problems through experience (Treacy et al., 2011).

Simulation-based instructional materials are commonly used in science education to promote active learning. They are found to scaffold learners to learn concepts that require higher abstract thinking by providing linkages between what is heard and what is seen (Olga et al., 2020). More senses are involved; hence learners are

engaged in deep learning that empowers understanding as opposed to surface learning. Despite the advantages proffered by simulation-based instructional materials in science education, many teachers are encumbered, and have no bold attempt to integrate these tools in their teaching pedagogies. Anoba and Cahapay (2020) pointed out that the lack of accessibility to resources, competence, and confidence on the proper utilization of technology are among the reasons. Hence, these available simulation-based instructional materials are not maximized, and little has been done to assess their effectiveness in teaching and learning the concepts of Central Dogma of Molecular Biology. This prompted the researcher to conduct a study to assess the effectiveness of simulation-based instructional materials on the learning performance of Grade 12 learners in Central Dogma of Molecular Biology. Specifically, this study sought to determine the mean mastery level scores of the learners in Central Dogma of Molecular Biology concepts before and after the conduct of the study in terms of: a) DNA Replication, b) Transcription, and c) Translation. Furthermore, this investigation determined the attitudes of the learners exposed to simulation-based instructional materials, and the plan of action that will be implemented to utilize the developed instructional materials.

Method

Research Design

This study utilized a mixed method approach (Creswell & Plano-Clark, 2011) to assess the effectiveness of simulation-based instructional materials towards the learning performance of Grade 12 learners on the Central Dogma of Molecular Biology concepts. The quantitative phase of the study used pretest and posttest design to determine the mastery level of the learners before and after the simulation-based instructional materials were applied. For the qualitative phase of the study, semi-structured interviews were carried out in order to reveal the attitudes of the learners towards the simulation-based instructional materials. This is to examine and strengthen the quantitative data gathered on the effects and significant differences on the pretest and posttest scores of the sample group. One sample pretest-posttest design (Knapp, 2016) was specifically employed in this study. The characteristic feature of this research design is that the study is conducted in one (1) sample group only, and the measurements of the samples were taken both before and after the method was applied (Fraenkel & Wallen, 2000).

This research design is shown in the diagram below:

Sample Group O1 x O2/SSI

where,

O1 referred to the pretest scores of the sample group

O2/SSI referred to the posttest scores of the sample group and semi-structured interview (SSI).

x referred to the use of simulation-based instructional materials in the sample group

Locale of the Study

The study was conducted at Notre Dame of Marbel University-Integrated Basic Education Department Senior

High School in Brgy. Sto. Nino, City of Koronadal, South Cotabato, Philippines. It is a Marist institution that strives for the formation of holistically developed learners through Marist Quality Education. The school is owned and managed by Marist Brothers Congregation of the Philippines. NDMU-IBED SHS is a new department created in compliance with the implementation of the K-12 Program in the Philippines. It was established in the year 2016.

Participants of the Study

The participants of this study were the learners from one (1) section of Grade 12 STEM strand of Notre Dame of Marbel University-Integrated Basic Education Department Senior High School. To ensure the containment of the data, and to avoid contamination and inconsistencies in the results of the study, the following inclusion criteria in selecting the participants were employed: (1) the participants must be enrolled in the Grade 12 STEM strand in the second semester of school year 2020-2021, (2) any gender with no age restrictions were recognized as participants, and (3) currently taking General Biology 2 subject.

Sampling Technique

The participants of this study were mainly selected based on purposive sampling technique. It was a non-probability sampling technique in which the researcher carefully selected the sample while ensuring the purpose of the study, with the assumption that each participant will be able to provide specific and rich data that are important to the study.

Research Instrument

For the gathering of quantitative data, the study used a Pretest-Posttest Questionnaire. The questionnaire was adapted from the study of Newman, D.L., Snyder, C.W., Fisk, J.N., and Wright, L.K. (2016), and was utilized to assess the mastery level of the learners on the concepts Central Dogma of Molecular Biology. The questionnaire consisted of forty (40) – multiple choice items covering the following sub-topics: a) DNA Replication with 16 items, b) Transcription with 8 items, and c) Translation with 16 items. The multiple-choice items in the questionnaire had different levels of difficulty based on the designed Table of Specifications considering the cognitive levels of Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001). The reliability of the questionnaire was assessed by using the split-half method. Right answers were given 1 point, and wrong answers were given 0 points. The analysis of the data revealed that the Pretest-Posttest Questionnaire had a Guttman Split Half coefficient of 0.992. This indicated that the questionnaire scale had a high level of internal consistency (DeVillis, 2003; Kline, 2005). The mastery level scores in the pretest and posttest of the learners on the concepts of Central Dogma of Molecular Biology were described using the scale in Table 1.

Table 1. Descriptive Rating of Learner's Mastery Level Scores

No. of Items			Percentile	Description	Interpretation
8	16	40			
6.41-8.00	12.81-16.00	33-40	81-100	Advanced	Very High
4.81-6.40	9.61-12.80	25-32	61-80	Proficient	High
3.21-4.80	6.41-9.60	17-24	41-60	Approaching Proficiency	Average
1.61-3.20	3.21-6.40	9-16	21-40	Developing	Low
0.00-1.60	0.00-3.20	0-8	0-20	Beginning	Very Low

Note. Adapted from: Andamon, J. and Tan, D. (2018)

For the gathering of qualitative data, the researcher used a semi-structured interview guide questions adopted from the study of Ulukok, S., and Sari, U. (2016) to reveal the attitudes of the participants exposed to the simulation-based instructional materials. The tool contained the five (5) open-ended questions that revolved around the utilization of the instructional materials on Central Dogma of Molecular Biology.

Development and Validation of Session Plans

Biology textbooks, together with the curriculum maps of Notre Dame of Marbel University-IBED Senior High School, and the Curriculum Guide of the Department of Education were considered in preparing the content to be included in the session plans. The topic considered in the study was the Central Dogma of Molecular Biology. This topic was chosen and included in the study for the reason that it was cited to be a difficult topic to teach and learn by the teachers and learners, respectively (Lewis et al., 2000; Kozma et al., 2000; Knippels, Waarlo, & Boersma, 2005; Reddy & Mint, 2017). Furthermore: a) teachers teaching the subject suggested this topic because of more complicated mechanisms involved; b) the experience of the researcher provided information that this was the topic found most difficult and least mastered competencies by the learners; and c) this topic involves DNA and RNA structures that were tedious to analyze and draw on the chalkboard and could be provided with a computer-simulation material.

After identifying and selecting the topic, session plans were developed and validated. Four (4) expert-validators: one (1) validator with a doctorate degree, and a curriculum developer; two (2) validators were associate professors of a private university with master's degree in Biology; and one (1) validator was a Science Program Coordinator with master's degree in Biology were asked to validate the developed session plans. The evaluation tool adapted from the study of Guerrero (2009) was used to validate the materials. The tool contains three main criteria: (1) content quality; (2) technical quality; and (3) instructional quality. All of the criteria contained nine (9) indicators. A 5-point Likert scale shown in Table 2 was used to describe and interpret the validation results of the developed session plans. The means were calculated to evaluate the developed materials in terms of its content, technical, and instructional qualities.

Table 2. Rating Scale for the Validation of Session Plans

Rating Scale	Range	Description
1	1.00 – 1.50	Not Applicable
2	1.51 – 2.50	Strongly Disagree
3	2.51 – 3.50	Disagree
4	3.51 – 4.50	Agree
5	4.51 – 5.00	Strongly Agree

The validation result showed that the validators, generally, strongly agreed on the content ($M= 4.78 \pm 0.36$), technical ($M=4.88 \pm 0.18$), and instructional qualities ($M=4.84 \pm 0.16$) of the developed session plans on Central Dogma of Molecular Biology.

Simulation-Based Instructional Materials Used in the Study

The simulation-based instructional materials used in the study were properly incorporated in the developed session plans. The LabXchange® Simulation Package on DNA Replication and Central Dogma developed by the Harvard Faculty of Arts and Sciences and funded through the Amgen Foundation, Gene Expression Simulation developed by Colorado University's Physics Education Technology (PhET®) Project, DNA Interactive Simulation developed by Cold Spring Harbor Laboratory, and Holt's Central Dogma Simulations developed by Holt, Rinehart and Winston, were integrated in the session plans to deliver the intended outcomes in teaching the Central Dogma of Molecular Biology. All the interactive simulation tools were adapted into English. The PhET® simulation software was arranged in such a way that the learners could do the activities easily by themselves in a virtual environment. The materials and tools necessary for the activity could be chosen in the different tool menu; necessary controls and varieties could be easily manipulated using the tools. The LabXchange® simulation was also arranged systematically where learners could easily learn and trace on how the genetic information was replicated and expressed to form proteins. Videos and articles were also incorporated in the series of simulations. The DNA Interactive® simulation presented the timeline on the significant and relevant scientific discoveries on DNA. It also presented the information in sequence where learners could easily understand and manipulate the variables. Furthermore, the Holt's® simulations presented the processes of DNA replication, transcription, and translation. The simulations were user friendly, and the variables and options could be easily understood and manipulated by the users.

Data Gathering

The following materials were prepared and ensured by the researchers before the conduct of the study; (i) developing and establishing the reliability of the Pretest-Posttest Questionnaire, (ii) identification of appropriate simulation-based instructional materials anchored to the topic and curriculum, (iii) review of resource materials and instruments to ensure the coherence of the competencies with the Department of Education (DepEd) –

Curriculum Guide, and (iv) development and validation of the session plans. The researcher initially wrote a permission letter to the School Principal of Notre Dame of Marbel University-Integrated Basic Education Department Senior High School to conduct the study, explaining the purpose and nature of the study. Subsequently, a letter of invitation and informed consent form approved by the Principal were sent to the participants and to their parents to seek for their approval through online. The goal and their participation in the research were also explained to them.

In the conduct of the study, the identified participants were asked to answer the pretest using the Pretest-Posttest Questionnaire. The pretest was administered through Schoology® - the official learning management system of the school. The participants answered the test synchronously for one (1) hour. The test was given to gauge the mastery level of the learners in Central Dogma of Molecular Biology before the application of the simulation-based instructional materials. The sample group went through ten (10) online teaching sessions based on the developed session plans. The official learning management system of the school - Schoology® was used as the platform. The simulation-based instructional materials from LabXchange®, PhET®, DNA Interactive®, and Holt's® Simulations were used during the online teaching sessions. The researchers delivered the instructions, methods, and instructional materials to prevent external factors and bias. The delivery of instructions using the simulation-based instructional materials run for one week. Two (2) hours of online teaching was administered per day, and one session was administered per hour. The same set of questions in the Pretest-Posttest Questionnaire was administered for the posttest. To maintain the objectivity, and to avoid bias in the posttest results, the different items in the 40-item questionnaire were distributed across ten (10) online teaching sessions based on the lessons that the questions were anchored. Time limits were employed in the conduct of the tests. The researchers administered the tests through online.

The semi-structured interview was employed to nine (9) identified participants from the sample group. These were the top three (3), middle three (3), and lowest three (3) performers based on the posttest scores. The participants were asked to answer five (5) questions through semi-structured interview through online. This was to examine and strengthen the quantitative data gathered on the effects and significant differences on the pretest and posttest scores of the participants. The date and time of the interview were scheduled based on the participants' convenience. The participants' responses were recorded, transcribed, and were subjected to thematic content analysis. The participants were coded as S1 to S9 to keep their identities confidential.

Ethical Consideration

The researcher strictly followed interview protocols before conducting the semi-structured interview. Hence, the researcher had ensured that the electronic informed consent form was approved by the participants and their parents. The participants were assured that their participation would be private, confidential, voluntary, and that their identity would remain anonymous. It was also emphasized to the participants that the data being gathered from the semi-structured interview will be used purely for academic purposes only, and shall be treated with utmost confidentiality.

Data Analysis

The mean and percentage were used to determine the mastery level scores of the participants before and after the conduct of the study on the concepts of Central Dogma of Molecular Biology. The paired-samples t-test was used to determine the significant difference in the pretest and posttest scores on the mastery level of the participants on the concepts of Central Dogma of Molecular Biology. Meanwhile, the data and information gathered from the semi-structured interview were subjected into Thematic Content Analysis to reveal the attitudes of the learners exposed to simulation-based instructional materials. Verbatim data from the interviews were transcribed. Subsequently, the transcripts were analyzed to classify relevant sentences for further coding, which may involve sentences, terms, or long statements. (Factor, Mateinzo & de Guzman, 2017). The reliability of the qualitative data was ensured by sending back to the participants the initial codes together with the significant statements for checking. This is to ensure that the codes generated resonate the real experiences of the participants (Birt, Scott, Caverns, Campbell & Walter, 2016). Related codes were clustered into categories (Saldana, 2009). Consequently, categories were synthesized in an overarching theme which later became instrumental in revealing the attitudes of the learners exposed to the simulation-based instructional materials.

Results

Pretest and Posttest Scores of the Learners

This study sought to determine the mean mastery level scores of the learners in Central Dogma of Molecular Biology concepts before and after the conduct of the study. The mean and percentage of the pretest scores of the learners on the Central Dogma of Molecular Biology concepts were computed. Based on the percentage values, descriptions were offered. The pretest mean mastery level scores of the learners on the concepts of Central Dogma of Molecular Biology are presented in Table 3.

Table 3. Learners' Pretest Mean Mastery Level Scores

Concepts	No. of Items	Mean \pm SD	Percentage	Description
A. DNA Replication	16	10.17 \pm 2.46	63.54	Proficient
B. Transcription	8	3.81 \pm 1.00	47.66	Approaching Proficiency
C. Translation	16	9.04 \pm 3.15	56.51	Approaching Proficiency
Over-all	40	23.02 \pm 5.82	57.55	Approaching Proficiency

Note. 0%-20% = Beginning
21%-40% = Developing
41%-60% = Approaching Proficiency
61%-80% = Proficient
81%-100% = Advanced

The pretest result showed that, out of 16 items on the concept of DNA Replication, the learners obtained a mean mastery level score of 10.17 \pm 2.46 or 63.54%. This implied that the learners were “proficient” on the concept of DNA Replication. On the other hand, out of 8 items on the concept of Transcription, the learners obtained a mean mastery level score of 3.81 \pm 1.00 or 47.66%. This suggested that the learners were “approaching

proficiency” on the concept of Transcription. Likewise, out of 16 items on the concept of Translation, the learners obtained a mean mastery level score of 9.04 ± 3.15 or 56.51%. This indicated that the learners were “approaching proficiency” on the concept of Translation. Nevertheless, out of the total 40 items on the concepts of Central Dogma of Molecular Biology, the learners registered an over-all mean mastery level score of 23.02 ± 5.82 or 57.55%. This revealed that the learners were generally “approaching proficiency” on the concepts of Central Dogma of Molecular Biology before the conduct of the study.

On the other hand, the mean and percentage of the posttest scores of the learners on the Central Dogma of Molecular Biology concepts were computed. Based on the percentage values, descriptions were offered. The posttest mean mastery level scores of the learners on the concepts of Central Dogma of Molecular Biology were presented in Table 4.

Table 4. Learners’ Posttest Mean Mastery Level Scores

Concepts	No. of Items	Mean \pm SD	Percentage	Description
A. DNA Replication	16	14.02 ± 1.44	87.63	Advanced
B. Transcription	8	6.35 ± 0.98	79.43	Proficient
C. Translation	16	13.06 ± 1.33	81.64	Advanced
Over-all	40	33.44 ± 2.94	83.59	Advanced

Note. 0%-20% = Beginning
21%-40% = Developing
41%-60% = Approaching Proficiency
61%-80% = Proficient
81%-100% = Advanced

The posttest result showed that, out of 16 items on the concept of DNA Replication, the learners obtained a mean mastery level score of 14.02 ± 1.44 or 87.63%. This suggested that the learners were “advanced” on the concept of DNA Replication. On the other hand, out of 8 items on the concept of Transcription, the learners obtained a mean mastery level score of 6.35 ± 0.98 or 79.43%. This indicated that the learners were “proficient” on the concept of Transcription. Nevertheless, out of 16 items on the concept of Translation, the learners obtained a mean mastery level score of 13.06 ± 1.33 or 81.64%. This indicated that the learners were “advanced” on the concept of Translation. Meanwhile, it could also be deduced in Table 4 that, out of the total 40 items on the concepts of Central Dogma of Molecular Biology, the learners registered an over-all mean mastery level score of 33.44 ± 2.94 or 83.59%. This revealed that the learners were “advanced” on the concepts of Central Dogma of Molecular Biology after the conduct of the study.

To determine if there was a difference between the mean mastery level scores of the learners on the Central Dogma of Molecular Biology concepts before the conduct of the study, and the learners’ mean mastery level scores after the simulations-based instructional materials were employed, a paired-samples t-test was utilized. Exploratory data analysis revealed that there were no outliers in the distribution. The pretest and posttest scores distributions were normally distributed as assessed by the Shapiro-Wilk’s test with $p=0.313$ and $p=0.260$, respectively.

Table 5 demonstrated the paired-samples t-test of the pretest and posttest mean mastery level scores of the learners on the Central Dogma of Molecular Biology concepts.

Table 5. Paired-Samples T-Test of the Learners' Pretest and Posttest Mean Mastery Level Scores

Concepts	Pretest	Posttest	Mean Difference
	Mean ± SD	Mean ± SD	
A. DNA Replication	10.17 ± 2.46	14.02 ± 1.44	3.85*
B. Transcription	3.81 ± 1.00	6.35 ± 0.98	2.54*
C. Translation	9.04 ± 3.15	13.06 ± 1.33	4.02*
Over-all	23.02 ± 5.82	33.44 ± 2.94	10.42*

Note. *significant at 0.05 level of significance

The result of the paired-samples t-test revealed that there was a statistically significant difference ($p < 0.05$) between the pretest and posttest mean mastery level scores of the learners on the concepts of DNA Replication, Transcription, and Translation. Likewise, a statistically significant increase in the mastery level scores of 3.85, 2.54, and 4.02 on the concepts of DNA Replication, Transcription, and Translation were observed, respectively. Furthermore, it could be observed in Table 5 that there was a statistically significant difference ($p < 0.05$) between the over-all pretest (23.02 ± 5.82) and posttest (33.43 ± 2.94) mean mastery level scores of the learners. Accordingly, a statistically significant increase in the over-all mastery level scores of 10.42 on the concepts of Central Dogma of Molecular Biology was observed.

Discussion

The low pretest mean mastery level score of the learners on the concepts of Central Dogma of Molecular Biology connotes less prior knowledge, and misconceptions of the concepts as they need the prerequisite knowledge on cell division and reproduction to be able to correctly explain the process of gene transmission. This finding supported the argument of Change and Anderson (2020) and Picardal and Pano (2018) that there was a lack of basic knowledge on Genetics and Genetics technologies by the learners, and widespread misconceptions at various levels. Meanwhile, the significant increase in the posttest mean mastery level score of the learners signified the pronounced effect of the simulation-based instructional materials to the learners' learning on the concepts of Central Dogma of Molecular Biology. This indicated that learners had developed a conceptual understanding on the mechanisms of DNA Replication, Transcription, and Translation. Computer simulations were proven to develop learners' thinking and interpretation skills, thus, resulting into the development of higher-order thinking skills (Efe & Efe, 2011). The present study conformed to the different research findings that the use of computer simulations in teaching resulted in a better learning outcome of the learners (DeCaporale-Ryan, Dadiz, & Peyre, 2016; Mceneaney, 2016; Gunda & Dongeni, 2017; Olga et al., 2020).

One of the reasons for the success of the learners in the posttest result was probably the fact that simulations help learners to visualize processes that seem abstract and complex such as the structure and composition of DNA, DNA replication, the use of knowledge in DNA to generate messenger RNA (mRNA), and the processing of functional proteins using the mRNA as a template. According to Gunda and Dongeni (2017), utilizing visual instructional tools in teaching and learning environments is relevant and highly useful since it allows learners to envision and explore the implications of the model's rules for a method or system. This, in turn, can aid in the development of the learner's self-confidence, and logical thinking skills (Mceneaney, 2016). There are some benefits of using models to teach the Central Dogma of Molecular Biology. They are both secured and practical to use. They often take less time to manipulate, and can be replayed as many times as possible (Sahin, 2006). In addition to these benefits, experiments in science education have shown that computer simulation-based learning improves academic performance (Efe & Efe, 2011; Gruler et al., 2019; da Silva, Rodrigues, & Leal, 2019). Previous studies have also shown that integrating simulations in learning environments improves learners' ability to learn the concepts (DeCaporale-Ryan, Dadiz, & Peyre, 2016; Mceneaney, 2016; Warren et al., 2016). Furthermore, decades of studies have identified a correlation between constructive motivation and a good learning atmosphere using computer simulations (Flanagan, 2009; DeCaporale-Ryan, Dadiz, & Peyre, 2016; Mceneaney, 2016; Ulokok & Sari, 2016; Gunda & Dongeni, 2017; Reddy & Mint, 2017; Olga et al., 2020).

On the contrary, several studies have demonstrated that the use of computers and technology-based instructional materials in the teaching-learning process is eliciting some negative reactions. Greene (2001) mentioned that digital technology has the potential to reduce the interpersonal component of teaching, since that the essence of teaching is the development of knowledge through relationships with learners in order to help them understand the concepts. The intertwining of emotional and intellectual bonds gives meaning to the teaching-learning process. Similarly, Bautista (2011) asserts that computers and the internet cannot imitate the art of teaching. These resources may enhance an already high-quality educational experience, but relying on them as the sole source of learning is a costly mistake.

Learners' Attitudes on Simulation-Based Instructional Materials

Participants' responses through semi-structured interview were analyzed and synthesized into specific codes. Similar codes were grouped into categories. Consequently, categories were synthesized in an overarching theme. Based on the responses of the participants, one theme emerged. This theme collectively characterized the attitudes of the learners exposed to simulation-based instructional materials: Engaged in Experiential Learning.

Engaged in Experiential Learning

The result of the thematic content analysis on the responses of the learners revealed that they were engaged in experiential learning with the use of simulation-based instructional materials. Most of them pointed out that

using the computer simulations, they were engaged in better attainment of concepts through experience. They also emphasized that they better understand the concept because they were able to experience the activity first-hand through engaging interactions. The following were some of the responses of the participants:

One participant shared:

“... the lesson was better understood. You do not just imagine, but it seems like you can really experience. Although it is just a simulation, it seems like you can still experience how things work.” (S5)

Another participant also added:

“...you can interact and you are the one who is manipulating, and there is a clear picture and view on how the processes are made. You can see it not just read it, and the process is very instructional sir. The way you interact with the simulations it can help you better understand the lesson.” (S4)

S2 commented:

“The simulation sir... it is useful, especially that it is interactive and engaging, at the same time it can visualize. So, it is easier to recall and understand the lesson.”

From the gathered data, it can also be noted that learners were able to better understand the concepts using the simulation-based instructional materials because they were able to visualize the information, giving them a concrete experience of what is happening in the processes. Some of the responses of the participants were the following:

One participant emphasized:

“... if I were to compare it to the usual lessons, more on the usual presentation, I cannot really grasp the ideas and I cannot follow the instructions properly. Whereas if there is simulation, I can see it properly and I can really better understand what is happening in the process.” (S6)

S5 shared:

“... we can see how the DNA works. We do not just imagine, but we can really visualize what is happening inside. We can really understand better the processes.”

Meanwhile, the learners also pointed out that the simulation-based instructional materials engaged them in evaluative thinking. They emphasized that using the computer simulations, they were able to evaluate the

consequences of their actions. The following were some of the responses:

One participant shared:

“... it can give me chance to evaluate the consequences of my actions and the importance of minimizing my errors, sir.” (S8)

S4 also added:

“...we think of the process like we also question ourselves how did it get to this, like...we always asked questions how and why instead of just simply defining.”

The results of the study presented collectively revealed that computer simulations engaged learners to better understand the concepts through experiential learning. According to Juan et al. (2017), experiential learning such as simulation is commonly used in teaching to engage learners' in critical and evaluative thinking, and self-directed learning (Pugh et al., 2020). It allows learners to immediately apply things that they have learned to real-world experiences. In the study conducted by Hakeem (2001), learners engaged in experiential learning have a greater understanding of their subject matter than learners in a traditional lecture class. Furthermore, DeCaporale-Ryan, Dadiz, & Peyre (2016) posited that computer simulations can enhance learning by engaging learners to create models of dynamic systems by combining words with pictures. This also conforms to the study of Gunda and Dongeni (2017) that computer simulations can engage learners to visualize and investigate the consequences of the rules of the model for a system, and develop conceptual understanding that can reveal learners' thoughts, ideas and experiences (Isiaka & Mudasiru, 2016).

Similarly, the data collected revealed that learners are actively involved in the learning process through interacting in practical, dynamic, complex, and evaluative contexts. According to Abelson (2017), active participation in learning entails evaluating what happens before and after an operation. When learners use an evaluative method focused on a hypothesis or personal interactions, they develop their analytical reasoning and have a deeper comprehension of concepts (Cant & Cooper, 2017). Furthermore, several authors emphasized the effectiveness of using computer simulations in creating scenario-based environments in which learners can interact and apply their knowledge and skills to solve real-world problems, improve their learning and thinking power, and evaluative thinking (Mceneaney, 2016; Gunda & Dongeni, 2017; Olga et al., 2020).

According to Kolb's experiential learning theory, the learner can learn through a circle of understanding, beginning with the direct experience of perception, progressing to a more complex conceptualization and, finally, active experimentation (Reshmad'sa & Vijaya Kumari, 2017). As a result, learners' learning can improve by problem solving and achieve a higher level of understanding of the concepts. On the other hand, Pugh et al. (2020) stressed that the human learning method can involve a variety of time periods based on what is to be processed and how rigorous the process is.

Plan of Action to Utilize the Simulation-Based Instructional Materials

To utilize the simulation-based instructional materials on Central Dogma of Molecular Biology, an action plan based on the study was designed. The Plan-Do-Check-Act (PDCA) framework (Realyvásquez-Vargas, et al., 2018) was utilized to develop the action plan. It involves four primary phases: planning, doing, checking, and acting. The framework employed is practical, and it is consistent with many standard curricular approaches. Table 6 demonstrated the action plan to utilize the simulation-based instructional materials.

Table 6. Action Plan to Utilize the Simulation-Based Instructional Materials

Phases and Time frames	Actions	Key Participants	Expected Outputs
Phase 1 - Plan Time frame: Before the start of the School Year	Examine the current curriculum on the topic Central Dogma of Molecular Biology with the field experts for the possible curricular updates and changes in the contents and methods.	Science teachers, academic coordinator, and field experts	Enhanced curriculum contents and methods on the topic Central Dogma of Molecular Biology
	Examine the school's available instructional materials (e.g. computer laboratories with internet connection, and teachers' and learners' resources on the topic Central Dogma of Molecular Biology.	Science teachers, and school administrators	List of available instructional materials
	Determine how the simulation-based instructional materials could be integrated into the existing curriculum structure on the topic Central Dogma of Molecular Biology.	Science teachers	Enhanced curriculum structure on the topic Central Dogma of Molecular Biology
	Develop the session plans on Central Dogma of Molecular Biology integrated with simulation-based instructional tools.	Science teachers	Session plans on Central Dogma of Molecular Biology integrated with simulation-based instructional tools
	Validate the session plans in terms of content, technical, and instructional qualities.	Science teachers, and field experts	Validation results on the developed session plans
	Develop evaluation methods and tools, and commence collecting pre-interventional data through pretest.	Science teachers	Evaluation methods and tools, and pretest result
	Phase 2 - Do Time frame: 3 rd Quarter	Utilize the developed session plans in teaching Central Dogma of Molecular Biology.	Science teachers
Phase 3 - Check Time frame: End of the 3 rd Quarter	Evaluate the effectiveness of the developed session plans through posttest, and conduct semi-structured interview to the learners.	Science teachers	Posttest result, comparison of the pretest and posttest data, and analysed data on the participants' responses
Phase 4 - Act Time frame: End of the School Year	Revise and improve the developed session plans accordingly.	Science teachers	Enhanced session plans on Central Dogma of Molecular Biology

As shown in the table, one should gain an understanding of the current curriculum during the planning phase. One way to do this is to examine the current curriculum on the Central Dogma of Molecular Biology. This may also include discussion on the content and method components of the curriculum with the field experts for the possible curricular updates and changes, especially those related to curricular methods such as transition from the traditional model to a problem-based learning model. In this phase, particular teaching models, curriculum evaluation methods, and where the simulation-based instructional materials can be integrated into the curriculum must be determined and clearly described. According to Realyvásquez-Vargas, et al. (2018), using this needs assessment approach can result in an easier development of curriculum materials to address curricular concerns. Accordingly, once there is already an overall understanding of the curriculum, school's available instructional materials such as the availability of the computer laboratories with internet connection, teachers' resources on Central Dogma of Molecular Biology (e.g. simulation-based instructional materials, existing lesson plans), as well as the available learners' resources (e.g. textbooks, and other learning references) related to the topic must also be examined. Namasaka, Mondoh, and Wasike (2017) posited that knowledge of the available resources can help in designing appropriate instructional materials.

Likewise, careful planning should be made in order to determine what is to be incorporated in the curriculum structure. Conceptualization of what is to be included, and how the simulation-based instructional materials should be incorporated must be taken into consideration (Efe & Efe, 2011; Lameris et al., 2016). Once content-relevant instructional materials and strategies are identified, the session plans can now be developed. The available computer simulations, appropriate teaching strategies, alignment to the curriculum, content, technical, and instructional qualities must be highly scrutinized to ensure that the contents and simulation-based instructional materials are properly organized and incorporated to achieve the intended learning outcomes (Lameris, et al., 2016). Similarly, every session plan must contain the essential instructional components such as content standard, learning competencies, specific learning objectives, lesson outline, introduction, motivation, instruction, generalization, evaluation, and references. Liu, et al., (2008) emphasized that when all the components of teaching pedagogies are highly considered in designing an instructional material, it results into an effective teaching-learning process. Consequently, the validity, appropriateness, and usefulness of the developed session plans in terms of content, instructional, and technical qualities must be evaluated by the field experts. Fong et al. (2010) maintain that a good combination of skills, expertise, and continuous evaluation of instructional materials are necessary for the production of effective curricular instruments.

Once session plans are developed and validated, evaluation methods and tools must be described. Evaluation methods and tools should match the overall instructional objectives. Deshpande (2010) suggests that sophisticated multiple-choice questions that test problem solving and application are found to be better evaluation methods.

In the second phase of the action plan, it is necessary that teachers are aware of the proper utilization of the simulation-based instructional materials. Thus, there may need to train the teachers on how to maximize the use of the instructional materials in the teaching-learning process. On the other hand, all curricular interventions

need to be regularly evaluated (Phase 3), revised, and improved (Phase 4). Since the instructional and curricular materials may change, flexibility and the development of alternative strategies based on the evaluation results are important (Carague, 2013).

According to Lamas et al. (2016), to optimize the teaching process, it must be planned consciously with the use of appropriate and effective teaching styles, and instructional materials. These materials can provide teachers with ideas and help them in achieving their goals that could not or would not be accomplished on their own (Brown, 2009). Likewise, Gray (2007) posited that when these materials are properly designed, incorporated in the curriculum, and used, they can have profound effects in increasing the power of self-direction, retention, skill in fundamental processes, reasoning ability and solving problems of the learners, and enable teachers to better deliver the lessons.

Conclusion

The learners were proficient on the concept DNA Replication, and approaching proficiency on the concepts of Transcription and Translation before the conduct of the study. On the other hand, the learners demonstrated advanced on the concepts of DNA Replication and Translation, and proficient on the concept of Transcription after the conduct of the study. Furthermore, there was a significant difference ($p < 0.05$) in the mean mastery level scores of the learners on the concepts of Central Dogma of Molecular Biology before and after the conduct of the study. The learners were engaged in experiential learning with the use simulation-based instructional materials. An action plan on the utilization of simulation-based instructional materials in the teaching-learning process was designed based on the study.

Recommendations

In the light of the findings from the data, the researchers recommended to assess the potential problems on the utilization of the simulation-based instructional materials to further validate their usefulness; conduct further study on a wider scope to improve the effectiveness and practicability of the simulation-based instructional materials; use other computer-aided simulations tools and educational software in teaching the concepts of Central Dogma of Molecular Biology, and assess their effectiveness towards learners' learning performance; utilize the designed action plan to incorporate the simulation-based instructional materials in the curriculum; and utilize the developed session plans in teaching the concepts of Central Dogma of Molecular Biology.

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Male Teachers in Elementary Settings: Perceptions of a Teaching Career

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Abstract: This study explored the perceptions of teachers who identify as male/male of color teachers about their sense of competence and satisfaction with their choice of career working with young children in elementary settings. This study sought to answer questions about the perceived factors affecting their development as teachers of young children and the potential for improving the recruitment and retention of male teachers in the primary grades. Male and male of color elementary school teachers were invited to share their perceptions of their experiences related to becoming and being a teacher in the primary grades through a questionnaire and interviews. The study found participants felt that their experience as teachers was informed by uniquely gendered factors, such as their male and/or intersectional identities and the associated perspectives and experiences as well as by more global factors such as their commitment to their professional expertise as effective teachers. Overall, the study suggests that both gendered and global factors have implications for recruitment and retention given that they contribute to male and male of color teachers' sense of competence and satisfaction teaching young children in elementary settings.

Keywords: Elementary education, Male teachers of color, Teacher diversity, Recruitment & retention

Introduction

Elementary school teachers who identify as male comprise a small fraction of the overall population of PreK-5 teachers and this study sought to understand their experience. The ubiquitous association of the female gender with a career as an elementary school teacher is reflected in the overwhelming large percentage of elementary teachers in the U.S. identify as female and White. It is in this context, in which it is assumed that the teacher is a White female, that males/males of color undertake a career teaching young child. By exploring the perceptions of the men/men of color who have chosen this occupation despite the societal assumptions, this paper highlights perceived factors for how they develop a sense of job satisfaction as teachers in primary grades. While the percentage of men who teach in primary settings is low, much can be learned by listening to the men/men of color currently in the profession. Due to the dearth of research in this area, this study sought out male/male of color elementary school teachers willing to share their thoughts and experiences. Listening to the males/males of color who currently teach young children can increase knowledge and understanding of what they believe has influenced them both to become a teacher and to stay in the profession.

Greater participation by males/men of color in teaching PreK-5 merits particular attention given the current teacher shortages as well as the needs for workforce diversification. If men/men of color were step into these jobs, it could address issues of teacher shortages and workforce diversification to better serve the student population. To pursue teaching as a career and step into the teaching profession, men/men of color must deal with these societal and cultural barriers in order to feel comfortable seeing themselves in the role. Highlighting the value of male/male of color experiential knowledge base could support men/men of color to see themselves in the role as an educator. In addition, male/male of color teacher role models could inspire men/men of color to see themselves as teachers. At the same time, seeing themselves becoming a role model could motivate men/men of color to become a teacher. In addition to recruitment, the retention of male/male of color teachers is also important. An effective process of professional development can contribute significantly to male/male of color teachers' overall sense of job satisfaction and a desire to stay in the profession. As male/male of color teachers engage in their work, it is important that they find the support, camaraderie and recognition needed to move forward through the stages of development. Another frequently overlooked aspect of professional development is the development of a teacher identity. This may have particular relevance for males and males of color who must forge their teacher identity in contrast to societal conceptions of teachers as female and White. To be successful, novice teachers must start by understanding themselves and understanding what they bring with them into teaching. Then, teachers use a sense of agency to take control of their own development.

Method

This mixed-methods study was conducted at a teacher credentialing program of a public university. Data for this study were collected over two years. Information about the male/male of color elementary school teachers' attitudes were obtained in two parts: a questionnaire using a Likert scale for quantitative data and small, focus group interviews for qualitative data.

Participants

Participants were males who graduated from one teacher credential program with a multiple subject teaching credential, authorizing them to teach elementary age students. 30 responded to the questionnaire. 2 identified as Asian/Pacific Islander, 12 identified as Hispanic/Latino and 16 identified as White.

Table 1. Questionnaire Participant Demographics

Variable	N	%
Asian/Pacific Islander	2	6.6
Hispanic/Latino	12	40
White	16	53.3
Taught >4 yrs	15	50
Taught 4 or less yrs	15	50
Total	30	

Half of the participants had taught more than four years and half had taught 4 or less years (see Table 1). The 30 participants who responded to the questionnaire were invited to participate in the focus group interviews. 8 of these participants were interviewed. 3 identified as Hispanic/Latino and 5 identified as White. 6 had taught for more than 4 years and 2 had taught for 4 years or less.

Data Collection

All 30 participants completed the questionnaire, consisting of 10 items which focused on the participants' perceptions and experiences related being an elementary school teacher. The questionnaire used a 5-point scale which participants used to rate their level of agreement for each item with one of the response alternatives ranging from one to five: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree. Responses to the questionnaire were analyzed for central tendency and range (see Table 3). Based on the results of the questionnaire, 5 open-ended interview questions were designed to obtain qualitative data that illustrated and further elaborated the quantitative findings. The open-ended responses to the interview questions were reviewed and coded (see Table 4). The coded concepts within the responses were then used to describe 3 main themes.

Results

Questionnaire

Add results and findings here. The questionnaire consisted of 10 items, which focused on the participants' perceptions and experiences related being an elementary school teacher. The 30 respondents (N=30) rated their sense of career satisfaction and career choice, their teacher qualities, their role perceptions, their working relationships and their developing professional expertise. An analysis of this ordinal data was focused on finding the central tendency, determined by finding the median for each item. The range of the responses was determined by finding the Inter-Quartile Range (IQR) of each item. The following table shows the median (Mdn) and the range (IQR) for each item (see Table 2).

Overall, the findings indicated a general consensus among male/male of color teachers' attitudes with regard to their careers as elementary school teachers. In a statement related to career satisfaction, respondents almost unanimously strongly agreed (96.7%) that teaching elementary school is a fulfilling career for men/men of color. In statements related to career choice, respondents considered two statements. When asked if their decision to become elementary school teachers was influenced by the male elementary school teachers they have known, 86.7 % of respondents disagreed or were unsure. On the other hand, 93.3% of respondents indicated that they believed it important that men considering a career in teaching have the opportunity to talk with men who already teach. In response to three statements related to the teacher qualities of males/males of color as elementary school teachers, respondents were in overwhelming agreement.

Table 2. Questionnaire Response Data

Item	Mdn	IQR
Teaching young children at the elementary school level is a fulfilling career for men/men of color.	5	1
My own positive & negative school experiences as a male student/male student of color influence my thinking and actions for being an effective elementary teacher.	5	1
My decision to become an elementary school teacher was influenced by the male elementary school teachers I have known.	2	1
It would be beneficial for men/men of color considering this career to have opportunities to talk with men/men of color who are already teaching elementary school.	4.5	1
Male elementary school teachers have different perspectives & life experiences than female teachers that are valuable for working with elementary age children.	4.5	1
Men/men of color possess the qualities needed to work with young children	5	1
I can design & implement effective learning activities for young children, both male & female, to support my students' learning & development.	5	0
It is important for men/men of color to have opportunities to grow & develop their professional skills and knowledge for teaching elementary school.	5	0
Male elementary school teachers have unique role expectations placed on them (different from female teachers) for what they are expected to do as teachers.	5	1
Male elementary school teachers benefit from having working relationships with other male elementary school teachers.	5	1

First, 93.3% of respondents strongly agreed or agreed when asked if their own schooling experiences as male students influenced their thinking and actions for effective teaching. Second, 86.7% of respondents strongly agreed or agreed that male/male of color teachers have distinct perspectives & life experiences than female teachers that are valuable for working with elementary age children. Third, 86.7% strongly agreed or agreed that men possess the qualities needed to work with young children, such as being nurturing, patient & empathetic. Also, in statements related to developing professional expertise, respondents unanimously agreed (100%) that male/male of color elementary school teachers can design & implement effective learning activities for young children, both male & female, to support student learning & development. In addition, they were in unanimous agreement that they valued opportunities to grow & develop their professional skills and knowledge for teaching elementary school. In response to statements about role perceptions, responses were consistent. 86.7% of respondents strongly agreed or agreed that male teachers have unique role expectations placed upon them (different from female teachers) for what they are expected to do as teachers. Finally, in statements related to working relationships, the vast majority of respondents (93.3%) were in agreement that communication and working relationships with other male/male of color teachers were beneficial to them.

Interview

The interviews consisted of 5 open-ended questions related to the topics of career satisfaction, their lived experience in relation to their teacher qualities, their developing professional expertise, their role perceptions and expectations and their working relationships. They were designed to obtain qualitative data, in particular, examples from participants own experiences to illustrate and further elaborate the quantitative findings from the questionnaire. Responses to the 5 open-ended questions were analyzed resulting in a total of 7 codes for all responses (see Table 4). Then, these were utilized to describe overarching themes.

Table 4: Interview Analysis Results

Question	Codes Assigned
1. Career satisfaction	Relationships, Role model, Identity match, Nature of the profession
2. Lived experience & teacher qualities	Relationships, Role model, Identity match, Nature of the profession
3. Developing expertise	Relationships, Role model, Identity match, Nature of the profession
4. Role perceptions & expectations	Relationships, Gendered perceptions/expectations, Identity match vrs mismatch
5. Working relationships	Relationships, Gendered Communication

The first three questions of the interview explored the male/male of color teachers’ attitudes related to their career satisfaction, the value of their lived experience, both personal and professional, to their work as elementary school teachers, and their developing professional expertise. Questions One, Two and Three had 4 codes: (1) relationships, (2) role model, (3) identity match, and (7) nature of the profession. When answering the first question about their high sense of career satisfaction, the top reasons given included their relationships with students and their position as a role model. When answering the second question about the value of their life experience as males/males of color for their teacher qualities, they shared that their gendered lived experience served as an asset enabling them to be an effective male role model and build relationships with their students. When answering the third question about their developing expertise, all participants expressed deep satisfaction with the nature of the profession, which allowed them to do work they enjoyed and to continue developing their professional expertise in rewarding ways. The remaining two questions of the interview explored the male/male of color teachers’ attitudes related to their working relationships and the perceptions and expectations they experienced in the school context. Questions Four and Five had 4 codes: (1) relationships, (2) gendered perceptions /expectations, (3) identity match vrs mismatch, and (4) gendered communications. When answering the next question about the unique experiences that men/men of color had in a field dominated by White women, participants explained that they learned that the perceptions and expectations they frequently faced in the school setting resulted from the fact that they identified as male/male of color. When asked the final question about their working relationships, most participants stated that while their professional relationships regardless

of gender were productive and rewarding, they experienced an extra benefit of communicating with other male/male of color teachers.

Themes

Overall, 3 themes captured the coded concepts expressed by the male/male of color teachers related to perceptions of themselves as teachers of young children and their sense of career satisfaction: 1) centering work on relationships with students 2) mitigating gendered perceptions and expectations 3) making the most of the profession's possibilities. Theme One described participants' perceptions that relationships with their students was what gave their work as teachers in elementary settings meaning and purpose. They became a male/male of color role model for their students. Theme Two described participants' perceptions that mitigating gendered perceptions and expectations was a necessary in order to have a satisfying career. Most importantly they had to learn to hold onto what they brought with them from their own life experiences and male/male of color identity to inform their teacher role in a way that reflected their own values. Theme Three described participants' perceptions that making the most of the profession's possibilities was a main reason that teaching was an enjoyable and satisfying job.

Discussion

For males/males of color to consider teaching elementary school, they need to be able to see themselves in that role. The overwhelmingly female and White demographics of elementary school teachers can present challenges for men/men of color to see themselves as teachers of young children. Nevertheless, the teachers in this study showed that they could. Listening to the males/males of color who currently teach young children highlighted that men/men of color perceive themselves as capable and effective teachers and that their sense of competence and career satisfaction results from both gendered and global understandings of their role as teachers. The teachers in this study acted with a sense of agency to take control of their own development as teachers. Their great sense of satisfaction with their career choice was the result in large part of their willingness to define their role on their own terms and to deal with gendered perceptions successfully. They took ownership of all that they brought with them into teaching, including their conceptions of themselves as men/men of color as well as their beliefs about what makes a good teacher. These gendered intersectional identities and associated perspectives and experiences became a richly textured resource for them informing their role as a teacher of children in the primary grades. They prioritized their relationships with their students as the central aspect of their work as teachers. In so doing, they became male role models dedicated to fostering the development of the young children in their care. In addition, they recognized the global aspects of teaching such as the generative possibilities the nature of this profession offered that they found particularly interesting and enjoyable. This expanded their commitment to develop their professional expertise and engage more deeply in the work of teaching young children. Their satisfaction was also the result of learning to deal with gendered perceptions and expectations that they faced due to being male/male of color in a setting demographically dominated by White females. They took opportunities to have conversations with other teachers, particularly male teachers, to talk

about the gendered perceptions and expectations, learning to respond in ways that helped them to clarify who they wanted to be as male/male of color teachers in elementary settings. They concluded that learning to navigate these perceptions in the ways that were most productive was part of their development as teachers.

Conclusion & Recommendations

The participants of this study showed that men/men of color teachers can feel a sense of competence and satisfaction working with young children. To do so, they can tap their gendered experiences as males/males of color and incorporate them into their teaching roles. Embracing their uniquely gendered characteristics within their conception of themselves as teachers can deepen their understanding and effectiveness as teachers. At the same time, they can tap their global experiences as members of this engaging profession, developing their professional expertise and collegial collaborations. Embracing work that is characterized by variety, fun, creativity and determination to move ideas from concept to completion, they can see their own potential to make a difference for their students, schools and communities. Given the problems related to the teacher shortages and lack of diversity of the teacher workforce in the US, males/males of color could step into careers teaching in early childhood education and the primary grades. This study suggests that more males/males of color can overcome societal and cultural barriers in order to redefine work teaching young children as a career that they could see themselves doing and doing well. This study has added to the knowledge about what leads to the success of male/male of color elementary school teachers. While small, this study provided information on perceived factors that have made the profession possible for some men. In order to be successful, recruitment and retention of male/male of color teachers could do more to be sensitive to the uniquely gendered factors as well as the more global factors that men/men of color perceive inform their experience as teachers of young children. It is recommended that recruitment and retention programs for primary grade teachers lift up the voices of male/male of color teachers working with young children. These teachers have valuable experiences to share of their work in this profession, the joys and the challenges, which show that this is a viable role for men/men of color in US society. It is further recommended that professional development programs across the stages of teacher development support male/male of color teachers in ways that are sensitive to and supportive of their gendered intersectional identities.

Work from Home and Emotional Intelligence Domains in the Challenge of COVID-19 Pandemic

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Abstract: This study focuses on work from home and emotional intelligence among civil servants in the challenge of COVID-19 pandemic scenario. The specific purpose of this study was to test the relationship between work from home perception with emotional intelligence domains on civil servants in Malaysia. A total of 2268 respondents were selected for the category of academic and non-academic staff. The measurements tool used was an instrument developed by the researcher, and it went through a process of instrument and construct validation, namely Work from Home Questionnaire of COVID-19 Challenge (WFHQue-CvdC). The second instrument is Emotional Intelligence Domain Inventory of COVID-19 Challenge (EIDInv-CvdC). In this study, correlation Pearson analysis was used to determine the relationship between perception of work from home with the emotional intelligence domains. The findings of the study showed that there was a significant positive and negative correlation in all the variables studied.

Keywords: Work, Home, Emotional, COVID-19, Pandemic

Introduction

Employees are exceptionally critical element factor that assumes a supporting part in the improvement of human resources of a country. It is a regulatory and the board apparatus that empowers individuals to bring a significant and significant public advancement structure to the world level as an adaptable model. Employees are additionally a significant worth added part in the public economy. It stays the country's biggest specialist organization covering the conveyance of information and administrations starting with one age then onto the next. Positively, the setting of human capital through human resources itself is driven alongside the vision and tasks in the hierarchical change part for the board change that has been planned and ready by the Malaysian Administrative Modernization and Management Planning Unit (MAMPU), in the country's endeavors to create dynamic change and should be enabled by an association in Malaysia (MAMPU, 2009).

In any case, nobody expected the presence of a huge and weighty charge that hit the entire world, including Malaysia, to be specific the forceful assault of the COVID-19 infection pandemic. The circumstance is extremely influencing all segments of society and different areas of work just as the economy. Positively, it has a circuitous and direct effect in numerous components crossing social, monetary, physical, enthusiastic, and mental on everybody. The measurements of the quantity of tainted in Malaysia started to expand step by step from January 23, 2020, until it arrived at the four digits in mid-March 2020. In this way, the Malaysian government set March 18, 2020, as the time of Movement Control Order (MCO) for all activities of the people, including schools, colleges, plants, and shops that should be shut (Syah Rul, 2020). The control mandate additionally applies to all specialists in the nation including each government employee who should work from home (WFH), albeit the discoveries are likewise offered adaptability to laborers and government employees who are straightforwardly involved as the bleeding edge.

This disturbing and stressing circumstance for all residents of the world and Malaysia is valued to see in more profound seeing so that all gatherings need to cooperate to sit at home to break the chain of spread of the COVID-19 infection (Syah Rul, 2020). Albeit on a fundamental level, residents and government employees should remain at home during the MCO time frame which has taken over a month and accomplish brief work from home. However, it ought to be perceived according to the point of view of passionate reality and emotional well-being, did it's anything but an extremely mitigating or exceptionally elating second. At the point when the truth of the matter is that individuals are eclipsed by stresses on the off chance that they or their families are tainted with the infection, with the expectation that the pandemic will end soon, in light of the fact that they know about the effect not just on business, economy and day to day existence which is as of now not typical, yet in addition significant. is simply the impact of enthusiastic angles and certainty. With the episode of the COVID-19 outbreak, the researcher felt the requirement to study the connection between emotional intelligence domains with work from home among government employees.

Background

Employees as quality human resources ought to zero in on ability of intellectual and expertise alone, yet should have likewise as far as qualities, morals, character, and feelings. The equilibrium of human resources, particularly in the advancement of human asset associations for practical public turn of events, ought to be considered principal by all gatherings. In any case, there is no question that there are yet different marvels and huge issues in associations that include the environment of psychological interaction among employees, in this manner giving an adverse consequence on the enthusiastic angle that can likewise lastingly affect work responsibility and worker conduct itself (Zainuddin, 2009). Past studies have shown the existence of behavioral influences and psychological elements in terms of self-esteem and its relationship with commitment and performance in organizations involving human resources including human resources (Michael, 2010). Appropriately, human resources in an association are a human asset that comprises of three primary areas specifically emotional, mental, and physical. It tends to be estimated whether it acts as per the requests of the association or the other way around, so it can cause internal crisis or an external crisis. The focal point of this study was to test the emotional elements. Emotions are something that an individual feel inside. The word emotion means movement of energy, which is gotten from a Latin word (Childe and Martin, 1999). As indicated by them, an individual's passionate encounters influence synapses and memory, then, at that point structure designs that impact an individual's conduct.

To what extent does mental health stability play an important role and its relevance to the COVID-19 pandemic scenario that has occurred since December 2019? It will be explored in this study, through aspects of emotional stability among civil servants. As we all know, almost the whole world is now suffering from the effects of the COVID-19 virus pandemic. At the time this paper was written on 20 September 2021 at 1.00pm, the total number of COVID-19 cases worldwide had reached 228,945,941 cases and recorded 4,700,198 deaths (<https://www.worldometers.info/coronavirus/>). Of the 18,703,476 cases that are still active, a total of 99,737 cases are in critical status and 18,603,739 cases are in stable condition, while a total of 205,542,267 cases have been cured. Malaysia so far (20 September 2021) has been listed as the 21st highest positive cases which recorded 219,359 active positive cases and 23,067 total deaths (<https://www.worldometers.info/coronavirus/>). Thus, the focus of this study was to explore the correlations of emotional intelligence domains with working from home perception among respondents.

Problem Statement

Corona Virus2019 (COVID-19) which was first recognized in Wuhan, China in December 2019 has spread broadly to different nations all throughout the world. This prompted the World Health Organization (WHO) to proclaim it a pandemic on 11 March 2020 (Azizi, 2020). Many assaults on individuals consistently since that second has set off different changes in the feelings, psyches, and practices of individuals. Absolutely, it gives psychological and mental health impact to the people, among them are extreme anxiety, symptoms of depression, panic, and stress (Firdaus, 2020). For instance, in the beginning phases of Movement Control Order

(MCO), it was tracked down that many individuals experienced outrageous uneasiness to freeze purchasing and gathering things to forestall COVID-19 contamination, for example, face masks, sanitizers and gloves until costs multiplied because of appeal surpassing stockpile. The psychological impacts should be considered in managing the COVID-19 pandemic danger, both during and after the pandemic danger. Particularly when all residents comprehend that the period for the world to create immunizations just as the circulation of the inoculation cycle isn't possible in a brief time frame. As per the Director General of the World Health Organization (WHO), Tedros Adhanom Ghebreyesus, the main immunization for COVID-19 is relied upon to be created inside year and a half (BH Online, February 14, 2020). A U.S. health official was educated that albeit beginning clinical preliminaries were working out positively, it would most likely take about a year to year and a half before the immunization could be utilized for general society (BH Online, March 19, 2020). What's more, the assumption is practically right in light of the fact that to date (August 22, 2021), the inoculation interaction to forestall COVID-19 is as yet in progress in Malaysia, while in different nations it has additionally begun since mid-2021.

Zeroing in on the effect on mental health effect, there are many examinations done on the psychological impact brought about by pandemics or calamities. As per a review distributed by the International Journal of Research and Public Health in 2020, there were 53.8% of respondents revealing moderate to serious psychological effects. Of these, 16.5 percent announced manifestations of depression, 28.8% revealed side effects of anxiety and 8.1% detailed indications of stress. The online review included 1,210 respondents from 194 urban communities in China on the psychological effect of the COVID-19 flare-up (Firdaus, 2020). Most respondents said they remained at home for 20 to 24 hours out of each day (84.7%) just as stressed over other relatives encountering a flare-up (75.2%). The aftereffects of the investigation likewise discovered that ladies, understudies just as explicit actual indications were related with higher mental effect (Firdaus, 2020). Be that as it may, those with exact information on the pandemic, just as a comprehension of the prudent system were found to have a lower mental effect. In view of a review led in Korea distributed in the International Journal of Healthcare in 2018, practically 50% of wellbeing laborers to be specific medical caretakers who were straightforwardly engaged with taking care of the Mers-CoV episode in 2015 experienced post-horrendous pressure problem or also called Post-Traumatic Stress Disorder (PTSD) (Younglee et al., 2018). On top of all the realities of the scenario, it was found that there were emotional outbursts and eruptions of anxiety, nervousness, worry, panic and stress about the risks and threats of the COVID-19 pandemic that could strike anyone unexpectedly. Although it may be after the MCO is terminated or perhaps the data of patients infected with the virus decreases with the findings of the sloping graph, but the threat of the COVID-19 pandemic will always hunt a sense of freedom and peace in the hearts of all citizens in this country. However, this frightening phenomenon will be a prolonged constraint so that it may affect the daily functioning of an individual, including may affect the quality and focus of work among civil servants. The constraints include the need to work as usual when the work from home policy is introduced and implemented in line with efforts to stop the spread of the COVID-19 virus through movement control and work from home orders.

The concept of working from home (WFH) during the COVID-19 pandemic was different if implemented in

normal practice that was not during the pandemic era. In the practical context in general, there is great flexibility between employer and employee, and there is a voluntary element to doing so (Rusli, 2020). This concept can be applied across many types of jobs. The form and mechanism of its implementation are more varied, and the parties concerned need to reach a consensus. For the public sector, there are service circulars issued from time to time by the Director General of Public Service in accordance with the ruling by the National Security Council during the Movement Control Order in the COVID-19 pandemic season. In practice, based on the Randstad Workmonitor study through the Head of Operations of Randstad Malaysia, it was found that 48% of the employees who were the study respondents expected the combination of working from home and working in the office could be continued during the post-COVID-19 pandemic (Hazwan, 2021). Meanwhile, 14% want WFH to be maintained. The more flexible work policy is felt to help reduce stress levels as well as increase morale among employees. In the opinion of some academics, it is found that the approach of working from home should be continued due to the positive effects that are felt beyond several aspects such as employees who need to jointly care for sick family members or those with chronic diseases (Harris Shah, 2021). The situation is expected to reduce the stress that arises due to the conflict of work demands and family demands. However, for women workers, it is found that they need to have strong mental and physical resilience if working from home because the task is heavier as a mother and wife (Tuty Haryanti, 2021).

The Covid-19 pandemic has changed the ecosystem and landscape of the world of work, from a changing office work to a work-at-home scenario. These changes also indirectly affect the working mood among employees as well as employers. Since the implementation of MCO 1.0 in March last year, most workers have been working from home. Therefore, it is not impossible that working long hours at home may present challenges to the mental health of employees (Nor 'Asyikin, 2021). It is necessary to pay attention to the mental health of employees to ensure that they maintain productivity while working at home, as their services are also indispensable for the economic development of the country. Employees face various challenges while working at home, for example the complexity of conducting online meetings when internet access is unstable and there is noise interference from around. In addition, there are civil servants who must struggle with the limited use of devices with children who also need to undergo home-based teaching and learning (PDPR), resulting in no conducive environment to work (Eton, 2021). A study of 1,100 Vase.ai online users found that 35% of respondents stated that an unstable internet connection is a challenge when working from home. Meanwhile, 77% of respondents admitted that they face difficulties when working from home. Only 9% of Malaysians say they prefer to work from home (Rusli Ahmad, 2020). The outbreak of all these negative feelings is likely to affect the mental health of civil servants when they begin to feel depressed, worried, and stressed, as well as can lead to behavioral changes either directly from the effects of the pandemic or indirectly due to having to face new norms of life, like having to work from home. It is feared that the situation could have an impact on the quality of work in the organization. Thus, the researchers felt a study needed to be done to examine the relationship of emotional intelligence domains with work-from-home perceptions among civil servants during the COVID-19 pandemic. The results of this study can be used as a reference and guide not only in the post-outbreak period of COVID-19, but also can be referred for future periods.

Research Objectives

- To test the relationship between work from home perception with emotion domain among civil servants in the COVID-19 pandemic.
- To test the relationship between work from home perception with self-awareness domain among civil servants in the COVID-19 pandemic.
- To test the relationship between work from home perception with emotional well-being domain among civil servants in the COVID-19 pandemic.
- To test the relationship between work from home perception with emotion regulation domain among civil servants in the COVID-19 pandemic.

Research Questions

- What was the relationship between work from home perception with emotion domain among civil servants in the COVID-19 pandemic?
- What was the relationship between work from home perception with self-awareness domain among civil servants in the COVID-19 pandemic?
- What was the relationship between work from home perception with emotional well-being domain among civil servants in the COVID-19 pandemic?
- What was the relationship between work from home perception with emotion regulation domain among civil servants in the COVID-19 pandemic?

Research Methodology

Research Design

The type of this study is quantitative nature and as a field study as well, just as illustrative with the utilization of relationship insights. Field studies are very applicable to use because of their high reliability, while the utilization of cost is moderately low (Maimunah, 1992). The reason for this study is for descriptive and hypothesis testing. The testing approaches toward the elaboration of independent variable in at least two components in each set of conditions (McIntyre, 2005). Correlation analysis was chosen as explaining the relationship of the variables.

Research Location

The study location is focused on Majlis Amanah Rakyat (MARA; Malay: People's Trust Council) organizations of Malaysian government office, from most states throughout Malaysia. This organizations were designed to help, train, and guide Bumiputra (Malays and other native Malaysians) in the space of business, industry, economic and education. For this study, location just choose for the education cluster of MARA.

Research Sampling

The study sample is a category of 2268 employees, consisting of academic staff and non -academic staff (salary grade 19 up to grade JUSA/VK/VU). Systematic random sampling method was used in the sample selection process, and the total of respondent choosing by G-Power system.

Research Instruments

The indicator used to test the perception of working from home was a self -developed questionnaire by the researcher. The developed questionnaire went through a process of instrument validation and face validation, named as Work from Home Questionnaire of COVID-19 Challenge (WFHQue-CvdC). The reliability value of this instrument is .864, and the total KMO is .879. Whereas the second instrument is Emotional Intelligence Domain Inventory of COVID-19 Challenge (EIDInv-CvdC). The reliability value of this instrument is .894, and the total KMO is .954.

Research Findings Analysis

The Relationship between Work from Home Perception with Emotion Domain among Civil Servants in the COVID-19 Pandemic

Table 1 show the finding of the relationship between work from home perception with emotion domain among respondents. The result of the analysis found that work from home had a significant positive correlation with emotion domain, with sig values. = .000 and R = .132.

Table 1. Correlation of Work from Home with Emotion Domain

Variables	Work from Home	
	Sig.	Correlation
Emotion Domain	.000	.132**

** . Correlation is significant at the 0.01 level (2 tailed)

The Relationship between Work from Home Perception with Self-Awareness Domain among Civil Servants in the COVID-19 Pandemic

Table 2 show the finding of the relationship between work from home perception with self-awareness domain among respondents. The result of the analysis found that work from home had a significant positive correlation with self-awareness domain, with sig values. = .000 and R = .130.

Table 2. Correlation of Work from Home with Self-Awareness Domain

Variables	Work from Home	
	Sig.	Correlation
Self-Awareness Domain	.000	.130**

** . Correlation is significant at the 0.01 level (2 tailed)

The Relationship between Work from Home Perception with Emotional Well-Being Domain among Civil Servants in the COVID-19 Pandemic

Table 3 show the finding of the relationship between perception of working from home with emotional well-being domain among respondents. The result of the analysis found that work from home had a significant positive correlation with emotional well-being domain, with sig values. = .000 and R = .148.

Table 3. Correlation of Work from Home with Emotional Well-Being Domain

Variables	Work from Home	
	Sig.	Correlation
Emotional Well-Being Domain	.000	.148**

** . Correlation is significant at the 0.01 level (2 tailed)

The Relationship between Work from Home Perception with Emotion Regulation Domain among Civil Servants in the COVID-19 Pandemic

Table 4 show the finding of the relationship between perception of working from home with emotion regulation domain among respondents. The result of the analysis found that work from home had a significant negative correlation with emotion regulation domain, with sig values. = .000 and R = -.419.

Table 4. Correlation of Work from Home with Emotion Regulation Domain

Variables	Work from Home	
	Sig.	Correlation
Emotion Regulation Domain	.000	-.419**

** . Correlation is significant at the 0.01 level (2 tailed)

Discussion

This study was conducted to test the relationship of the perception of work from home with the emotional intelligence domain among civil servants. The results showed that the Work from Home Perception with the emotional intelligence domains, namely, the domains of Emotion, Self-Awareness, Emotional Well-Being, and

Emotion Regulation of COVID-19 Challenge, had the significant positive and negative correlation. Although the amount of the contribution of these effect in terms of percentage is not too great for any domain on the perception of work from home among respondents, it can be interpreted that the domains of emotional intelligence of the respondents in this study have positive influence in helping to retain the right elements well-being and emotional stability. Quite clearly, the domain of emotional intelligence also serves as one of the variables that can influence the perception of working from home among respondents. Its mean as well that how employees manage their emotion and mood while working from home has interrelated each other. This is because if employees have the capability to control their emotions, sensitive to any stress and can handle work well even working from home, then their emotional intelligence abilities have helped them manage themselves and their surroundings in a controlled manner. However, the findings of this study also show that there is a significant negative correlation specific to the question of emotional regulation during pandemic challenges while working from home. This situation can be concluded that employees need a stable level of emotional intelligence to help them be more resilient to work at home during a pandemic.

This interpretation finding study slightly in line with what had Shivangi (2020) concluded by his research which is had shown clearly that emotional intelligence has an impact on the employee performance and on stress level even while working from home. An emotional intelligent workforce can give a competitive advantage over others. In summary, the work-from-home policy is no less important in influencing employees whether they can stabilize issues related to depression, anxiety, and inner self-esteem in the wake of the COVID-19 pandemic challenge. In short, the element of emotional intelligence is one of the important and necessary elements in employees who work from home, so that they are still on track and not lost their direction despite having to work from home and away from the employer's observation.

In another perspective which is still in the main function of emotional intelligence and work from home, the relationship of working from home with a sense of emotion among employees is in line with the findings of the online study Vase.ai when as many as 35% of 1,100 respondents admitted they were somewhat stressed due to unstable internet connection while working from home (Rusli Ahmad, 2020). The findings of the study also prove that the scenario of working from home has increased anxiety among employees when as many as 77% of respondents admitted that they face difficulties when working from home. In fact, the study also showed that only 9% of Malaysians really like working from home. The findings of the study are somewhat contradictory to the findings of a study by Randstad Workmonitor through the Head of Operations of Randstad Malaysia in 2021, when 48% of respondents want a combination of working from home and working in the office can continue after the COVID-19 pandemic, while 14% want to work from the house is maintained (Hazwan, 2021). The situation highlights the importance of employees having to balance work commitments with self and family management while at home, thus testing their ability in managing their unstable emotion. The findings of the study above clearly show that workers who work from home do indeed require a high level of emotional intelligence in dealing with the challenges of working from home during a pandemic, as it has to do with emotional regulation issues. Working from home presents its own set of issues in terms of communication, job ownership, and quality of work. People with a higher emotional intelligence take responsibility for their work

and don't need to be monitored to keep it up to par. Employees who worked from home had a better work-life balance because they could spend more time with their families and pursue their hobbies (Shivangi, 2020).

Working from home presents its own set of issues in terms of communication, job ownership, and quality of work. People with a higher emotional intelligence take responsibility for their work and don't need to be monitored to keep it up to par. The ability in dealing with the symptoms, such emotional disorder is also in line with the dimension of emotional intelligence introduced by Bar-On (1997) in the framework of his model, which contains sub domains related to stress management. According to him, people who have high emotional intelligence is an intelligent individual in managing the pressure almost every time. This situation can also highlight the importance that an individual who can manage their unstable emotion is an individual who can work well under control even in an atmosphere of pressure. The findings of this study also support the findings of the study by Salovey and Sluyter (1997) who stated that individuals who have emotional intelligence are more able to regulate any form of their emotions, and even able to handle emotions that involve others. In short, the function of emotional intelligence is no less important in helping to ensure that employees are not in unstable mood and irrational mind in the wake of the COVID-19 pandemic threat and challenges, while they need to be working at home.

Conclusion

Overall, the results of the study indicate that the COVID-19 pandemic has its own distinct effects on civil servants. However, the effect can be stabilized by the influence of emotional intelligence that contributes to a normal level for the work from home perception among employees. The relationship between work from home perception with emotional intelligence domain is clearly showed that the ability to control emotions to achieve emotional well-being was found to help employees to be in a calmer and more controlled state. This needs to be highlighted even when the surrounding conditions are tested with the threat of dangerous diseases that not only plague the country, but also the whole world.

Recommendations

In this study, the work from home questionnaire and the emotional intelligence instrument was successfully constructed and has achieved the validity is proposed to be used as a guide to other interested researchers. The results of this study are also proposed to be used as a future reference for any organization in the government agencies.

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Strategic Activities to Improve Student Success Rate in Branch Campuses

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Abstract: Branch campuses are the open doors to those who would not otherwise be able to attend college. They are an open-access, four and two-year public regional campus. Because of open access, many students come to the branch campuses academically underprepared, struggle with math and writing deficiencies, and have difficulties acclimating to college. Only small percentage of STEM majors pass their developmental math courses. This paper discusses several strategies designed to help students succeed at branch campuses.

Keywords: Student success, Developmental math

Introduction

Students come to branch Campuses academically underprepared, struggle with math and writing deficiencies, and have difficulties acclimating to college. Branch campuses are also typically understaffed in academic advising and there is no specific advisor support offered for developmental or at-risk students.

Many branch campuses serve regions with a wealth of industrial and agricultural businesses that need to keep the STEM talent pipeline local. In order to accomplish this, the campus needs to improve academic support and infrastructure for all students, particularly those who are academically underprepared for STEM careers with math deficiencies, and those from underserved and underrepresented populations. A more cohesive student success program coupled with intrusive advising and improved developmental math programming and technology will enhance student services and academic support at the campus ^[1-5]. The following strategic activities will improve success rate: 1. Expand/Revitalize Student Success Center and Support Services; 2. Expand/Improve Academic Advising for Developmental Math/At-Risk Students; 3. Expand/Improve Developmental Math Program; 4. Improve Student Interest in Math.

Profile of Today's Students

We must first recognize that 21st century students do not fit the traditional profile (see Figure 1).



Figure 1. 21st Century Students Profile

Expand/Improve Student Success Center

Success coaching is a form of peer mentoring that helps students prepare for their courses and address obstacles that hinder their ability to stay in school. The Student Success Coach should be housed within the Student Success Center (SSC). The coach will incorporate comprehensive support services tailored to address students' unique needs and helps them identify their academic, personal, and career goals while helping them address any barriers that keep them from completing college. The Student Success Coach will help identify and familiarize students with both campus and community resources that help them stay in college. Since large number of students are Pell-eligible, Student Success Coaches will be trained to be familiar and current with resources that may alleviate financial burdens such as locating and applying for jobs and scholarships, applying for Medicaid and SNAP benefits, and locating childcare and other resources that benefit high-financial need students. Success Coaches will also help students create course calendars, make tutoring appointments, review course syllabi, operate the college's learning management system and more.

Expand/Improve Advising

Academic support providers are often challenged to identify students who need assistance because standardized tests are not particularly helpful in predicting which student will experience academic difficulty, and students meeting with an advisor one time per semester is not enough time for the advisors to detect if they are struggling to navigate college resources that will help them earn good grades. Research showed that these students do not

have the knowledge they need regarding college resources to be successful, and they do not know that they need help until it is too late, they do not take the steps necessary to seek it out, or they do not know what questions to ask to be successful. They reported that developmental advising is one strategy to help first-time, first-generation students with little to no social know-how navigate college.

Hiring a developmental advisor is needed. The Development Advisor will serve as a connection to the success coaches, as well as the Student Success Center and tutors, referring students to make an appointment with success coaches and/or tutors, and communicating with developmental math faculty to ensure particular struggling students' needs are met. To implement a meaningful advising philosophy, the developmental advisors need to attend professional development workshops, meet other professionals in the field, learn about opportunities and challenges in the field, and have access to experts in the association.

Expand/Improve Developmental Math Program

Supplementing traditional coursework with additional instruction or support is thought to improve success by providing developmental education students extra academic and non-academic resources. As an example, tutoring and math labs are designed to provide individualized instruction to meet students' unique academic needs. With additional embedded tutors in the Math Center, students will receive that faster, on-demand help they need as called for in theory. Adding more embedded tutors will reduce the frustration students often experience while being stuck on a specific problem.

Improve Student Interest in Math

What does it take to improve student success and interest in math? The Philadelphia-based Society for Industrial and Applied Mathematics (SIAM) asked more than 400 U.S. high school math teachers for their advice related to teaching and learning mathematics. They recommended:

1. Build confidence. More than two-thirds of respondents (68 percent) cited lack of confidence as a problem that prevents their students from succeeding in mathematics.
2. Encourage questioning and make space for curiosity. Sixty-six percent of respondents said their best piece of advice for students looking to do well in math was to not only pay attention in class but also ask for clarification when they need to better understand something.
3. Emphasize conceptual understanding over procedure. Three out of four respondents (75 percent) emphasized that working hard to understand math concepts and when to apply them versus simply memorizing formulas is essential to doing well.
4. Provide authentic problems that increase students' drive to engage with math. Sixty-three percent of participants pointed to students' desire, initiative, and motivation to succeed in math as being critical, and the majority of them (80 percent) said that applying math to real-world problems helps increase both student interest and understanding.^{[1][2]}

5. Share positive attitudes about math. Teachers suggest that parents avoid talking negatively about math, and especially avoid saying that it is hard or useless (74 percent)—instead they should encourage their kids not to give up, and help them find math mentors when they're not able to answer questions (71 percent).

Conclusion

The strategies listed above in several published studies showed that they do improve student success. Students who received Success Center tutoring services during the 2012–2015 academic years had an overall success rate 7% higher than the campus-wide average for students enrolled in courses that provided tutoring support but did not utilize Center services. Also, Retention rates for students who received Center services were slightly higher than the campus-wide average for students enrolled in courses that provided tutoring support but did not utilize Center services, with an average increase of 3%.

As a branch campus educator and previous administrator, I plan to seek a grant to implement the strategies discussed in this paper and publish student success data after the implementation is complete.

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An Epidemiological and Intersectional Approach to Understanding African Descent Women's HIV Risk in the United States

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Abstract: Despite the advent of life-saving prevention and treatment strategies which have helped to slow the HIV/AIDS epidemic, the incidence, prevalence, and mortality rates for African descent women far outnumber the rates of all other racial groups of women in the United States of America. While risk-taking behavior as well as women's biological vulnerabilities are important factors in explaining the disproportionate HIV/AIDS incidence and prevalence rates among all racial groups of women; alone, they are inadequate in explaining the disparity faced by African descent women. Examining the environment in which "risky behaviors" take place is critical in understanding the HIV/AIDS epidemic among African descent women. An understanding of the epidemic among African descent women is crucial in developing effective prevention and treatment strategies. The paper will discuss the conditions and intersecting factors which underlie the HIV/AIDS health disparity among women of African descent in the U.S. An epidemiological framework along with an intersectional approach will be used to guide the discussion.

Keywords: HIV/AIDS, African descent women, Intersectionality, Epidemiological

Introduction

Over the past three decades medical and public health officials as well as social science theorist and researchers alike have outlined the toll that the HIV/AIDS epidemic continues to exact on African descent populations and communities in the United States (Airhihenbuwa, Webster, Okoror, Shine & Bankhead, 2002; Center for Disease Control and Prevention [CDC], 2021). The impact has been cited as a public health, economic, social, and human rights crisis especially for low-income heterosexual African descent women (CDC, 2021; NASTAD, 2008; Pointdexter, 2009). Despite the advent of life-saving prevention and treatment strategies which have helped to slow the epidemic, most notably among white homosexual males, people of African descent continue to account for a higher proportion of cases at all stages of HIV/AIDS – from infection with HIV to death with AIDS (CDC, 2021).

Understanding the epidemic among low-income African descent women is critical to developing effective prevention and treatment strategies (Dicks, 1994; El Bassel, Caldeira, Ruglass, & Gilbert, 2009; NASTAD,

2008). This paper will discuss the factors which underlie the HIV/AIDS health disparity among women of African descent. An epidemiological framework will be used to guide the discussion. This examination will include an intersectional review of the risk factors that contribute to African descent women's heightened susceptibility to HIV infection. The discussion will conclude with the identification of one key issues which warrant further investigation.

Epidemiological Framework

Dicks (1994) used an epidemiological approach to critically analyze the multi-causal factors and conditions which support the spread of HIV/AIDS among women of African descent. In this analysis, the author does not view the epidemic as merely a problem of heterosexual contamination, but as an interplay between several factors – vector (carriers of the virus- heterosexual partners), agent (body fluids containing HIV), host (African descent women), environment (conditions which act as protectors/enablers of exposure) and reservoir (factors/conditions most favorable for the reproduction of the disease) [Dicks, 1994]. A major assumption of the epidemiological approach, is that human disease does not arise in a vacuum but results from interactions between three components -- host, agent and environment (Gordis, 2009).

Agent and Host

Primary modes of transmission explain how HIV is passed from one individual to another. HIV is passed directly from one person to another through contaminated *human body fluids*. These include blood, semen, vaginal fluids, and breast milk. Any activity which allows the direct transfer of any of these body fluids (agents) can place any individual (host) at risk of contracting HIV (CDC, 2021). Engaging in risky behaviors such as *unprotected* vaginal or anal sexual contact with a partner (male or female) that practices high risk behaviors, engaging in intercourse with multiple concurrent sexual partners, ingesting breast milk from a woman living with HIV/AIDS, and/or sharing “dirty” needles during intravenous drug use (IDU) can place both females and males at risk of contracting HIV (CDC, 2021).

As receptive sexual partners, women are more likely than men to contract HIV during unprotected vaginal intercourse (NASTAD, 2008; Wingood & DiClemente, 2000). Women are eight times more likely to contract HIV during unprotected sexual intercourse than their male partner (Wingood & DiClemente, 2000). Eighty-five percent (85%) of all new infections for all groups of women, in 2020, were attributed to unsafe **heterosexual** contact (CDC, 2021). For women of African descent, heterosexual contact accounted for 92% of all new infections followed (CDC, 2021). Although, “risk-taking behaviors” as well as women's biological vulnerabilities are important factors in explaining the disproportionate HIV/AIDS incidence and prevalence rates among all racial groups of women; alone, they are inadequate in explaining the disparity faced by African descent women. Examining the environment in which these risky behaviors take place is critical in understanding the HIV/AIDS epidemic among African descent women (Dicks, 1994; El Bassel, Caldeira, Ruglass & Gilbert, 2009; McNair & Prather, 2004; NASTAD, 2008; Wingood & Diclemente, 2000). Braveman

and Gottlieb (2014) highlighted the importance of social factors in shaping health outcomes, noting that, ““despite challenges, controversies, and unanswered questions, the tremendous advances in knowledge that have occurred in the past 25 years leave little room for doubt that social factors are powerful determinants of health” (p.27). This suggests that the HIV epidemic is driven by overlapping and inter-related factors which impact people's choices and ultimately drive risk behaviors (World Health Organization [WHO], n.d).

Environment

Race, gender, and class oppression are specific influences found within the environment that promote African descent women's powerless status in the U. S, thereby indirectly increasing their susceptibility to HIV/AIDS (Adimora, Schoenbach & Flores-Moore, 2009; Dicks, 1994; NASTAD, 2008). Gender and race identity have traditionally shaped and affirmed women's disempowered status and proximity to economic, physical, and social risks [**exposures**] (Wingood & DiClemente, 2000). Race, class and gender oppression dictates women's **social location** (Arnold, Hsu, Pipkin, McFarland, & Rutherford, 2009; Sobó, 2003). It also helps to shape their inherent perception of HIV/AIDS risk (McNair and Prather, 2004; NASTAD, 2008; Sobó, 2003; Wingood & DiClemente, 2000). Before examining how each oppression impacts African descent women, it would first be useful to define oppression.

Oppression can be simply expressed as the domination of one powerful group – politically, socially, economically, and culturally – over a subordinate group (Young, 2001). Young (2001) advances a typology of oppression with five specific categories or “faces”. These are exploitation, marginalization, powerlessness, cultural imperialism, and violence (Young, 2001). These “faces” are thought to encapsulate the “lived” experience and shape the social identity of all oppressed groups. Consistent with the empowerment literature, power and powerlessness are key concepts in relation to oppression (Gutierrez & Lewis, 1999; Lee, 1994; Simon, 1994). Social problems stem directly from oppression (Gutierrez & Lewis, 1999; Lee, 1994; Simon, 1994). Sources of oppression for African descent women are embedded in their race, class, and gender socialization process which reflect the historical and current social norms in our society (Harro, 2001). These are the pervasive, consistent, circular, self-perpetuating and mostly invisible norms, rules, habits, and insidious symbols from which women's **social identities** are formed (Harro, 2001). Social identity describes social categories in which individuals claim membership and the personal meanings associated with them (Shields, 2008). An inherent imbalance of power is achieved by dominant groups in society by devaluing subordinate groups. A stigmatized view of the oppressed is firmly adopted, as the scorned attributes of the oppressed are regarded as an undesired differentness or a spoiled identity (Goffman, 1963). African descent women who live in poverty face a triple bind, in that; as members of three stigmatized groups (race, class, and gender) in the U.S, they are oppressed on three levels. Once infected, they take on a fourth stigmatized social identity (Airhihenbuwa et al., 2002; Berger, 2004). These women receive negative messages regarding low self-worth as it relates to their race, gender, class status on a daily basis. These messages bombard them through caretakers, common institutions (school, media and church) and are to their detriment. Importantly, women of African descent in the U.S are not a monolithic group. Although commonly referred to as “African American” or just

“Black”, women of African descent have diverse ethnic backgrounds (Broman et al., 2009). Many researchers note that ethnicity, especially among first generation immigrants, is also an important factor that helps to shape the group’s *identity* and potential for health risks (Broman et al., 2009; Hoffman et al., 2008; Shedlin et al., 2006). Despite one’s nationality/culture, once in the U.S, African descent immigrant groups inherit an already discredited and spoiled racial identity () and are influenced by the same social factors that shape the experiences of U.S born African descent populations (Goffman,1963; Hoffman et al., 2008; Jordan, 1968). It is important to understand how social identities has determined the group’s social location.

Race

The objectification and stigmatization of African men and women in the U.S was delivered through their commodification in chattel slavery (Baron, 1971; Bennet, 1984; Dicks; 1994). Their unique history of enslavement and experience of individual and institutional racism has directly impacted the population’s access to valued resources and channels of opportunity and privilege (Baron, 1971; Cummings and Jackson, 2008; Dicks, 1994). Importantly, race is a social construction and not a biological fact (Cummings & Jackson, 2008).

Beginning with slavery and the slave trade in the 17th century, people of African descent were considered property and/or non-juridical beings, and relegated to the lowest ebb of society through de jure and de facto legal and social policies (fugitive slave clause, Black Codes, Jim Crow Laws) [Berry, 1994; Bennet, 1984]. For more than 400 years, these institutionalized policies presented power blocks which limited the group’s access to essential resources needed for subsistence and, more importantly, for self actualization. People of African descent were also subjected to consistent covert and overt violent terrorist acts that were socially sanctioned and are a part of this nation’s blueprint (Berry, 1994). It was not until the second Civil Rights Movement (20th century) that African descent groups fought for and were legally guaranteed some of the most fundamental human rights already extended to people of European descent in the U.S.

The second Civil Rights Movement was marked by the expansion of many first generation (civil and political) human rights, insofar as there were notable changes to the U.S legal structures (Rule of Law), that were predicated on the successful integration of human rights principles/values into the U.S legal system. These include freedom of speech, the right to a fair trial, and freedom of religion, as well as voting rights. However, in spite of gaining access to political and civil rights, the masses of African descent people in the U.S still have limited access to economic, and social rights (second generation human rights) which define their disadvantaged position in a low socio-economic class, still, in the 21st century. Second generation human rights ensure that different members of the citizenry have equal conditions and treatment. They include (but are not limited to) the right to employment, adequate housing, and health care. Whereas, political and civil rights required only that agents **refrain** from interfering with the group’s attempts at accessing a right, such as voting; social and economic rights required that the government **act positively** in the expansion of tangible benefits. Past institutionalized discriminatory laws, policies and practices as well as structural changes in the U.S economy have resulted in current structurally oppressive conditions which underlie the poverty among a great majority of

people of African descent in the U.S (Cummings & Jackson, 2008; Wilson, 1987).

Class

In 1999 Rank and Hirschl found that nearly every African descent adult in the U.S “will at some point experience a year below the poverty line” (p.212). Compelling evidence indicates that race and ethnicity correlate with persistent, and often increasing, health disparities among U.S. populations (Cummings & Jackson, 2008; House, 2001; Bent-Goodley, 2007). House (2001), suggests that race and socio-economic status influences people’s “exposure to and experiences with virtually all known psycho-social, as well as many environmental and biomedical risk factors, and these risk factors help to explain the size and persistence of social disparities in health” (p.125). African descent women are more likely to have higher rates of infant mortality, cardiovascular disease, diabetes, hypertension, HIV infection, STDs, cancer, obesity, lupus, and poor dental care (CDC, 2006). They are also more likely to be concentrated in resource-poor urban centers (Cummings & Jackson, 2008; Wilson, 1987). These areas are characterized by deteriorating housing; single female headed households; high rates of teenage pregnancy; unemployment; low skills; low educational attainment; easy access to and use of illicit drugs; high rates of interpersonal violence; crime and high rates of incarceration (male and female); social isolation as well as despair (Wilson, 1987). These conditions are directly related to the disparity of HIV/AIDS in the African descent community, specifically among African descent women (Airhihenbuwa et al., 2002; Cummings & Jackson, 2006; House, 2001). In the United States, rates of HIV/AIDS are highest in urban areas (CDC, 2019).

African descent people represent approximately 13% of the population; however, 23.8% of those who live in poverty (Census Bureau, 2019). However, there are more African descent women living in poverty than are African descent men (Census Bureau, 2019). Unlike African descent men who face race and class oppression, African descent women also grapple with gender oppression as well. For African descent women race, class and **gender** oppression heighten their exposure to risk factors for contracting HIV (Cummings & Jackson, 2008). Cummings and Jackson (2008) state:

“Race, gender, and socioeconomic status (SES) are social status categories that predict the differential distribution of disease, disability, and death in society” (p.137) ... “In general, Whites relative to Blacks and men relative to women have higher levels of (SES). It is not surprising to find, then, that Black women are the **most disadvantaged**, especially in terms of rates of poverty” (p.139).

House (2001) suggests that improvements in a groups’ socioeconomic status can significantly change their exposure to an array of health risk factors.

Gender

Gender power theory holds that three major domains characterize the gendered relationships between men and

women: the division of labor – the stratification of men and women into specific occupations, the division of power – power inequities between men and women and the structure of cathexis – affective attachments and social norms (Wingood & Diclemente, 2000). In all three domains men, in particular cis-gendered European descent men, have the ability to act or change in any desired direction in relation to women and transgender populations.

Men historically have defined and are positioned at the top of the social hierarchy, while women of all races are subordinated in society. Importantly, both gender and race identity are linked to prescriptive and proscriptive stereotypes, which become normative over time, and support power inequalities (Eagly, Beall & Steinberg, 2004). Essentially, gender assignment, the constructed social “fact” of being identified as a girl or woman, shapes women’s roles, opportunities, burdens, and vulnerabilities in society (Crawford, 2006; Wingood & Diclemente, 2000). Women are more likely than men to be segregated into low-paying occupations, receive unequal wages for comparable work, are more susceptible to sexual harassment, abuse and spend more time providing unpaid care giving (Crawford, 2006). These underlie the feminization of poverty. Women’s disempowered gender status as well as increased exposure to sexual abuse and intimate partner violence (IPV) impacts their possession of culturally normative beliefs which also negatively impact their ability to communicate and negotiate male condom use (Amaro & Raj, 2000; Harvey et al., 2002; Kull, 2010; Parker, 2009; Peasant et al., 2018; Soler et al., 2000; Wingood and DiClemente, 2000).

While gender oppression is critical in shaping the social identity of African descent women (as with race, and class), gender alone cannot be used as a single analytic frame for examining HIV risk factors among African descent women and/or the treatment of African descent women living with HIV/AIDS (Hill-Collins, 2001). Gender (like race) is socially constructed. Although all groups of women are to some extent objectified; in a social context where oppression is racialized, the way women experience gender is very much *influenced* by their racial identity (Hill-Collins, 2001; Higginbotham, 1992). Cultural standards for physical beauty in the U.S were formed during the period of enslavement in the U.S and used as a form of social control. While “white” skin became synonymous with beauty, black skin and the phenotypic characteristics that were associated with the African (the subordinated group), became synonymous with a state of ugliness. Black skin was “*othered*,” seen as a spoiled identity which departed from “normalness”. European descent women were represented by images of purity and chastity and came to epitomize beauty (Hill-Collins, 2001). African descent women, the antithesis, are represented by images of impurity and indifference.

Hill-Collins (2001) and West (2008) detail three stigmatizing categories in which African descent women are traditionally placed. These are mammy—an asexual care giving female well suited for domestic work, jezebel – oversexed, sexually promiscuous, and immoral female, and sapphire—angry and combative, strong and masculine female. These stereotypes influence how African descent women are perceived and treated. If internalized it can also influence how they perceive themselves. A full meaning of womanhood could not be claimed by African descent women, precisely because they already inherited a stigmatized racial identity (Higginbotham, 1992 & Hill-Collins, 2001). These stereotypical scripts have been intricately interwoven into

the blueprint of the United States and persist even in current times (Berger, 2004; Collins, 2001).

Intersectionality

Intersectionality is rooted in an experience-based, feminist epistemology (Hill-Collins, 2001). It was developed to address the absence of race as a critical factor in the examination of womanhood in traditional feminist thought (Cole, 2009). Black Feminism reflects the unique themes of African descent women's experiences. Although the term intersectionality was first posited by legal scholar and critical race theorist, Kimberle' Crenshaw in the 20th century, this concept has deep roots that extend out of the historical scholarship and activism of African descent women beginning as early as the 18th century in the United States (Cole, 2009). Intersectionality is an interpretive framework used to examine how distinct oppression converges simultaneously and operates as a single phenomenon in its impact on the lives of African descent women in the United States (Hill-Collins, 2000; Kelly, 2009). The multiple oppressions of race, gender, and class intersect and create specific ways in which African descent women experience HIV/AIDS. The implication is that it is not always possible to say with certainty that a woman's gender or race or class alone exposes them to HIV risks, but rather, it is the combination of oppressive circumstances. African descent women living in poverty, in this view, can not separate out their multiple social identities. They are **resource poor, of African descent and women** at the same time. The **intersection** of race, gender, and class oppression creates a reservoir of exposures and psychosocial risk factors which are most favorable for the reproduction of HIV/AIDS (Dicks, 1994; Wingood & DiClemente, 2000;). Exogenous factors such as the depressed social and economic realities of low-income African descent populations that live in de facto segregated communities exacerbate the spread of diseases. These women's sexual networking patterns are formed within a depressed context which limit choices (Adimora, Schoenbach & Flores-Moore, 2009). These factors directly impact the development of healthy sexual networks and therefore make low-income African descent women, more susceptible to infectious diseases, such as HIV/AIDS than any other group of women.

Crenshaw advances three understandings of intersectionality -- structural, political, and representation. The first structural intersectionality helps to explain how women are socially situated within overlapping structures of domination. Gender and class oppression are exacerbated by racial discriminatory practices which may affect a women's access to essential resources such as employment, livable wages, and housing and expose them to a unique combination of HIV risk factors. Political intersectionality refers to ways in which political and discursive practices relating to gender and race are interrelated. This framework holds that women are members of two subordinated groups (gender and race) with opposing political agendas. The last representation intersectionality suggests that "popular culture produces images and representations that converge to create unique and specific narratives deemed to be appropriate for women of color" (Berger, 2004, p.20). Berger (2004) has built upon the work of Crenshaw and Hill-Collins by putting forth the concept of **intersectional stigma**. She posits that African descent women are not only pushed to the fringes because of their stigmatized race, class, and gender identity; they are also stigmatized because of their HIV positive status. The four categories of HIV positive stigmas identified by Berger (2004) are – drug use, sex work, sexual trauma and

HIV/AIDS virus.

Scholars have characterized feminist intersectionality as an essential and critical theory for understanding gender, a theoretical and methodological approach to research in the social sciences and as distinct approach to research on health and healthcare inequalities (Berger, 2004; Hill-Collins, 2001; Kelly, 2009;). Because heterosexual contact accounted for 92% of all new infections in 2011, it is important to first discuss why African descent males and African descent women (vectors) are uniquely impacted by HIV/AIDS (CDC, 2021).

Vector: African Descent Men, Women and HIV/AIDS

African descent men are disproportionately affected by HIV/AIDS. In 2019, they accounted for approximately 39% of the estimated number of adults and adolescents living with HIV/AIDS (CDC, 2020). Higher rates of HIV infection among African descent men have important implications for the HIV risk of African descent women (McNair and Prather, 2004; NASTAD, 2008). Among African descent men 59% of HIV diagnosis in 2018 were associated with male-to male sexual contact (Kaiser Family Foundation [KFF], 2020).

Because of the stigma and danger surrounding gay sexuality in the Black community many men choose to live a covert gay lifestyle, while passing as heterosexuals (Dicks, 1994; Gipson, 2006). Studies report that men who engage in sex with other men and identify as non-homosexuals are more likely to engage in risky sexual behaviors than men who have sex with women (Browne, Clubb, Wang & Wagner, 2009; Gipson, 2006). They are also more likely to engage in risky behaviors such as having sex while intoxicated (Browne, Clubb, Wang & Wagner, 2009; Jefferies, 2009). This reality is impacted by the conservative cis-gendered beliefs held within African descent communities around sexuality.

Research suggests that the internalization of conservative religious beliefs is associated with heterosexism (Schulte & Battle, 2004). The Black church has historically played a major role in African descent communities (Dicks, 1994; Schulte & Battle, 2004). Two important functions carried out by this institution include social welfare provision, and social and political planning. Schulte and Battle (2004) found that differences in attitudes toward lesbians and gay men while not related to ethnicity were strongly related to religious attendance and even more so with attendance in the Black Church.

Also, important to note are the impact of policies such as the “War on Drugs” direct impact on the disproportionate incarceration rates and removal of African descent men from low-income communities. These policies have directly impacted the already lopsided sex-ratio balance in low -income communities, where women already outnumber men (Durmont, 2013). Although there are speculations about the rate of HIV transmission that occur in correctional facilities, it is widely known that inmates engage in drug-related and sexual risk behaviors while in prison (Hammett, 2008). Krebs (2002) found that forty-four (44%) of inmates in a southeastern state prison had sexual contact with other inmates. Despite the surmounting evidence, the

distribution of condom and clean needles/syringes are banned in all federal and most state correctional facilities. Young African descent men between the ages 18-29 years old are disproportionately incarcerated at higher rates than other groups of men. For instance, while they make up only fourteen percent (14%) of the general male population in 2005, they represented over forty percent (40%) of the U.S prison population (KFF, 2006). If men who identify as non-homosexuals MSM engage in unprotected sex while incarcerated, many will, once out of prison, resume engaging in heterosexual contact with women suggest that high rates of exposure to the criminal justice system have important implications for African descent men's susceptibility to HIV (Blakenship, Smoyer, Bray, & Mattocks 2005; McNair & Prather, 2004). Findings released from a CDC epidemiological investigation support this view. Over a 17 -year span (1988-2005), 88 men who were known to have entered the Georgia Correctional System HIV negative, tested positive upon release. Sixty seven percent (67%) of these men were African descent (CDC, 2006).

Spikes et al. (2009) conducted study comparing demographics and sexual/drug risks behaviors among African descent men who either had sex with women only, men only or both men and women. They found that respondents with both male and female partners reported more non-injection drug use, sexual exchange activities, and also reported having more sexual partners than the other two groups of men (Spikes, Purcell, Williams, Chen, Ding & Sullivan, 2009). Bisexual men were more likely to report having unprotected sex with a consistent female partner whose status was unknown to them and they also reported using drugs during their last episode of sexual intercourse (Spikes et al., 2009). The implications are astounding, especially since African descent women are more likely to contract through a steady partner (El-Bassel, Caldeira, Ruglass, & Gilbert, 2009).

There are three social factors in particular that shape the impact of the epidemic among lo-income African descent women – low level condom use, sex ratio imbalance and high rates of HIV incidence and prevalence rates among African descent men (McNair & Prather, 2004). Despite the common stereotypical script that portray African descent women as being promiscuous and over-sexed (Berger, 2004; Crawford; 2006; Hill-Collins, 2001 & Hoffman-Gotez; Higginbotham, 1992; West, 2008), African descent women are more likely to contract HIV from a steady sexual partner who they are less likely to use condoms with during sexual intercourse (El-Bassel, et al., 2009; Wyatt, Carmona, Loeb, Guthrie, Chin, & Gordon, 2000).

The fact that African descent women are less likely to partner with men outside of their race, has significant implications for African descent women who live in low-income communities (McNair and Prather, 2004; NASTAD, 2008; Wyatt, et al., 2000). The supply of marriageable or employed Black men is severely decreased due to high rates of incarceration, death by homicide and HIV/AIDS, as well as unemployment (Wilson, 1987; NASTAD, 2008). As mentioned before, African descent men make-up a substantial amount of those who are incarcerated. The homicide death rate for African descent men, in 2003, was three times the rate of Latino men and eight times the rate of European descent men. The HIV/AIDS mortality rates are also significantly higher among African descent men than any other group (male or female) in the U.S (CDC, 2021). This reality underlies a **sex ratio imbalance** in African descent communities. There are fewer men available to women.

African descent men who are available are also significantly impacted by the epidemic as well. In this context African descent women's sexual desire, choices and health are politicized (Tolman & Szalacha, 1999). Because there are fewer men available, these women are more likely to engage in high-risk behaviors (Gilbert & Wright, 2003 & McNair & Prather, 2004).

Many researchers posit that low-income African descent women's social location compels them to interface with various HIV risk factors that are unique to their stigmatized social identities. Gender, race, and class oppression individually expose women to various risk factors; however, when these risk factors intersect, they create a **reservoir** (a deadly cocktail) of compound risk factors which speeds up the spread of the virus in African descent communities. African descent women, under these conditions, engage in multiple concurrent partnerships, which make them more susceptible to contracting HIV (McNair and Prather, 2004). In isolation a sex ratio imbalance or low condom usage or men's HIV infection status may not have had such a huge impact on women, however, when combined they are very potent. These variables are, themselves, significantly related to the disempowered status of African descent women *and men* in the U.S. Prevention strategies aimed at African descent women must move beyond just being gender responsive or just targeting social cognitive behavioral risk to examining the unique social determinants of health which heighten women's risk. Sobo (1993) conducted a qualitative study which examined the connection between low-income, city-dwelling *African-American* women's understanding of heterosexual relationships and limited use of condoms. In this study the researcher found that the women's perception of HIV risk is just one of many risks they face on a daily basis (Sobo, 1993). Sobo (1993) found that even though unprotected sex may pose risk for African descent women, depending on the *situation* in which the choice is made perceived benefits may outweigh the perceived risk.

Key Issue

A key issue that warrants further investigation is the intra-racial differences found among African descent women in the United States and its possible connection with the rise in infection.

In their study, Hoffman et al. (2008) suggest that although *West Indian Blacks* are exposed to the same social factors such as "racial discrimination and the potential for social and economic marginalization"; the distinctiveness of their migration experiences, social conditions which support gender inequalities in their home country and subsequent cultural beliefs held around traditional relationship and sexual norms may increase the group's risk of contracting HIV and other sexually transmitted infections (Hoffman et al., 2009, p.2042)). As suggested, when examining African descent women's risk of becoming infected with HIV, it is important to take into consideration not only the intersection of race, class, and gender but also ethnicity (Bent-Goodley, 2007; Cao, Marsh, & Shin, 2008; Hoffman et al., 2008). While many research and scholarship have critically examined the societal influences which increase African descent women's perception of HIV risk in the U.S, much of the scholarship, research, and subsequent prevention intervention strategies have lumped various ethnic groups of African descent women together (Airhihenbuwa et al., 2002; Bent-Goodley, 2007; McNair & Prather,

2004; Sobo, 1993; Sormanti, et al., 2004;). African descent women are not identified as distinct groups of women with diverse cultures and experiences but as either “African-American” or just “Black”. Agyemang, Bhopal, and Bruijnzeels (2005) note that the use of these broad terms in representing diverse groups of African descent people in scholarly writing is not only incorrect but also offensive.

Culture can affect a group’s perception of and response to health and illnesses (Bhui & Dinos, 2008; Bent-Goodley, 2007). Bhui and Dinos (2008) note, “culture is linked to the way emotions, mental distress, social problems, and physical illness are perceived” (p.411). The authors call for appropriate labels for describing the various groups which not only identifies the race but also the ethnicity of each group (Agyemang, Bhopal, & Bruijnzeels, 2005). This redress will not only enlighten researchers about the unique needs of each group but can ultimately lead to the development of more appropriate evidence-based intervention strategies. And in so doing, can help to slow the epidemic among all African descent women.

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From Inability to Expert: Using Personal Motivation to Prepare Future Reading Teachers

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Abstract: The demand for confident reading teachers is greater than ever before. To guarantee successful reading instruction, teachers across the nation are being trained in the science of reading, which focuses on explicit instruction in phonemic awareness, phonics, fluency, vocabulary, and comprehension. Large reading initiatives are tirelessly working on plans to implement the science of reading training to in-service teachers; however, what are universities doing to support their efforts? Dr. Kelli Smith, Dr. Tami Shelley, and Mrs. Pam Higgins teach reading instruction to early childhood and elementary students at Auburn University at Montgomery (AUM). Our experiences as elementary students, teachers, and leadership roles drive our desire to prepare pre-service teachers with the tools and skills needed to be confident reading educators. The following presentation will offer a more in-depth view of our motivation to learn science of reading instructional strategies so that we can best prepare our students as future reading teachers.

Keywords: Science of reading, Preservice teachers, Education courses

Introduction

The demand for confident reading teachers is greater than ever before. Based on the Alabama State Department Report Card for 2018-2019, over 55% of students in k-12 are less than proficient in reading (<https://www.alsde.edu/dept/erc/Pages/home.aspx>). Dr. Eric Mackey, State Department of Education Superintendent, along with a team of experts, passed the Alabama Literacy Act in 2019 to ensure students are proficient in foundational reading skills by the end of 3rd grade. To guarantee successful reading instruction, teachers across the state of Alabama are being trained in the science of reading, which focuses on explicit instruction in phonemic awareness, phonics, fluency, vocabulary, and comprehension. The Alabama Reading

Initiative (ARI) is tirelessly working on a plan to implement the science of reading training to in-service teachers; however, what are universities doing to support their efforts?

Dr. Kelli Smith, Dr. Tami Shelley, and Mrs. Pam Higgins teach reading instruction to early childhood and elementary students at Auburn University at Montgomery (AUM). Our experiences as elementary students, teachers, and a principal drive our desire to prepare pre-service teachers with the tools and skills needed to be confident reading educators. The following stories offer a more in-depth view of our motivation to learn science of reading instructional strategies so that we can best prepare our students as future reading teachers.

Dr. Smith's Story

I remember sitting at the small group reading table during center time, praying for the teacher to not ask me to read aloud. I was less than confident with my ability to pronounce words and read fluently. Even at six years old, I knew my foundation in reading was less than par. In the early 1980's, reading instruction was taught using the whole language approach. This curriculum operates on the premise that real-life experiences and background knowledge can facilitate new learning. The program uses different language skills such as writing, reading, listening, and speaking to build a reading foundation. Although these skills are important, there was a lack of instruction on phonemic awareness, phonics, and fluency.

During my tenure as an elementary teacher, I spent countless hours participating in professional development for reading instruction. Trainers would discuss ways to integrate phonics skills, the purpose of counting syllables, and how assessment can drive instruction. Needless to say, my ability to understand these concepts was frustrating because I had zero background knowledge to support this reasoning. I taught first grade for one year and I believe this was one of the hardest years of my teaching career. Recognizing the importance of reading instruction, coupled with my inability to grasp the concepts, was exasperating. During grade level meetings I continued to ask the questions "Why are we teaching this?" and "How is this going to help my students?" I ended that year feeling sorry for my first-grade students and decided it was time to transfer to an upper level classroom.

One of my greatest accomplishments was completing my doctorate in elementary education. Knowing I would have to write a dissertation was, undoubtedly, the most difficult part of the degree. I doubted my skills as a reader and a writer which caused great strife in the whole process. Several years later I found myself applying for a higher education position as a reading professor for pre-service elementary education students. Since my goal was to become a college instructor I decided to apply. Knowing my hesitations about teaching reading, I thought this would be a perfect time to learn effective reading strategies in order to better prepare future teachers.

Once hired I learned our school had received a grant to attend the Language Essentials for Teaching Reading and Spelling (LETRS) training. Since previous professional developments did not provide adequate training on

reading instruction, I automatically thought this program would be the same. However, what I learned on the first day of coaching was the biggest “AHA” moment of my teaching career. The LETRS program is grounded in the science of reading, which asserts that learning to read is a difficult process. Teachers implementing the strategies and lessons based on this research explicitly teach phonemic awareness, phonics, fluency, comprehension, and vocabulary skills. Using these teaching strategies can hopefully provide a solid reading foundation and expose areas of weakness. Over the two-year course, I have gained a considerable amount of knowledge on the teaching of reading. I continue to think back to the year I taught first grade. I wonder what type of readers they would have been if I had known these strategies?

Dr. Shelley’s Story

Graduating with a teaching degree in early childhood education in 1980, provided me with exposure to both whole language reading instruction and basic phonics instruction. I was definitely aware of the two camps of reading instruction. As I look back on some of my first teaching positions, I was very fortunate to be surrounded by colleagues that were committed to reading instruction being a combination of phonics and whole language. At times, this became quite a challenge with time constraints of instructional time and the need for supplementing programs in the area of phonics.

During the beginning of my career, most reading programs were based around a balanced literacy approach (whole language) which encouraged the use of authentic literature with an emphasis on comprehension. The literature rich classroom environment was established hoping to provide students with opportunities for real-world purposes for reading. Classrooms were labeled, read the room activities abounded, and enjoyment of reading was an overall goal.

Recognition of common sight words was considered a part of the whole language approach. Looking back at phonics supplementation with these balance literacy programs, I would have to say that they fell under the headings of synthetic phonics (one to one correspondence between phonemes and graphemes) and analytic phonics (phonograms used to generalize words; example “fail”, “trail”, “mail”, etc.) approaches. I was also a classroom teacher during the time of “reading and writing workshop” which is based on the teacher modeling a whole group strategy lesson and students are given blocks of time to read and practice the strategy. I had a lot of exposure to a variety of reading approaches.

This variety of reading instruction approaches still left some gaps for me when it came to reading instruction. The struggling reader was the largest gap. What happens when a student simply can’t pick up on phoneme/grapheme blending? The more explicit reading instruction measures for phonics and fully understanding the why and how of that explicit instruction was definitely a gap that existed in my training. As a college professor instructing preservice teachers in reading methods, enrollment in the Language Essentials for Teachers of Reading and Spelling (LETRS) training program was the perfect “gap filler”.

The LETRS training program provided me with the most current research on what, when, and how language skills need to be taught. LETRS has been a two-year commitment in time and learning but it has been invaluable to me as I prepare pre-service teachers to become more complete and competent instructors of reading.

Mrs. Higgins' Story

After working in education for 37 years, I can honestly say that my understanding of how to be an effective reading teacher is just now becoming cemented. Being a lifetime learner is critical in this ever-changing world of education. When I graduated from college, I had no idea how to teach a child to read. It wasn't until 20 teaching years later I was enlightened on how a child learns to read.

I began to enjoy teaching reading when I taught 4th grade and our school received a grant for purchasing sets of children's literatures to teach with instead of a program with basal readers. It forced me to develop lessons where I chose the vocabulary words and comprehension skills that would be taught. It was theme based and the students truly enjoyed the fun activities that we as a faculty created to go along with each theme. Although this was a new way of teaching, it did not meet the needs of my struggling readers. I was at a loss on how to help those who were not on grade level.

In my 19th year of teaching, the Alabama Reading Initiative (ARI) began. It focused on beginning reading in grades K-3. My school was chosen as one of the "sweet sixteen" schools in the state to pilot the initiative. Since I taught 4th grade I did not participate in the initial training; however, I was trained in the second year of its existence. It was during my 20th year of teaching that I learned about the role of a reading coach, which is a vital part of ARI. I experienced how helpful it was to have a knowledgeable coach support me in reading instruction. The next year I became a reading coach at a very low performing school.

My professional development in reading instruction was fast and furious! I learned a vast amount about the science of reading and how to effectively coach teachers of reading in my two years as a school-based coach. I then became a regional coach where I was assigned different school coaches to visit and support. I enjoyed this opportunity because it allowed me to observe many different reading programs and attempt to offer help where it was needed.

I moved on next to work with ARI at the state department level. At this point I assumed I knew all there was to know about reading, but as education goes there is always more to learn. My work was different now because I was responsible for helping create the "new learning" for teachers who were like me and had no idea how to teach reading. This was very exciting and challenging.

In conclusion, our story of becoming proficient reading instructors to pre-service elementary education students is far from over. The stressors that once overwhelmed Dr. Smith at the reading table in first grade still appear

every now and then. These anxieties continue to drive her desire to equip pre-service students with all the tools needed to be successful, because one day there will be a first-grade student sitting at their reading table praying for the teacher to not call on them. Although the LETRS training has been a two-year commitment in time and learning, Dr. Shelley believes it has been invaluable to her as she prepares pre-service teachers to become more complete and competent instructors of reading. Mrs. Higgins believes teaching pre-service teachers about reading is definitely the icing on the cake. She wants to ensure that our college students graduate with skills needed to be proficient reading teachers. Although each of our perspectives of reading instruction has varied throughout the years, there is one commonality between us: we desire to learn more about reading instruction in order to equip our students with the tools and skills needed to be effective reading teachers.

Construction and Deconstruction of Female Body in China by Technology Change: A Case Study in Napkins

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Abstract: Nowadays, Technology has played an increasingly important role in the construction of Gender roles, so we need to incorporate a technological perspective to further understand the changes and the influences in gender. This paper is mainly about the process of change of a technological product like a sanitary napkin in women's daily life and works from the era of the planned economy to the era of the market economy. Also, the paper focuses on a process of reconstructing, deconstructing, and then reconstructing the Female body during the 1970s and 2000s from a unique Menstrual Cultural perspective, such as euphemism, corporate culture, advertising placement and gender discrimination. In the end, with a gradual development of gender equality awareness, people can not only know the history and process of Chinese sanitary napkins compared to Western history like the United States but also gradually reacquaint the gaze, stigmatization and deconstruction of cultural symbols about females.

Keywords: Menstruation, Technology, Gender, Culture, Female body

Introduction

Even nowadays, every month, women around the world suffer from the ordeal of menstruation. People in poverty-stricken Nepal consider menstruation a disease and send girls in the period to a small dark room (Jolly, 2017). The governments in the highly-developed countries such as the United States and the United Kingdom have given menstrual products high taxes, prompting many girls to wear bloodied pants. (Knisely, 2018) When the regular physiological routine of menstruation is stigmatized by families and society as "dirty" and "disgusting" and considered "taboo" to talk about, girls themselves began to be unable to face up to themselves. They start to use euphemism and think that menstruation is a shameful thing.

Therefore, in my opinion, menstruation has never been just a female problem, it is a hidden "misconception" that society has avoided. In an era where technology is becoming more and more advanced, technological products are undoubtedly playing a more and more important role in our lives and have a more constructive impact on people's health. As a woman, the development of sanitary napkins on the construction of women's body, a topic that belongs to the relationship between technology and gender, is not sufficiently discussed. The

silence and avoidance of menstruation by outside cultures, as seen in the introduction above, adds to the underlying gender stereotypes. Therefore, it would be interesting to discuss these studies at the intersection of gender and technology.

In this paper, I will more focus on the evolution of the sanitary napkin has been a process of constructing, deconstructing and reconstructing the female body. I will divide this paper into two parts: theory and practice. Through the relevant literature review, I will learn why menstruation is considered unclean and dirty on a cultural level, why a technological product like the sanitary napkin is created, and what impact its development had on the social changes of Chinese women. Also, by doing the oral history, I will interview several 70s-00s women from all walks of life to ask their true feedback on sanitary napkins. Through this process, I will grasp the knowledge in detail about the impact of China's transformation from a planned economy to a market economy on women in the period, the perception that people treat menstruation as a personal and private matter, the portrayal of sanitary napkin colours in the mass media and the care given to menstruating women in public facilities.

In a word, I hope that the topic of sanitary napkins will never be avoided and female bodies will no longer be labeled by traditional culture. This issue does not seem to involve many people, but given the wide audience and the inevitable use of menstrual products by women, this research is inextricably linked to everyone in this society.

Literature Review

The Development of Menstrual Hygiene Products

The Invention and Evolution of Menstrual Hygiene Products

Menstrual belts are homemade from woven cloth, so people often refer to it "on the rag" (Kotler, 2018). It resembles a pair of buttoned trunks with a detachable crotch and two layers. The bottom layer is a cloth pad that women layer with absorbent cloth or other materials to absorb menstrual flow, and the top layer is rubber-faced and secured with elastic bands on both sides. (Delaney, Lupton, J and Toth 1988). The menstrual belt is very uncomfortable and is usually described by the women as "like a huge scarf under their skirts", feeling unfree (Menstrual Belts: Menstrual Protection in the Past, 2017). After each use, women have to wash it repeatedly, which is not only very troublesome but also very unhygienic because too much use of the rag is likely to lead to some gynaecological diseases such as Candida infection unless the cloth is disinfected. (Cloth Menstrual Pad Or Reusable Pads, 2015) The United States is experiencing rapid growth in menstrual hygiene products. During World War I, when nurses dressed the wounds of the wounded, they noticed that cellulose was much more effective at absorbing blood than the cloth bandages previously used. With this discovery, the first step towards menstrual hygiene products was officially taken- in 1918, the first cellulose Kotex sanitary napkins made from leftover highly absorbent war bandages were successfully introduced to the market. (Delaney, Lupton, J and Toth, 1988). Immediately afterwards, in 1933, the first disposable tampon Tampax is introduced (Delaney, Lupton, J and Toth, 1988), which is simpler, healthier and more portable than all previous products. (Sackren,

1939). In 1956, Leona Chalmers, a woman who has thought more about the biological condition of the general female population, updated the menstrual cup by using softer materials to make the product more like the one we use today (Stanley, 1995). With the emergence and popularity of a wide variety of menstrual hygiene products, women became unencumbered by their periods and took more autonomy to participate in the workforce, contributing to the booming US economy (Vostral, 2008).

The Introduction of Sanitary Napkins in China

Compared to the United States, China lags in developing menstrual hygiene products. Before the 1980s, China was in an era of material scarcity, and a quota system was in place. All livelihoods were received by ticket, which included menstrual belts. At one point, while Chinese women were still buying menstrual bands by ticket (Mainland planned economy odd tickets: turd ticket menstrual belt ticket, 2021), foreign women who visited China found that there were not even sanitary napkins in the country, let alone the tampons they commonly used, so upon returning home, they described the embarrassing experience to outsiders. This had directly contributed to the development of sanitary napkins in China. In 1982, China imported its first sanitary napkin production line directly from Japan's Ruiguang Co. In 1985, Xu Lianjie saw the potential of sanitary napkins in the domestic market and founded Hengan Group, which became the first company to enter the Chinese sanitary napkin market. (A Brief History of Domestic Sanitary Napkins: 35 Years of Auntie Napkins' Adventures in China., 2017) However, for women at that time, this soft, white and high-grade commodity were more or less unbelievable, and the popularity rate was not high due to the high price of sanitary napkins. Until 1999, the annual sales of sanitary napkins reached 30 billion pieces, a 15-fold increase from the 2 billion in 1990.

The Culture of Menstruation

The Stigma on Menstruation

Stigma refers to any stain or mark that makes some people different from others; it conveys that these people have physical or character defects that undermine their appearance or identity. (Goffman, 1963) Menstrual blood is such an example of it. Women in the period were considered unclean and harmful for the whole family. That is why they had to take a ritual bath before having a close imitation with men in the past (Cicurel, 2000; Goldenberg & Roberts 2004). At present, this stigmatization is widespread in women's daily life. To some extent, the design of menstrual hygiene products indicates that women have been making many efforts to hide the onset of menstruation. The external specifications are small enough to be folded in a tiny purse, and the absorbent material inside is designed so that liquids and odours can be firmly absorbed without being noticed by others (Kissling, 2006). The most apparent result of stigmatization is the emotions that women in the period feel and the others perceive. Specifically, the impression on menstruating women is violent, irritable, irrational, inexplicable sad, out of control (Johnston-Robledo & Chrisler 2013). Concerning the women in the period, they tend to pathologize their premenstrual experiences and label themselves as PMS is a form of behavioural self-protection that distances them from their physical selves to preserve their femininity, giving a decent feeling. Lack of self-control, such as choosing to say no to others, can be blamed on the body rather than the women's

desires (Ussher, 2004). As for others, due to some exaggerated information through outside media or books, they gradually develop a stereotypical image of what menstruating women look like. Gradually this emotion becomes radicalized and becomes common sense when they see women suddenly in a low or irritable mood. For example, though the women don't get in a period, as if they are sad or angry, people unconsciously think menstruation come. (Lv, 2015)

Taboo and Euphemism

Taboo is a cultural or religious practice that people are not allowed to use or talk about a specific thing because they feel offensive and embarrassed especially when talking about sex, body or race (Hornby 2004) Thus, it gradually forms privacy in people's minds. In an English saying "A man's home is in his castle" which means an individual's home is so sacred to him that nobody can be allowed inside without permission. Specifically, he doesn't like people snooping on him when bringing up something he considers to be a matter of private secrecy. (Deng, Yanchang & Liu, Runqing 1989). However, when people have to mention things in their privacy, they turn to another way to express them indirectly and politely-euphemism, an agreeable or inoffensive expression for one that may offend or suggest something unpleasant. (Bhartiya 2013) Also, in most situations, Euphemism is used to avoid awkward situations and thus protect personal feelings. (Gao 2013).

For example, because of the strong social stigma, women and girls are increasingly not allowed to talk about menstruation in public, especially to men. (Brooks-Gunn & Ruble, 1982; Williams, 1983). Thus, they often use "aunt flow" "Bloody Mary" "lady business" "old friend" to replace menstruation even they know the real words. This culture is ingrained in women's minds and passed on from generation to generation, which leads more and more mothers to be embarrassed or postpone talking to their daughters about the significance of the arrival of menstruation. (Whisnant & Zegans, 1975). This also explains that when a girl suddenly sees a brownish-red bloodstain on her pants one day, she thinks she has a disease or poop. If menstruation was not thought of as taboo and stigmatized, there would be no reason to call it anything other than by its normal name: Menstruation. (Lv, 2015).

The Influence of Modern Media on Menstrual Attitudes

Advertisement is the most effective tool for spreading information. Due to its strong visual impact and wide distribution, it is easy for people to construct their ideas. Thus, the advertisement is condensed with the most important and desired messages that people want to be impressed with. However, everything changes when it includes the introduction of sanitary napkin products. In this kind of promotion, red menstrual blood is replaced by blue liquid to emphasize that the products are clean and fresh (Berg & Coutts 1994). This emphasis on the confidentiality of menstruation and the avoidance of embarrassment is gently inserted into our thinking (Tao & Wang, 2016). Gradually, consumers have such a fear of staining and leaking (Bhartiya, 2013), that they unconsciously think menstruation should be hidden rather than be discussed openly as a normal thing.

Please embed tables and figures in appropriate areas within the document and center them horizontally. Tables and figures should not exceed the given page margins. Provide captions (maximum length: 6 to 8 words) for each table or figure. Centre the caption above the table and below the figure. Please reference the table or figure in the text (see Table 1). Please do not use vertical lines in tables. For figures, GIF and JPEG (JPG) are the preferred formats.

Method

The research method uses oral history. After using a semi-structured interview outline, conducting a personal, conversational interview, and comprehending the person's experiences, observations reveal potent specific behaviours, motivations, purposes and feelings. In the late 1980s, with China's reform and opening up, the technical product of sanitary napkins started to flood the market. Therefore, the interview subjects span a vast age range, mainly different groups of women living in the 70s-00s. In this way, I can get a comprehensive understanding of women's hygiene during the period from menstrual belts to sanitary napkins and women in the period's feelings about using menstrual products at work and school. A total of 10 respondents were interviewed in-depth for about one hour each for this study. The specific information of the interviewees is shown in the table below.

Table 1. The Attitude About Women from Different Ages

Interviewee	Gender	Age	Work
Helen	Women	67	a state-owned company
Mary	Women	55	a small factory
Monica	Women	43	a state-owned company
Cindy	Women	17	senior school
Alice	Women	17	senior school
Isa	Women	27	full-time mom
Judy	Women	34	a private company
Mandy	Women	30	swimming coach
Crystal	Women	14	junior school
Vivian	Women	18	Undergraduate

Results

Sanitary Napkins Work as A Technical Product for The Liberation of The Female Body

Sanitary napkins have liberated the body, brought convenience to our daily use of menstruation, and improved a

hygienic condition for women during menstruation, providing a protective effect. However, at the same time, sanitary napkins can also bring some new cultural constructs.

Improvement and Development of Menstrual Technology Products

The continuous improvement of menstrual products has brought great convenience to women's lives. In the past, menstrual belts needed to be changed and washed frequently, and sometimes boiled in water. Also, there are specific requirements for the time of exposure to the sun and the location of the band :

“It was inconvenient to use menstrual tapes. After using it, I had to wash for over three times and put it under the sun. By the 1980s, the appearance of sanitary napkins freed up my hands. I didn’t spend much time on it anymore.” (Mary, A)

Nowadays, the most widely used sanitary napkins have solved the problem brought by menstrual belts. The "use it and throw it away" concept has made them very popular. Besides, compared to menstrual belts that need to be folded into a square shape, sanitary napkins are small and convenient, more in line with the pursuit of today's youth.

Moreover, in these years, the advent of tampons has made it easier for women to break stereotypes: no exercise. Tmany fitness enthusiasts practice proper physical activities - such as swimming and yoga - during their periods to maintain good habits. To avoid blood flow, they often use tampons. As Mary said:

“A lot of people wonder how to swim when they have their period all they need to do is to use a tampon. The pressure difference between their body and water causes the blood not flow.” (Mary, B)

In addition to providing convenience, the development of menstrual technology products has improved hygiene to a certain extent. However, in the case of menstrual belts, if they are not washed and changed on time, bacteria can multiply and cause menstrual infections:

“At that time, the price of the menstrual belt was relatively high. Since my family had nice economic situations. I changed once for two days. But for the poor, they had to wait until the menstrual belt was very dirty to save money. In this way, Hygiene was certainly not guaranteed.” (Helen, A)

As technology advances and women become more concerned about their periods, sanitary napkins and tampons, have been invented with cleaner and safer materials. This has not only greatly improved women's hygiene during their periods but has also added to their comfort when using these technical products.

Transition of Supply Approach from SOE to Market

Unlike the US market-driven model for menstrual products, there are two main types of supply in China. One is a planned economy, a system of economic operation that regulates economic activity according to government plans, and the other is a market economy with the reform and opening up, whose most important feature is to ensure the efficiency and vitality of the economy through market competition. With the market-oriented reform, many forms of commodities have also changed. This shift is also reflected for women in the supply of menstrual products.

In the past, the nature of the work unit determined what kind of menstrual services were available to female employees. For example, the state-owned enterprises provided employees with a women's washroom and some hygiene products. But employees in other kinds of enterprises didn't have access to such services. This is Helen's argument:

"I have worked in China Telecom, a state-owned enterprise, for over 30 years. Before the 1980s, there was a special douche room for women workers, which was located next to the health clinic. Thus, after work, we went there to have a bath to prevent gynaecological diseases and thus protect our health."

(Helen, B)

Since not women from all walks of life could enjoy this benefit, this situation brought about inequality as well as differentiation of menstrual technology products for women. Therefore, the emergence of the market economy has reduced this inequality in supply and broadened women's choice of menstrual products:

"By the late 1980s, the women's washroom with the hygiene products were eliminated for the development of enterprise because both manpower and money would be a great burden to the work unit." (Helen, C)

Since the market supply has changed, more women are moving from the home into the workplace. In the past, some infrastructure and daily living expenses were directly underwritten by the work unit, so we often saw places such as attached kindergartens and attached communities. However, now the work unit has become just the place of work. The people themselves have to take on the expense of food, clothing, housing and transportation.

When the women enter the enterprise, they face all the contradictions of high intensity and menstruation that come with the workplace. The following argument is what Judy says:

"Sometimes, if I forget to bring the sanitary napkins, I have to borrow from my colleagues. If I get blood on my pants and there are no one around, the only way to solve it is to take my clothes to block them and then hurry home to change my pants." (Judy, A)

Women encounter many constraints because society has not kept pace. For example, during the Wuhan epidemic in 2020, many female doctors and nurses wore thick protective clothing for a full day. This meant that if women were on their periods, they could not keep up with the change of sanitary napkins. In that environment, no one thought about the trouble of these women because they felt that physiological periods did not have much impact on their work for saving patients (Chen, 2020).

Realization of Body Stigmatization

As the supply of goods changes and women move into the workplace, menstrual products not only bring convenience to women, but also become a new cultural symbol - stigmatization.

When a woman is on her period, she will experience many discomforts, such as stomach pain, etc. Therefore, when they do not participate in some competitive activities, they are back to be ridiculed by others:

“Once a time, when I can't participate in the run because of my stomach pain, I hear the boys in my class say, “Why are you so petulant?” I wonder and question myself, “Is this my fault?” After that, although I am in the period, I insist on running although I feel very uncomfortable.” (Crystal, A)

In addition to physical discomfort from daily life and work, women also experience much emotional turmoil during their periods. However, some people gradually form a bias or even a common sense: although the women don't get in a period, as if they are sad or angry, people unconsciously think the aunt flow comes. As Isa says:

“I am just a little bit depressed, but my husband suspects that I am having my period and gives me brown sugar water and then tells me to rest at home. It made me a kind of angry and funny.” (Isa, A)

This physical comfort and emotional turmoil, to some extent, exacerbate the fierce competition between women. Many high-intensity jobs are filled by men but not women because, in the traditional sense, women are unstable, irresponsible, and lacking any intellectual rigour in the period.

Sanitary Napkins Work as A Technological Product to Re-Embed the Female Body into A New Gaze.

The existence of sanitary napkins is to liberate women's bodies. However, as society has evolved and the status of women has changed, it has once again become a shackle or a new kind of labelling.

Shame of Sanitary Napkins

Sanitary napkin as a technical product gives people a sense of dependency. It's like how boring and inconvenient life would be without the Internet. However, although sanitary products are necessary for women,

there is always a sense of shame when they buy or use them.

In life, women always put sanitary napkins in their pockets or put them in black bags when they buy them in supermarkets. Some of them think sanitary napkins make them very embarrassed, and in their minds, products like these should not be seen by the public. The following is Cindy's description:

"It's an innate feeling. It's awkward to show it to a boy. When I go to the toilet to change the sanitary napkin, I always put them in my pocket or clutch it in my hand." (Cindy, A)

However, in the eyes of other people, they think this behaviour is simply out of a sense of self-preservation:

"I don't think there is shame in that. It is a personal and private matter, and there is no need for everyone to know." (Monica, A)

Privacy has two sides. On the one hand, it belongs to personalized information, generally private family status and topics that people do not want others to discuss. On the one hand, it emphasizes the content makes people feel uncomfortable or creates stress. Hiding menstrual products in various ways falls under the second category of privacy. This also reflects a cultural construction - social environment and tolerance are not so open today that people do not see it as a natural phenomenon.

Taboo of Cultural Narratives

In our life, the aunt flow and the "that", which are euphemism to mention something that might be shameful and not so "respectable" replace the name of menstruation. The euphemism used in real life is of practical significance: it will reflect women's views about menstruation and even self. For a long time, people chose negative words to imply that this kind of thing was "bad luck." Thus, grandmothers and moms born in the 80s and 90s refer to menstruation as "bad luck" or "bad thing" -- even as "good thing" to counteract its negative connotations. After all, menstruation was a shameful, dirty thing to talk about in public in traditional culture.

Also, most people, especially in adolescence, are not aware of the euphemism or the negative content that menstruation represents. They are usually influenced by the surroundings:

"I didn't really understand what an aunt flow was at first. It's just my classmates around me called menstruation as aunt flow and then I called it like them." (Crystal, B)

Also, in many formal settings, menstrual products are referred to as "feminine hygiene" products, without reference to periods or blood, and promote their "invisibility" and ability to prevent "accidents", embarrassment and distress. When sanitary napkins were advertised, blue ink was often used to show their absorbency, rather than the actual colour of blood, as natural bodily fluids were considered too naked and offensive. The normal

bodily functions of women regarding menstruation were thus made invisible and taboo. This is Alice argument:

“When I was a kid, I saw women in the advertisements used to do anything they wanted by using the menstrual products, such as rolling all over the floor, playing tennis, playing soccer. Thus, I especially wanted to have it. But my mother told me that it was just an exaggerated and embellished propaganda tool.” (Alice, A)

I find these feeling stems from the fact that in the advertisement of sanitary napkin, what is highlighted is not the real feeling of women during menstruation, but its function to make menstruation invisible and avoid the so-called embarrassment and distress brought by menstruation.

The development of technology has recreated new stereotypes and stigmatization. The taboo and stigmatizing portrayal of menstruation creates fertile ground for social injustice. For example, free toilet paper is provided in public restrooms, but no menstrual products are provided. These policies have undoubtedly been developed from a male perspective while ignoring or disregarding the real experiences of women who menstruate.

New Cultural Re-Construction of Sanitary Napkins Appears

With the spread of the new gender equality and popular culture, I see people from all walks of life making an effort to educate about sanitary napkins and care for menstruating women.

To begin with, the Britain government began work on the emoji in 2017 after finding more than 48 per cent of girls and women in the UK between the ages of 14 and 21 are embarrassed by their periods. “Ending the shame around periods begins with talking about it” There are five symbols on the emoji: sanitary pad, a monthly calendar, smiling or depressed blood droplets and a uterus. However, the Unicode Consortium, the body that maintains and regulates emoji, reject the choice. Instead, they propose a new emoji: a red blood droplet. The launch of "a red blood droplet " emoji means people can use emoji to discuss menstruation when chatting on WeChat and QQ. (Fu and Zuo, 2019)The "Emoji Period" campaign gained tens of thousands of endorsements in the two years between its launch and its final bid, thanks to the fact that entrenched stereotypes of menstruation persist around the world.

Also, to break people's prejudice against menstruation, improve menstrual shame, help women understand sanitary napkins and promote public care for women during the menstrual period, Guangdong Bingbing Care Products Co., Ltd. Led, the first museum of sanitary napkins with great educational significance in China will be established in March 2021 in Jiangmen. (Li, 2021) The museum integrates menstrual education, menstrual science, the history of human sanitary napkins, the menstrual feminist movement, dysmenorrhea experience and other multi-dimensional displays of women's menstrual knowledge and sample display. In this way, no matter the women and men, both of them can learn about the knowledge of menstruation a lot.

Moreover, some large and humane companies give 1-2 days off with paying for women who are not feeling well during their periods to help them feel better. This ingenious approach has won the approval of employees and set an example within the industry. As Judy says:

“When I know the company's decision, I am so happy that the company finally started to understand us female employees. Before that, it is too painful and inefficient to work with the pain.” (Judy, A)

Not only the government, social organizations and companies, but the people themselves make efforts for menstruation to change the common misinterpretation. Chilean artist Carine Aubeda turned five years' worth of menstrual bedsheets into installations for people to appreciate. (Vartanian, 2013) The British marathon girl Kiran Gandhi has become a folk hero in the face of controversy after she refused to use sanitary pads and let her menstruation run. (Gandhi, 2015) In the Wuhan Epidemic, a girl called Liang Yu donated many reassurance pants to the medical staff. (Qiu, 2020)

Conclusion

After a series of research studies, I obtain the following results and divide them into three parts.

Firstly, from the past menstruation belt to the present sanitary napkins and tampons, the invention of the new menstrual period products liberates the female body. Nowadays, women don't have to worry about potential safety hazards or high prices the past menstrual products brought about. At the same time, because of advanced technology, new menstrual products reduce the appearance size and use comfortable and safe material, which give women a pleasant experience and enough convenience. Also, With the transition from SOE to market in China, more and more women have the equal choice to go to work. Compared with the past, the workplace now focuses more on benefits of employees and preferential policies for their children's education.

Secondly, sanitary napkins re-embed the female body into a new gaze. The high dependence of women on such technological products and the deep-rooted menstrual culture unconsciously rebuild the new stereotypes and stigmatization. In the view of women in period, they feel ashamed and believe using menstrual period products is their privacy. Thus, they use some euphemism instead of speaking the name of menstruation confidently. Concerning other ones, they disguise "petulant", "irritable" and "dirty" to define women in a menstrual state. That's also why gender discrimination is a common phenomenon in big companies. As for the advertisement promotion and public fertilities, they don't popularize the use and concept of menstrual products but emphasize "invisibility" or ignore the women who menstruate directly.

Thirdly, with the gradual development of gender equality awareness and public communication, people's ideas have also begun to change, and a new attempt has been made to resolve the stigmatization and deconstruction of cultural symbols. The government adopted the proposal about the design of the Emoji Period, which includes five symbols: sanitary pad, a monthly calendar, smiling or depressed blood droplets and a uterus. Besides, more

and more social organizations have appeared. For example, the museum of sanitary napkins inducts basic knowledge of menstruation, which imposes excellent education on men and women. Moreover, some humane companies care about female employees in a lot of ways, such as giving 1-2 days off with paying for women who are not feeling very well during their periods. Last but not least, people themselves make efforts for the industry of menstruation to giving women in the period the material support, especially in some significant social accidents.

According to the above conclusions, technological products are inevitably influenced by the social environment, leading it to change from its original practical use to the present cultural symbol. Specifically, people's understanding of such products is no longer through the channel of objective scientific cognition but based on the cultural constructs brought about by the general environment. For example, in my paper, the evolution of the sanitary napkin has been a process of constructing, deconstructing and reconstructing the female body, in part because social structures have not kept pace enough. This is also why terms such as "stigma" and "gender bias and stereotypes" are always associated with sanitary napkins and women's menstrual status.

Honestly, there are some shortcomings in this paper. First, with the changing times and advanced technology, many menstrual products have emerged in the market, such as tampons and liquid sanitary napkins, which are not mentioned too much in this paper. Secondly, this paper does not judge the menstrual products from a technological or medical level, making the overall discussion lacking in comprehensiveness. However, I think the whole paper is roughly in line with the requirement concerning the former one; sanitary napkins are the most popular not only in the promotion but also in users' experience. Thus, discussing sanitary napkins is talking about the entire state of menstrual products. As for the medical level, due to my limited expertise in this area, I cannot give a cautious argument.

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Adopting a Project-Based Learning Framework in an Online Course to Enhance the Quality of Student Projects

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Abstract: The purpose of this research was to examine pedagogical factors that supported graduate-level Instructional Design students in the rapid adoption and integration of technology-based projects in under 7 weeks, previously accomplished in approximately 9-months. Project-Based Learning (PBL) pedagogy was adopted to redesign a course to scaffold and support the students in the achievement of the course learning outcomes. This pedagogy was selected as its emphasis is on ill-defined problems, problem-solving, collaboration, authentic real-life applications, and the creation of an end product (Savery, 2006). In the revised curriculum, students were challenged to learn instructional design methods and simultaneously produce a robust eLearning deliverable that evidenced the very instructional design principles being learned. The technology project was based on a needs assessment survey designed to capture self-reported gaps in the knowledge, skills, and abilities of individuals in the instructional design field. This exploratory case study reports on the design process related to how the course adopted a Project-Based Learning framework, the varied scaffolding strategies employed to reinforce the achievement of learning outcomes, and the instructional design decisions that facilitated and supported the learners in the achievement of technology-based projects in under seven weeks.

Keywords: Instructional design, Project-based learning, Scaffolding, Technology

Introduction

In a graduate level program, two courses were originally dedicated to the design and development of a capstone technology-based eLearning project. The first course was dedicated to the analysis and design plan for the project; the second course was dedicated to the development, implementation, and evaluation of the project. Both courses were offered online in 7-week formats, however, rarely was a learner able to complete either course in that timeframe. In the majority of instances, projects took upward of 9 months to complete. For a variety of reasons, these two courses were eliminated. As a result, a graduate level course was revised to adopt a Project-Based Learning (PBL) framework that would culminate in the creation of a technology-based project. The achievements of learners in under 7 weeks were astonishing in that they all completed an eLearning project that evidenced competency in instructional design skills and in many instances, the incorporation of premiere eLearning software. This preliminary study examined the pedagogical design decisions that fostered the success

of the students in the new curriculum in an attempt to better understand the phenomenon that contributed to their success.

Related Literature

Literature supports Project-Based Learning (PBL) as a constructivist learning pedagogy (Dewey, 1938; Savery, 2006). The active learning component of PBL engages learners in authentic tasks, or ill-defined problems, and typically results in the production of an artifact (Capraro & Slough, 2013; Doppelt, 2003). Scaffolding is a concept in the PBL framework in which the instructional leader supports the ongoing development of the learner (Jumaat & Tesir, 2016). It can include instructor contact, peer-to-peer contact, and/or technology/computer interaction. It can increase motivation, and ultimately, learning (Capraro & Slough, 2013). Instructional designers may be systematically eclectic in their approach to designing impactful and deep learning (Ertmer & Newby, 2013). This implies strategically using elements from various frameworks to achieve the desired learning goals. Learning theories can be employed to help motivate learners by ensuring the learning is meaningful, valuable, and relevant (Knowles, Holton, & Swanson, 2015).

Research Questions

An exploratory study analyzed what factors contributed to the success of the students in the creation of their technology-based projects. The research was guided by these fundamental questions:

1. How was Project-Based Learning adopted in the design of the course?
2. What is the quality of learning since the adoption of the Project-Based Learning approach?

Methods

This study utilized the case study method to address the two research questions. The case study was chosen for its particularistic characteristics (Merriam, 1998). In this regard, the case study focused its analysis on understanding a particular phenomenon. “The case itself is important for what it reveals about the phenomenon and for what it might represent. This specificity...makes it an especially good design for practical problems – for questions, situations, or puzzling occurrences arising from everyday practice” (Merriam, 1998, p. 29). The following table summarizes the course artifacts used in the analysis:

Table 1. Data Collection Categories & Artifacts

Instructor Records	Instructional Content	Assessment & Feedback	Communication Strategies
Curriculum Map	Syllabus	Instructions	Announcements
Program Learning Outcomes	Instructional Content	Rubrics	Discussion Forum
Module Learning Outcomes	Instructional Videos	Instructor Feedback	Small-Group Discussion

Data Analysis

The case used in this exploratory study is a program course that piloted the adoption of the PBL framework in which a technology-based project served as the summative assessment. Two course offerings were examined and each served as a unit of analysis. One course was offered in a 7-week online format, and one in a 6-week online format. Using a constant comparative method of analysis (Merriam, 1998), elements were examined to identify, label, and map the strategies and frameworks used throughout the courses (Harrison et. al., 2017). This cross-case analysis helped unify a description of the categories to conceptualize the data (Merriam, 1998). Multiple sources were used to increase the triangulation of the data, including formal resources on Project-Based Learning which served as an “outside source to validate case study materials” (Merriam, 1998, p. 204). In this regard, the curriculum was compared to formalized recommendations in the literature for quality PBL integration in technology-based projects.

Results

To answer the first research question which sought to better understand how PBL was adopted in the course, analysis discovered three primary categories that emerged. The categories revealed several pedagogical decisions that are believed to contribute and support the success of the both the design and development of the final technology-based projects: (1) the overarching pedagogical framework used, (2) the instructional content which served as a modeled throughout, and (3) key learning theories that were utilized to help design the curriculum. Each of these is discussed below.

First, Project-Based Learning was utilized as the primary pedagogical framework upon which the course was designed. The course proved to be more than a technology project assigned as a summative assessment. When compared to the key indicators of the Project-Based Learning principles as noted in literature, multiple distinguishing PBL principles were incorporated into the adopted course (Boss & Kraus, 2018; Capraro & Slough, 2013; Doppelt, 2003; Savery, 2006). Specifically, five key underpinnings of the PBL framework were evidenced and are described in more detail below:

1. Each student was given the opportunity to select an instructional design project based on an ill-defined problem as indicated through the results of a needs assessment survey. The needs assessment survey was distributed to graduate level instructional design students and revealed self-reported knowledge gaps. The survey results served as the basis for selection of the ill-defined problem in which an eLearning solution was required to solve.
2. All students were asked to devise their own design solution for their selected ill-defined problem. This included making decisions about the curriculum to be developed, as well as which instructional technologies would be used as part of their eLearning solution. In this regard, students were required to select technologies they did not know and that could be used to advance their knowledge and marketability within their diverse career paths. Investigation was required in order to find a technology

solution.

3. Opportunities that promoted collaboration were found at regular intervals throughout the course. These included opportunities for the student, in the mindset as an Instructional Designer, to receive input on their instructional design problems from the design team (their classmates), as well as to help coach and provide feedback to other designers. In this manner, students worked cooperatively together on their individual projects, yet remained focused on their independent eLearning design projects.
4. The faculty member scaffolded and supported the students throughout the entire course. Many of these opportunities were intentionally integrated at key points, such as in the beginning, to help reduce cognitive overload. A discussion forum was provided for all public questions. Additionally, faculty support was also offered in the form of just-in-time “pop-up” office hours when there was a significant increase in the volume of questions being asked. All office hours were offered through optional video-based conferencing sessions which featured small-group instruction as a method to engage those present in helping to offer solutions to design dilemmas.
5. Assessment and reflection were provided at weekly intervals throughout the duration of the course as another means of supporting the learners. There were weekly knowledge and comprehension checks in the form of a quiz that could be repeated to earn a higher score. This was followed by a weekly opportunity to apply the new knowledge gained in a performance-based assessment. Each successive assessment required the learners to methodically work through each stage of the ADDIE instructional design model: Learners *analyzed* a real-life instructional design problem, *designed* a learning plan for the eLearning solution, *developed* the instruction using relevant technology, *implemented* the instruction, and *evaluated* the learning achievement. Feedback was provided on each assessment and learners were asked to remediate any design issues prior to proceeding to the next instructional design phase of their projects. Every member participated as learners in the eLearning solutions developed by their colleagues and by doing so, allowed that Instructional Designer to collect data on whether learning outcomes were achieved. This ultimately helped the learners reflect on their own instructional design skills in a final self-assessment.

Second, the revised course was found to employ a variety of instructional design framework. These were presented and modeled in the course, and learners were assessed on their ability to evidence one or more models in both their design plan and their technology-based projects. The instructional design models included ADDIE, Bloom’s Taxonomy, and Gagne’s 9 Instructional Events (Gagne, Wager, Golas, & Keller, 2005). Because these models were incorporated in the technology-based projects, it is believed that observing them in action and then applying them as part of their weekly progression in various assessments, helped foster the clear integration of the framework into the final projects. For example, learners were required to include a design plan that incorporated all of Gagne’s 9 Instructional Events in the final eLearning projects. Careful attention was noted in assessing the final project, to ensure the events were still present in the technology-based project.

Third, a variety of learning theories were employed to support the design of learning: andragogical, self-directed, and constructivist learning theories (Knowles, Holton, & Swanson, 2015). The integration of an

eclectic framework of learning theories in the design of the course was used to help motivate the learners. Comments in the qualitative course evaluation mentioned that having a real-life instructional design problem to work through, made the learning meaningful, relevant, and inspired their performance.

To address the second research question which focused on the quality of student learning, all final projects were assessed using a performance-based rubric. The rubric was designed to measure the incorporation of instructional design principles and the creative incorporation of instructional technology. The results overwhelming evidenced a robust quality of learning as evident in the following:

- 100% of the learners met or exceeded expected achievement as evidenced in the final project rubric designed to measure the achievement of course learning outcomes.
- 100% of the learners submitted a technology-based project in under 7 weeks, delivering an eLearning solution to an ill-defined instructional problem.
- 100% of the technology-based projects evidenced the highest levels of Bloom's Cognitive Taxonomy, creation.

In conclusion, as observed through the eLearning projects and achievement on the final project rubric, learners were able to progressively build their instructional design solutions within the allotted time of the course, resulting in quality eLearning solutions that evidenced sound instructional design principles. Due to this success, the PBL framework is recommended to support learners in discovering solutions to ill-defined projects.

Implications

The findings of this exploratory case study support the utilization of learner-centered pedagogies, such as Project-Based Learning (PBL), in the production of technology-based projects. It is believed that this framework was successful because it formed the foundation for an ill-defined problem as applied to real-life needs. Adults are most primed for learning when they can immediately see the relevance, and be key players in deciding why there is a need to know (Knowles, Holton, & Swanson, 2015). The learners were given choice in selecting technologies that were relevant to them professionally; this may have contributed to many selecting industry standard eLearning software such as Articulate Storyline. Ultimately, the technology-based projects were promoted as ones that could be used as samples in professional portfolios, a standard requirement in the profession. This may have further motivated them to excel within the accelerated timeline. Scaffolding learners with multiple levels of support, from commencement to culmination is highly encouraged. Similarly, modeling key concepts the learners are expected to evidence in their projects, may also prove helpful. Providing timely and quality feedback, allowing revisions, and being readily available for consultations, are also key considerations to anyone opting to implement and use a Project-Based Learning pedagogy within their practice.

Recommendations

As an exploratory case study, additional interviews and focus group interviews would foster greater validity of

the findings and contribute a greater understanding to their motivation to produce caliber technology-based projects given the accelerated timeline. Future research that explores the reactions and motivations of the learners as they progress with their technology-based projects, could shed additional light on their metacognitive strategies that helped them plan, monitor, and evaluate their progress within the accelerated timeframe.

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Educational Journey of a Mexican Immigrant Teacher

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Abstract: This study explored the educational journey of a Mexican immigrant teacher from a resiliency perspective by taking a particularized look at how the participant overcame the challenges she faced during recertification processes in the United States. Researchers adopted narrative inquiry methods, collected qualitative data including interviews, field notes, and artifacts, and analyzed the data using content analysis. The immigrant teacher encountered a series of challenges such as language barriers, discrimination, and unfamiliarity with recertification processes. Despite the presence of difficult circumstances, the participant optimized various resources and educational opportunities. The study found that the participant resilience was oriented not only in personal factors but also in external resources. The study also uncovered that ongoing, purposeful, and systematic institutional supports had an impact on the participant resilience. The findings indicate that the success and resiliency of highly motivated Mexican immigrant teachers may not be absorbed solely by the personal level of motivation. Rather, they may continue integrating all personal, external, linguistic, cultural resources and systematic institutional supports to surmount obstacles through ongoing and active interactional processes towards their professional goals.

Keywords: Mexican immigrant teachers, Teacher's resilience, Foreign-trained teachers, Resiliency

Introduction

Recently, much research regarding quality teacher education has yielded significant insights and has led to theories concerning teacher resilience (Beltman, Mansfield, & Price, 2011; Ebersohn, 2012, 2014; Mansfield, Beltman, Broadley, & Weatherby-Fell, 2016). Broadly defined, resiliency refers to individuals who have the capacity to manage their own emotions, behaviors, and cognition and optimize their instruction and learning despite the presence of difficult circumstances. Over the last two decades, studies on Mexican American resilience have emphasized the critical role of sociocultural factors in individual resilience (Gonzalez & Padilla, 1997; Lusk & Galindo, 2017; Sajquim, & Lusk, 2018). Researchers (Arellano & Padilla, 1996; Gonzalez and Padilla, 1997) have identified personal and external resources as the protective factors that enhance individual resilience. Personal resources include self-efficacy and intrinsic motivation, whereas external resources include cultural factors such as supports from family, peers, and community. Studies on Hispanic population resilience showed a positive relationship between resilience and protective factors. This might be particularly true for Mexican immigrant teachers who want to become teachers in California, USA.

However, compared to the amount of research on the resilience of Hispanic American students and Hispanic mental health, there has been little research on Mexican immigrant teacher resilience. Researching the characteristics of highly motivated Mexican immigrant teachers is necessary to address the needs of the growing population of Hispanic English Learners in San Bernardino County schools in California. There are over 70,000 English Learners in San Bernardino County schools, and more than 50% are Hispanic, experiencing a lack of fully qualified teachers. As a first step toward understanding Mexican immigrant teacher resilience, this study explored the educational journey of a highly motivated Mexican immigrant teacher from a resiliency perspective. This research specifically examined the challenges the participant faced when preparing to become a certified teacher in Southern California and the ways she overcame those barriers.

Methodology

Participant

One immigrant teacher from Mexico was recruited from a university in southern California. Participant (Isabel) came to America to join her family in the United States. She and her spouse were elementary school teachers for approximately seven years in Mexico. The researchers used pseudonyms throughout the study to protect the participant's confidentiality.

Data Collection and Analysis

This project adopted narrative inquiry methods, reaching into the ethnographic domain such as interviews (two semi-structured and two in-depth interviews), field notes during professional workshops, and physical evidence such as the syllabi of the participant's professors and sample papers to gather narrative data. Participant consented to the data collections. All the interviews, field notes, and physical evidence were analyzed, using

content analysis (Strauss & Corbin, 2008).

Results and Findings

Main Themes on Participant's Challenges

The language barrier was one of the major themes that emerged around Isabel's challenges. For example, Isabel could not pass the California Basic Educational Skills Test (CBEST), which must be passed to enter a teaching credential program in California due to her language barrier. Discrimination was another major theme regarding Isabel's struggle. Isabel experienced discrimination at work because of her language origin and interpreted the discriminative statement as incapability of caring her work. Pertaining to a recertification process, Isabel found it difficult to navigate the system of recertification and get appropriate information on teaching credentials in California. Isabel worked as a certified teacher in Mexican for seven years. However, she had to complete associate and bachelor's degrees and a teaching credential program in the United States due to the differences between the United States and Mexico in teaching certification processes.

How to Overcome Challenges: Isabel's Resiliency

There were three major themes on how Isabel overcame the challenges she faced in the process of recertification: (a) professional identity as a teacher, (b) seeking opportunities toward recertification, and (c) social interactions and supports: family supports, community mentors, an institutional program, and a peer learning community.

Having a strong professional identity as a teacher was one of the major themes that emerged around Isabel resilience. Isabel described her professional identity as a teacher. Enjoyment and passion for teaching were the most frequent category of responses regarding the reasons Isabel continued pursuing the long-standing process of recredentialing in the United States.

Isabel did not give up but thrived on overcoming language barriers, discrimination, and recertification processes by actively searching for educational opportunities to obtain a teaching certificate in California. To improve English proficiency, she sought help, visiting a local community college. Following the guidance of a counselor at a community college, Isabel took English as a Second Language (ESL) courses and completed courses for an associate degree. Her education at a community college helped her gain confidence in teaching, and she eagerly looked for working opportunities at schools. After graduating from a community college, she found a job and worked as a paraprofessional, helping bilingual students at a public school in Southern California.

Isabel frequently mentioned the vital role of family supports in the journey of her credentialing. Her family provided Isabel with various supports, including financial and emotional ones. Family's ongoing assistances and motivation enabled her to initiate schooling, taking courses at a community college. The supports and ongoing interactions with community mentors were another major theme pertaining to Isabel's resiliency. One of the

mentors was an assistant principal at her work; the other was her professor at a university she attended. Mentorship and Ongoing interactions with an assistant principal inspired Isabel not to give up but continue her educational journey towards recertification. Isabel's professor provided her with specific guidelines and information to solve her problems.

The institution's systematic support was another major contribution to Isabel's endurance. Isabel participated in a teacher professional development program at a state university for three years. She received purposeful, systematic, and ongoing supports and mentoring to complete her teaching credential in California, including stipends, workshops, mentoring, and assistance to navigate credential systems and to pass credential-related tests and coursework at different levels and entry points into teaching. Isabel felt she was ready to teach students because of the coursework and professors' support at a credential program. She became confident in applying her knowledge into teaching practice. In addition to receiving supports and mentorship, Isabel became a part of the learning community with other foreign-trained teachers from different countries. Isabel valued the community because she felt the members shared similar values, concerns, and experiences and understood each other.

Discussion and Conclusion

We found that the participant in the study encountered a series of challenges related to language barriers, discrimination, and unfamiliarity with recertification processes in the United States. Instead of giving up, the highly motivated and resilient immigrant teacher continued pursuing her educational journey toward her professional carrier goal and optimized various resources and opportunities despite linguistic, cultural, social barriers and a lack of resources.

The present study found that the participant utilized the protective factors which enriched her resilience to surmount the obstacles she faced, as may be seen in other studies (Gonzalez & Padilla, 1997; Lusk & Galindo, 2017; Sajquim, & Lusk, 2018). The participant resiliency was oriented not only in personal factors such as professional solid identity and passion for teaching but also in external resources such as family, mentors, and professors. In addition to the personal and external factors, ongoing, purposeful, and systematic institutional supports and interactions also had an impact on Isabel resilience. The findings indicate that highly motivated Mexican immigrant teachers' resiliency may not be absorbed solely by personal factors. Rather, they may continue orchestrating all personal, external, linguistic, cultural resources and systematic and purposeful institutional supports to surmount obstacles towards their professional goals in diverse sociocultural contexts. This study has a limitation due to studying a Mexican immigrant teacher. Therefore, future research is needed to examine Mexican immigrant teachers' resilience, including more teachers from different regions and cultural backgrounds.

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An Overview of MOOC Platforms: Applications in Turkey

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Abstract: Massive Open Online Courses (MOOCs) can appeal to very large masses as a distance education model and provide the same quality and standard education with large user groups worldwide via the internet. In MOOC systems, users can get the course they want for free or for a small fee in the application they are registered with, using videos, lecture notes, booklets, and interactive forms. In this system, which is open to everyone, different countries have various applications. In this context, this research aims to briefly introduce the MOOC platforms in Turkey and give opinions and suggestions for MOOCs. This study is important in that it sheds light on future studies by giving information about MOOC platforms in Turkey.

Keywords: MOOC, distance education, e-learning

Introduction

Developments in information and communication technologies (ICT) have increased interpersonal communication and interaction as well as developing interpersonal communication and interaction opportunities. This transformation has changed the ways of accessing information and led to the emergence of more flexible learning ways and environments such as distance learning and e-learning (Bozkurt, 2015; Ergüney, 2017). With these developments, lifelong learning has become continuous. As an extension of this development, MOOCs have enabled the same standard and quality of education to be carried out worldwide with unlimited users (Ergüney, 2015).

MOOCs are designed to address large audiences on web-based platforms without time and space restriction, and they contain course materials such as lectures, tests, assignments, videos, and discussion platforms (Glance, 2013). In a MOOC system, courses are offered free of charge or for a small fee. The courses are taught synchronously or asynchronously in this system, supported by various materials by field experts. Certificates are issued to those who successfully complete the course (EADTU, 2013). While the courses on some MOOC platforms are free, certification is available for a fee.

MOOCs may vary according to each country's own culture and education system. In Turkey, a MOOC platform was first launched with "E-Üniversite" (*E-University*) in 2013. In this initiative, MOOCs in English were translated into Turkish and Turkish content suitable for the business and education world began to be designed. Thus, different methods and technologies used in this system were utilized by taking part in the international education system.

In this context, this study aims to give brief information about the MOOC platforms developed in Turkey, introduce these platforms and emphasize the importance of MOOCs. This study is important because it gives information about the MOOC platforms developed in Turkey to the people concerned about taking courses and giving lectures, and it is expected to shed light on future studies.

MOOC Platforms in Turkey

Although MOOC platforms in Turkey are less developed than in Europe and America, they are experiencing different developments day by day. The first MOOC platform in Turkey started with "E-Üniversite" (*E-University*) in 2013 (Özbek et al., 2018). The most common MOOC platforms in Turkey are as follows:

E-University (In Turkish: E-Üniversite)

It is the first MOOC platform launched in Turkey. In 2013, it started to offer courses under the name of E-Üniversite (*E-University*) at <http://www.e-universite.com.tr>. It provides equal opportunities for those who want to receive education independently of time and place (Ergüney, 2015). E-Üniversite (*E-University*) provides significant advantages for those who cannot find the time and money to study or for those who have a physical disability, as it is free of charge. In addition to offering courses to earn undergraduate, graduate, and doctorate degrees, there are also various e-certificate programs. However, the website at <http://www.e-universite.com.tr/> was found to be inaccessible during the research process.

Anadolu MOOCs

It is a MOOC platform created by the Anadolu University of Turkey for the vision of lifelong learning. The platform's purpose is to enable learning activities to be carried out more systematically and planned. In addition to the features of course management systems, it has many functions, such as live chat that supports open and distance education, assigning homework, online assessment, and evaluation (Anadolu MOOCs, 2021). It is accessed online through the website <http://mooc.anadolu.edu.tr>.

AtademiX

It is a non-profit MOOC platform established in 2014 with the technical infrastructure and experience of Atatürk University Distance Education Application and Research Center (ATAUZEM) and Atatürk University Open

Education Faculty (ATA-AÖF). Turkey's first corporate platform, AtademiX, started its teaching process in 2014 with four courses and more than three thousand students. Lessons for people with different education levels are taught synchronously or asynchronously with various materials and applications on the internet. Successful students are given certificates of participation by evaluating with homework, exercises, quiz or online exam. Besides, digital badges are awarded according to the rate of participation in course activities (AtademiX, 2021). It is online through the website <https://atademix.atauni.edu.tr>.

Akadema

It is a free MOOC platform open to everyone whose infrastructure was completed by Anadolu University in 2014 and started its activities in 2015. As a product of the openness movement in education, it provides flexible and free learning opportunities to anyone who wants it. Although it usually includes asynchronous activities, simultaneous activities are also included. Educational activities at *Akadema* are designed for lifelong learning, and the courses are of two types according to their structure: guided lessons and individual lessons. In guided-supervised learning, the courses are carried out under the guidance of an instructor according to a specific start and end date, while in individual learning, it is self-directed learning that the participants start and finish whenever they want. *Akadema* is also a social responsibility project (Akadema, 2021). The platform can be accessed on <https://www.anadolu.edu.tr/e-egitim/akadema>.

Bilgeiş

It is a project established by Middle East Technical University in 2015 with the motto of “*business world developing with informatics.*” It aims to provide 100 online courses to everyone to increase the professional competence of employers and employees. Thus, it was thought to increase the managers' professional capacities and create a labor market compatible with the technology. Although SME employees are considered the target audience, they are open to many audiences such as students, disabled, and unemployed individuals (Bilgeiş, 2021). The website of the platform is <https://www.bilgeis.net>.

Advanced Education (In Turkish: İleri Eğitim)

It is a distance education platform that continues its activities within the scope of the Ministry of Science, Industry, and Technology project through the Dokuz Eylül University Technology Development Zone (DEPARK). It was created for every individual to have widespread access to education under all circumstances. Published courses are produced in a studio environment with green box technology. In addition to many free or low-cost courses and certificate programs, it has a wide portfolio of courses in many fields, such as KPSS and ALES courses (countrywide exams in Turkey). Students enrolled in the course can continue their education from any device (*İleri Eğitim*, 2021). The system operates on <https://www.ileriegitim.com>.

University Plus

It is an education platform where everyone who aims at lifelong learning can continue their personal and professional development in any field. Courses are given by Yeditepe University and Istanbul Technical University. The content on this platform is in the form of videos. It offers a social learning experience by asking questions about the course through discussion and social platforms (Universite Plus, 2021). The website is available at <https://www.universiteplus.com>.

Lifelong (In Turkish: Hayatboyu)

Yaşar University shares the open course materials of the university through the open education environment it has created. Although it does not offer course credits or any degree, there is easy access to course materials of interest (Hayatboyu, 2021). It is accessible at <http://hayatboyu.yasar.edu.tr/about>.

Conclusions and Suggestions

The number of MOOC participants is increasing day by day, and these platforms provide various opportunities to learners by offering various courses that are open to everyone willing to learn, flexible, and free or for a small fee. Therefore, it is perceived as a promising approach along with technological developments (Bozkurt, 2015). In order for the advantages of MOOCs, which are considered as the learning opportunity of the future, to be recognized and effective, it may be beneficial to have various language translations of the MOOC contents and support the contents with appropriate animations and simulations. It could be better to make the assessment system efficient, which differs MOOCs from video sharing sites. Making informative posts about MOOCs can create awareness about them so that more people can produce content or take courses. Various incentives can be designed to enrich the course content further. Since the teaching takes place in the online environment, necessary improvements can be made to optimize the technological opportunities. Methods such as group work, feedback, student opinions, and having experienced guides in the system can be developed to increase the effect of MOOCs. It can be ensured that different sectors serve within this structure to reach a more agile and flexible structure.

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Comparing the Distributions of Attitudinal Resources of News Discourses on London and Wuhan Lockdown During COVID-19 Outbreak Based on Appraisal Theory

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Abstract: The study aims to conduct a comparative study on the distribution features of attitudinal resources in London and Wuhan's news discourses to examine the degree of objectivity shown in the wordings of the chosen discourses and analyze the way the reporters show their appraisals in 20 news discourses through quantitative and qualitative analysis. The author selects the news discourses on CNN (Cable News Network) official website reporting on Wuhan and London lockdown during the coronavirus epidemic as the corpus, with the attitude system of appraisal theory as the semantic framework, and UAM Corpus Tool as an auxiliary tool. The findings show that there is a richness of attitudinal resources in news discourses on Wuhan and London lockdown, among which affect resources appear the least frequently, while appreciation resources are the most used in the discourses. Secondly, the high-frequency content words are summarized from the discourses. Thirdly, the reporters manifest their appraisals in news discourses on Wuhan and London lockdown mainly by five methods: 1) the preference of negation and double negation; 2) an implicit shift of the focus; 3) the use of previous relevant news; 4) the use of quotes from authority and 5) the emphasis on internal disorder. The study builds a small corpus to explore the attitudinal resources, textual features and the subjectivity and objectivity of the chosen CNN news discourses, sharing a research perspective and value for future research.

Keywords: Appraisal theory, SFL, News discourse, Lockdown

Introduction

The year 2020 witnessed the profound change of global politics, economies and people's lives due to the coronavirus epidemic. During the outbreak, cities affected by the COVID-19, took steps to stifle its spread, and among them, the lockdown of Wuhan, China, undoubtedly caught much attention at the beginning of the outbreak, and was heavily covered by news outlets around the world, such as CNN. While in December, 2020, the highest level of lockdown was announced in London after the emergence of a kind of mutated coronavirus. Whether and how the attitude of CNN's news discourses on this "seemingly impractical" restriction measure has changed after a lapse of ten months has given rise to the interest of the author and thus, it is to be analyzed in this study with the application of appraisal theory. Below this paper will analyze the organization of

attitudinal resources of news discourses on London and Wuhan lockdown during COVID-19 outbreak through quantitative and qualitative analysis.

Literature Review

Definition of Key Terms

Systemic Functional Linguistics

Devised by Halliday (1961) who took the concept of system from his tutor Firth, Systemic Functional Linguistics (SFL) is a theory that focuses on the function of language. SFL reveals ideational, interpersonal, and textual metafunctions of language. Halliday (2014) explains ideational metafunction as an indication of the lexicogrammar of language. It has two levels, the experiential and the logical—the former exists in one semantic layer and the latter between two or more clauses. At the experiential level, there are finite (the predicate verb in a sentence), subject (the subject or participant in a sentence) and circumstances (the time or place shown in a sentence). Finite reveals the process types of a sentence which generally includes material, mental, relational, behavioral, verbal and existential process. While for the second metafunction, interpersonal metafunction shows the aim of language to promote interaction. Thirdly, Thompson regards that textual metafunction reveals the way to construct messages smoothly. This study will mainly focus on the ideational process of messages.

Appraisal Theory

The appraisal draws out the structure of systemic functional linguistics (SFL) of Halliday in the aspect of interpersonal attitudes. Martin (2003) proposes a theoretical system of appraisal that examines how texts construct shared emotions and values and perform normative evaluations. It focuses on the interpersonal relations in language, the subjectivity of text, and the position of author. The attitude system of the appraisal theory implies the connotation of whether the reporter deems that things such as an action or an idea are positive or negative. Martin and White (2003) group the types of values into smaller groups: at the first level, three main parts are classified as affect, judgment and appreciation. Affect resources relate to human emotions; judgment indicates attitudes toward human behavior, and appreciation resources focus on the evaluation of things.

Besides, Thompson (2013) views the appraisal theory as a theoretical system of evaluation based on shared values using different linguistic resources for both speaker and receiver. However, in practice, due to political and cultural differences, it is difficult to reach an identical value between two parties, so some people may find the appraisal system subjective to some degree. For example, in news discourses, the resources used in the same news of different countries may vary, and how to classify these resources, especially attitude resources, with the application of the appraisal system may be subjective. It will be a difficult task to classify the attitude resources, as the norm for classification will inevitably be set by the values of the researcher, and it still needs discussion to define whether the researcher's values can be completely objective.

Studies on News Discourse

Research on news reports has focused on discourse analysis (Hall, Dijk, Bell, Iedema & Feez & White, Xin, Wang, Liu, Huang), such as conceptual metaphors, comparative analysis (Jiang & Chen), critical discourse analysis (Fowler), translation, cross-cultural communication, etc. Hall (1980) argued that cultural studies had focused on two overlapping but distinct paradigms: culturalists and structuralists, and revealed that news is linked with experience, power and ideology. Dijk (1985) developed a discourse analytical approach to mass media texts and communication, introducing the directions and ways to analyze media discourse, and its characteristics. In 1988, he illustrated the structure of national and international news through case studies. By comparing news reports from different countries, he analyzed whether news reports produced in different political and ideological contexts provided different accounts of the same event. Similarly, Bell (1991) also explored the language of media news. He argued that reporters produced stories, instead of facts, which emphasized the importance of the production of media language. Fowler (1991) also analyzed the relation between language of news report and ideology. While Iedema, Feez and White (1994) examined how “subjectivity” and “objectivity” are presented in journalistic discourse with the use of appraisal values.

In China, there have also been many studies on news discourse. Wang (2001) introduced appraisal theory into view. Xin (2006) discussed Foucault’s view of power and his ideas about the relationship between power and knowledge and discourse. Though critical discourse analysis, Huang (2008) conducted a comparative analysis of news discourse and its translation, examining how reporters and translators use the reported discourse to express their own views and ideologies respectively. Liu (2010) reviewed the condition of appraisal theory research in China, identifying the strengths and weaknesses of the research, and proposing ideas for future research. Jiang & Chen (2017) used appraisal theory as a theoretical framework to analyze foreign news corpus about “One Belt, One Road” policy, which is a global infrastructure development strategy initially announced by Chinese government in 2013.

The appraisal system extended from SFL is one of the main methods used to analyze news discourses. Appraisal is at the heart of the interpersonal meanings of the text. For example, as news reports, which is seemingly unbiased facts, is actually manipulated by various value factors such as one’s political status, therefore by using the appraisal theory, one can find the unspoken expressions of various ideologies which subconsciously influence readers’ views, opinions and positions, behind the seemingly objective news, just as Thompson (2013) says, the choice of appraisal reflects and reinforces the ideological values of the culture. By observing the attitudes implied in the reports of different countries on some domestic and international news with the use of appraisal theory, it can be much clearer to observe the changes and directions of the international situation. Therefore, the appraisal theory is adopted in this research to analyze the chosen news discourse.

Research Questions

The study pays attention to the attitudinal resources in news discourses on Wuhan and London lockdown from

CNN (Cable News Network), one of the biggest and authoritative news media in the USA. The author aims to address three questions as follows:

- a. What are the distribution characteristics of attitudinal resources in CNN's news discourse on Wuhan and London lockdown?
- b. To what extent do CNN's news discourses on Wuhan and London lockdown show the objectivity in wordings?
- c. How do the reporters show their appraisals in Wuhan and London's news?

Research Methods and Data Analysis

The aim of the study is to explore how American news media CNN applies attitudinal resources to convey its implied attitude and stance, and analyze the objectivity of the choices of words based on appraisal system in the Systemic functional linguistics framework through quantitative and qualitative analysis. The author selects twenty news reports of similar length on Wuhan and London lockdown from the worldwide influential news agency CNN to ensure the equivalence of the discourses. News released by CNN is collected from its official website (<https://www.cnn.com>) where there is a timeline to show all the news reports related to COVID-19 outbreak. The date of news reports from which the discourses are collected ranges from Jan, 2020 to Jan, 2021.

The event of Wuhan lockdown is selected, as the COVID-19 outbreak and the policy of Wuhan lockdown is one of the top influential news in 2020, fairly up-to-date, and remains controversial in the news media. As a contrastive research, London lockdown is selected as a comparison, for the latest London lockdown policy was introduced on 22 December, 2020 and the latest news discourses are more current and enable people to see if there has been some transition in attitudes towards the policy of lockdown against the coronavirus after ten months of fighting with the epidemic.

Through the timeline offered by its website and the key words that can be put into search, the author collects ten news between January 23rd and the end of February after the imposition of Wuhan lockdown. Similarly, for the period after the announcement of the newest lockdown in London in December, 2020 to January, 2021, collects ten news by the same rule. Finally, the author uses UAM Corpus Tool (a text corpus annotation tool based on SFL) to deal with the data by manual annotation. The author collects the attitudinal resources to discuss the differences and similarities in the use of words and the implied attitudes towards the lockdown policy in the two cities.

Results and Discussion

Table 1 shows that altogether there are 889 resources annotated from 20 CNN's discourses on Wuhan and London lockdown in this case study, with affect appearing 99, judgment 213 and appreciation 577. Affect resources appear the least frequently in CNN's news on Wuhan and London lockdown, only taking 11.14%, while judgment resources are also not much used, taking up nearly one third of the number of appreciation

resources with a ratio of 23.96%.

Table 1. A Comparison of Attitudinal Resources in CNN’s News Discourses

Sub-type	Frequency	Percentage
Affect	99	11.14%
Judgment	213	23.96%
Appreciation	577	64.90%
Total	889	100%

Appreciation resources are the most used in the discourses, making up 64.9% of the total.

From Table 2, the organization of attitudinal resources in London and Wuhan news discourses for affect, judgment, and appreciation resources are broadly similar, with appreciation resources making up over 64% of the total, while judgment accounts for less than 30% and affect takes up less than 10%.

Meanwhile, there is a slight distinction that news on Wuhan has more judgment resources than those on London, which shows that the news about Wuhan tends to judge the behavior of people more directly than those about London.

Table 2. A Comparison of Attitudinal Resources between CNN’s News Discourses on London and Wuhan
Lockdown

Sub-type	London		Wuhan	
	Frequency	Percentage	Frequency	Percentage
Affect	45	10.59%	54	11.64%
Judgment	86	20.24%	127	27.37%
Appreciation	294	69.18%	283	60.99%
Total	425	100%	464	100%

News discourses on Wuhan and London both share a high ratio of appreciation resources, as according to Martin (2004), appreciation can increase objectivity and when appreciation is used, the reporter represents as a distant observer rather than an active participant.

Among all attitudinal resources, affect resources which represent emotional expressions make up the smallest percentage, as they are relatively subjective. Therefore, affect is not frequently utilized in order to avoid subjectivity.

The author selects the high-frequency content words from the discourses. Among them, “said” is used most often, being mentioned 226 times, which indicates that news reports are projecting what others say. It is followed by “virus”, which is mentioned 134 times. Other most frequently mentioned words include “most/more”, “lockdown” and “new”, being used 127, 109 and 107 times respectively. These words are all relevant to epidemic prevention policies or the health and safety of people. It is worth noting that “quarantine” and “outbreak” are hardly mentioned in the discourses on London, but are hardly mentioned in the news about Wuhan. The extensive use of “outbreak” in news discourse on Wuhan is probably due to the fact that Wuhan was in the early stage of the coronavirus outbreak, and as the epidemic develops, the word is hardly used in the discourses on London. Similarly, the word “quarantine” is almost exclusively used in news discourses on Wuhan, probably because it is the first time in modern times that mass quarantine is used in a metropolis, so “quarantine” which usually happens on a ship is chosen and used, while after restriction measures become normalized, the words “restrict”, “stay”, etc. are commonly used.

From these discourses, there are five typical features that can be generally observed, which is an answer to the third question: “How do the reporters show their appraisals in Wuhan and London’s news?” These features tell how the reporters manifest their appraisals in the discourses on Wuhan and London. The five features are: 1) the preference of negation and double negation; 2) an implicit shift of the focus; 3) the use of previous relevant news; 4) the use of quotes from authority and 5) the emphasis on internal disorder.

Firstly, in these news discourses, it is observed that many opinions or comments of scholars and officials quoted use negative sentences or double negatives to express their attitudes. Negative sentences are euphemistic, used to diminish the harshness of the speech. Basically, negative sentences are more moderate in tone than affirmative sentences that express the same meanings. One reason is that the negative tone can be progressively weaker as the distance between the negation and the negated item increases. For example, this phrase “it’s highly unlikely that this mutation would fail to respond to a vaccine” expresses a more euphemistic tone than “this mutation is highly likely to be able to respond to a vaccine”. In rhetoric, negation, especially double negation, can be regarded as litotes, which uses understatement to emphasize, further making an affirmative point by stating a negative one.

Words like “unlikely”, “unsurprising” or “unexpected” often appear in news about London, usually revealed in the existential process, which suggests a more euphemistic, neutral or positive tone to the discourses on London. Stronger words (e.g., failure, shame) are not used to judge London lockdown, and they tend to be more moderate, such as “the emergence of different coronavirus strains...is neither cause for panic nor unexpected”. As Li (2004) says, appraisal is not merely a means to express the narrator’s attitude, but also a way to construct shared values between the reporter and the reader, by which it realizes the interpersonal metafunction of language and constructs interpersonal relationships with readers.

Furthermore, here is an example in detail to deeper prove the use of negation and double negations in the real London context:

Experts in the genetics of viruses said it not unexpected that mutation would arise and noted many had already been seen and had not significantly affected the spread or effects of the virus on people.”

It is a compound sentence with one clause and belongs to the verbal process. The reporter uses the view of experts in the related area to strengthen the objectivity, reliability and preciseness of his opinion. There is also a double negation applied in this sentence, which implies the unlikeliness of the rise of mutation according to experts. Furthermore, it stresses that the mutation has appeared in other countries and shown no distinct serious consequences till the news was posted, which would prove the dependability of experts' view. From the logical perspective, it is a projection.

Another observable feature is an implicit shift of the focus in some news discourses. For example, when reporting the discovery of a new variant of COVID-19 in the UK, the reporters write that it is likely that the new coronavirus variant has already appeared in other countries, only that the UK's powerful genetic sequencing industry has discovered it first, and praise the UK for rationally over-warning other countries, saying it was very different from China. It is clear that the reporters have shifted the focus from the emergence of the latest mutated virus in the UK to its advanced technology and its positive attitude of alerting the world to this news.

Thus, the second question is able to be answered: “To what extent do CNN's news discourses on Wuhan and London lockdown show objectivity in wordings?” Although the writing of news is relatively objective, the choice of news materials is inevitably subjective. At the same time, the descriptive focus of the news also affects the objectivity of the news to a certain extent.

Thirdly, there are two previous news stories that are used as examples in these news discourses. For example, in Wuhan's news discourse, the reporter cites that quarantine first occurred during the plague in Italy in the 1300s to quarantine ships and sailors from infected areas. This example is ironic, serving as evidence that this method is old and unreliable as a failure. In another news discourse, the reporter uses the Ebola epidemic that happened in Africa in 2014 as an example, arguing that quarantines can also stimulate public violence and distrust, questioning its effectiveness. Although these examples are presented in an objective manner, they imply the position and attitude of the reporter. The reporter hinted that lockdown is stale, risky and inefficient. In addition, it is worth noting that these examples all appear in earlier news discourses on Wuhan lockdown, while similar examples are not used in discourses on London lockdown. Thus, it can be conjectured that over time, the success of Wuhan's epidemic prevention probably led the reporters to gradually shift their views.

As mentioned, there are many quotes cited in these discourses, as news reports are supposed to acquire the views of the mass and the authorities. But these quotes have their tendency. Therefore, by citing quotes, the reporter implies his or her stance skillfully. For example, the quote of a professor's comments indicates that the shutdown of Wuhan is “utterly incredible”, and by citing another professor of global health law, it reveals that the lockdown is “unprecedented” and “very unwise”. To our knowledge, the reporters say nothing subjective but quote others' views “fairly”, and these views have a certain degree of professionalism and authority. However,

these quotes are biased, and in the early news reports on Wuhan lockdown, positive and optimistic comments are rarely quoted, which inevitably makes one wonder if the reporters' attitude toward this is also more negative. In contrast, in the later news on London, the quotes are more balanced, with a small number of negative views and many positive or neutral views, and they are more focused on reporting the facts that have happened and the taken measures. For example, in Wuhan's discourse, the reporter cited a professor's opinion to demonstrate that some people who are less vulnerable comply with lockdown rules "as a matter of civic duty".

The news also emphasizes the internal disorder, especially for Wuhan. The disapproval of lockdown by the reporters is indicated in the descriptions of the panic, disorientation and fear of the citizens. For example, there are words such as "unwanted faces", "outcasts" or "resentment and discrimination", which may somehow exaggerate people's reactions to the outbreak. There are also many descriptions of emotions, quotes from others, for example, "feel wronged" or "really at the end of my rope". And the word "fear" is mentioned 10 times in ten news discourses on Wuhan, while for London, it appears 7 times in the discourses.

From the contrast of similarities and differences and the analysis of the corpus, the conclusion is: news discourses on Wuhan and London lockdown often use negative sentences to suppress the reporters' unpromising negative perceptions so as to be more "objective"; they also often make negative comments by quoting others, rather than by the reporter directly. At the same time, the news reports implicitly state their attitudes by using examples of previous relevant news, implicitly shifting the focus and emphasizing internal disorder.

Conclusion

To summarize this study, 889 resources are annotated from 20 CNN's news discourses on Wuhan and London lockdown, with affect appearing 99, judgment 213 and appreciation 577. The organization of attitudinal resources in London and Wuhan news discourses is broadly similar, with appreciation accounting for over 64% of the total, while judgment makes up less than 30% and affect takes up less than 10%. Meanwhile, there is a slight distinction that news discourses on Wuhan have more judgment resources than those on London.

The author selects the high-frequency content words from the discourses. Among them, "said" is mentioned most, which indicates that news discourses are projecting what others say. The high-frequency words are all relevant to epidemic prevention policies or the health and safety of people.

News discourse about Wuhan and London lockdown often uses negative sentences to suppress negative views that are not favorable to the reporters and thus more "objective"; negative comments are also often made by quoting others, rather than by the reporters themselves directly. Meanwhile, the discourses use previous relevant news as examples to implicitly state their attitudes, subtly shift the focus, and emphasize the internal chaos. The study builds a corpus to explore the attitudinal resources, textual features and the subjectivity of the chosen CNN news, sharing a research perspective and value for future research.

This study attempts to contribute to the critical studies of news discourses by analyzing and comparing CNN's news discourses, yet it may have limitations in the following three aspects: Firstly, due to the length and time limit, the study has only employed the attitude system of appraisal theory to analyze attitudinal resources. Secondly, the scope of the discourse can be another limitation of this research, as the data only covers 20 news reports from CNN. In addition, the analysis of CNN's news discourses cannot be completely objective since it is hard for the author to exclude the influence of her own ideologies on the judgments.

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The Strategic Significance of The Ancient Tea Horse Road from The Perspective of History

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Abstract: The ancient tea horse road is a traffic network mainly crossing The Hengduan Mountains and the three river basins of Jinsha River, Lancang-Mekong River and Salween River. It was an old transportation hub with the tea horse trade as the main content and horse Gang as the primary mode of transportation. In China, the ancient tea horse road has crucial historical value. Whether in natural resources or cultural resources, it is a cultural brand with international influence. By analyzing the historical origin of the ancient tea horse road, combined with historical materials and relevant research results, this paper discusses its multiple strategic significance. This paper mainly studies the strategic value of the ancient tea horse road in cultural exchange, national unity, resisting aggression and geopolitics.

Keywords: Cultural diffusion, Ethnic relations, Wartime artery, Geopolitics

Introduction

The ancient tea horse road was a non-governmental international trade channel and a corridor for economic and cultural exchanges. Initially, the ancient tea horse road originated from the tea horse exchange market in southwest China. Moreover, its size and connectivity peaked in the later period of World War II. From two elementary routes of the Sichuan-Tibet line and Yunnan-Tibet line to the transportation network connecting South Asia, Southeast Asia and East Asia. In terms of economy, it was believed that the ancient tea horse road had formed an economic and trade belt through the region. What's more, Wang considered that the circulation of particular products, advanced technology and skilled artisans promoted the improvement of the market on the ancient tea horse road (Wang, 2012). Jinyu analyzed the influence of the ancient road system on modern urbanization and rural revitalization (Jinyu, 2011). When it comes to culture, Luo took folk songs and temples as the breakthrough point to study the cultural significance of ancient roads (Luo, 2003). Luo studied the protection of cultural heritage from the perspective of settlement (Zheng, 2015). Moreover, Freeman studied the innovation of cultural tourism products and sustainable tourism of ancient tea horse roads (Freeman, 2015). Scholars tended to excavate the modern economic and cultural value of the ancient road. However, as a famous international ancient key channel, the strategic and international significance of the ancient tea horse road in ancient times is also worth studying. In addition, modern one belt and one road could be inspired by the historical value of the ancient road.

Method

This paper adopts the method of literature research and field investigation. Based on numerous historical documents and existing relevant research results, this paper further refers to local chronicles, historical books, county annals, ancient artworks, and ancient maps. This paper refers to the impact of the ancient tea horse road on linear cultural heritage, customs, language, architectural style, religion, festivals and logistics, investigating its humanistic significance and strategic value in different regions. This paper also utilizes the cross-analysis method of history and human geography to comprehensively evaluate the comprehensive function and standing of the ancient tea horse road.

Results and Discussion

History of Ancient Tea Horse Road

The ancient tea horse road was an ancient transportation route formed by people's tea and horse trade. Its formation and development experienced a long historical process. As far as the Chinese part is concerned, Tang-Tibet Ancient Road was first opened, and Princess Wencheng took this route into Tibet. The international part was called Tibet-Nepal Ancient Road. With the opening of these two sections of roads in the seventh century, a complete international channel connecting mainland China and South Asia took shape (Harrison, 1999). However, people in the surrounding areas did not stop exploring. They promoted the refining and networking of this international channel. People opened up the Sichuan-Tibet line, Yunnan-Tibet line and many capillary branch channels in China. Since then, the road network had become more and more perfect, and the scale had become larger and larger. In the Song Dynasty, a networked transportation system was finally established between East Asia, Southeast Asia and South Asia. The formation of this system promoted all-around exchanges in the surrounding areas.

Channel for International Cultural Exchanges

Communication Channel of Buddhist Culture

Buddhism spread widely on the ancient tea horse road. The ancient tea horse road connected Sichuan Basin, Yunnan-Guizhou Plateau and Qinghai-Tibet Plateau, extending into Bhutan, Sikkim, Nepal and India, and reaching West Asia and West Africa. On this road, the horse carried not only tea and luxuries, but also cultural collision and blending. The spread of Indian Tantric Hinduism was a symbolic cultural contagions diffusion. With the opening of the ancient tea horse road, Indian Buddhism was introduced into Tibet and integrated with the local primitive religions. Furthermore, it gradually evolved into Tibetan Buddhism, and formed the atmosphere of people believing in Buddhism. The ancient tea horse road had become a holy road for preaching and pilgrimage. In Sipsong Panna, Dali and other places where the ancient tea horse road passed, Buddhism became the fundamental religious belief of the local people (Zhang, 2015).

On the ancient tea horse road, Buddhist culture absorbed Chinese culture. Nanhong agate was one of the seven

treasures of Tibetan Buddhism. In Tibetan areas, it could only be worn by religious leaders and nobles. However, Nanhong agate was only produced in Yunnan and Sichuan. Therefore, the ancient tea horse road had become a transportation channel for jade (Hong, 2002). Tantrism Tantra believed that Nanhong agate was a mystical stone that could communicate with gods. Since ancient times, it had always been used as an amulet to symbolize love and hope. Similarly, jade was not only the embodiment of morality and temperament in Chinese culture, but also the symbol of beauty. As a cultural carrier, Nanhong had completed the organic blending of jade culture and Buddhist culture.

The Road to the Inheritance of Spirit

For China, the ancient tea horse road had essential meaning in the inheritance of civilization. It was a culture dish of multiculturalism, which made China's national spirit inherited and spread. The fortitude and honesty of the horse gang and trader's adventurous and pioneering spirit had become a considerable part of the Chinese national spirit. Significantly, a belt of cultural relics was formed on the ancient tea horse road. Meanwhile, cultural heritage was the material expression of regional culture. The tea horse official house built in the Song Dynasty, the Jiang courtyard built by the Jiang family who was famous for making tea, and the Yixing tea site in the Ming Dynasty were representatives of the caravan spirit and entrepreneurial spirit. In addition, on the ancient tea horse road, figure sculptures, passes, ancient towns, steles, and Buddhist temples were showing people the footprints of ancestors and horses.

Expansion of Cultural Ring

The ancient tea horse road wholly ended the frequent obstruction of the Eurasian connecting zone (Ma, 2016). Because geographical barriers are broken, culture could spread to distant and remote places. Some primitive cultures were preserved along the ancient tea horse road, such as the Carol culture. Some vanished cultures in mainland China could be found in Tibet and Southeast Asia, such as southern Nuo dance. Residential styles, costumes, customs, languages and even religious symbols appeared in two places far apart. It also witnessed the history of agricultural culture extending to nomadic areas, such as Dongba culture, Guardian God culture, water burial culture, sarcophagus burial culture and Sandao tea culture.

Notably, the southwest tea culture released its unique charm on the ancient tea horse road. The international part of the road started from Lhasa and Xigaze in the hinterland of Tibet. It crossed the Himalayas and led to South Asia. It had a position that could not be ignored in the history of transportation at home and abroad. At this moment, the Qinghai-Tibet Plateau has become a cultural highland for exchanges between China and the world. The formation of the traffic system of the tea horse ancient road made the southwest tea culture gain world-class influence. Meanwhile, tea culture was a part of Chinese etiquette culture. The dissemination of tea culture was essentially a manifestation of the identification of the world to the Chinese civilization. Therefore, tea had become a carrier to improve the soft power of Chinese culture (Jaewoo, 2009).

Bridge of National Unity and Development

Integration of Multi-Ethnic Cultures

The ancient tea horse road promoted national cultural exchanges. Many nationalities were crossed by the road, including Tibetan, Yi, Naxi, Pumi and Lisu. Therefore, the ancient tea horse road became a significant corridor for cultural exchange. On the one hand, the tea culture, architectural culture and utensil culture in the mainland spread to the border areas through the ancient tea horse road. For example, businessmen from all over the city also established Shanxi guildhall, Hunan guildhall, Sichuan guild hall and other chambers of Commerce. Sichuan Opera, Shanxi Opera, Beijing Opera and other dramas spread into Tibetan areas with trade. On the other hand, the frontier culture with distinctive characteristics also spread to the mainland through the ancient tea horse road, such as Polo culture. Polo was a traditional Tibetan sport. The Tang Dynasty was introduced into the Central Plains with the ancient tea and horse road, and the court aristocrats deeply loved it.

Furthermore, in the ancient tea horse road, multiple cultures develop harmoniously, thus forming a multicultural pattern. The linkage of multi-regional economic and political integration constructed a pluralistic and integrated cultural network. The ancient tea horse road provided an effective means of communication for the prosperity of cultural diversity. For example, in Tibet Kangding and Ganzi, there were not only Lama temples representing Tibetan Buddhism, but also Guanyu temples representing Han cultural buildings. In Yunnan, there were mosques representing Islamic culture and Taoist temples representing Taoist culture. In addition, the harmony of culture promoted the affinity of blood relationships, and numerous Han-Tibetan marriages appeared along the road. Only in Shuodu village, were there 15 descendants of Han-Tibetan marriage in the Qing Dynasty, and 19 Han people intermarried with Tibetans. The Tibetan heroic epic *Gesar* said that the transportation of goods from the Han area to the Tibetan area connected the hearts of the Tibetan and Han people (Pałosz, 2001).

Multi-Ethnic Community of Destiny

The ancient tea horse road deepened people's feelings and improved cohesion, centripetal force and affinity. Merchants engaged in the tea horse trade often formed business gangs. Most of the ancient tea horse road areas were ethnic minority areas, and the tea merchant horse Gang was often composed of Han, Tibetan, Bai, Hui, Yi. They coexisted with each other, united and cooperated, forming a unique caravan lifestyle. Moreover, the caravan spirit represented by hardworking and brave was a common heritage treasure of local people. The horse gang had become a cultural carrier flowing on the ancient tea horse road. The ancient arachnoid road recorded the memory of national exchanges and formed a national community of destiny. In many towns along the ancient tea horse road, Tibetan culture developed harmoniously with different cultures such as Han, Islamic, and Naxi. Interestingly, festivals of different nationalities were celebrated together. Meanwhile, the diets of different nationalities were absorbed into each other. Moreover, the customs of different nationalities were respected by each other. In the long-term exchanges, all ethnic groups have enhanced their understanding and affinity for each other's culture, and forming a compatible cultural circle.

More importantly, the ancient tea horse road was a monument to national unity. In 1942, the Japanese occupied Myanmar, blocked the Stilwell highway and cut off all modern land routes to the Chinese war zone. The ancient tea horse road, which ran through the Qinghai-Tibet Plateau and went directly to the Pakri port, had become the only ground channel to transport international aid to China. Folk transport teams voluntarily formed by horse gangs of various nationalities were loaded with all kinds of wartime materials. They used more than 5000 mules, 3000 horses and 20000 yaks (Clark, 2010). Long-distance transport teams came and left almost every day, and their footsteps could not be stopped even in rainy and dangerous seasons. It witnessed the history of Han, Tibetan, Bai and Naxi against colonialism and fascism, and reflecting the patriotism of fighting the enemy together.

Artery Against Aggression

Anti-Imperialist Channel

In the process of resisting imperialism, the ancient tea horse road-maintained China's life like an umbilical cord. Just like the Opium invading the southeast border of the Qing Dynasty and the low-cost cotton products invading India, in the Tibetan areas, the imperialists decided to use dumping as the leading economic tool to split the ties between the mainland and the Tibetans. In 1904, the commodities of the East India Company began to occupy the Tibetan market on a large scale. Instigated by the colonists, the political ties between the mainland and Tibet began to lose slowly. However, the masses were used to the taste of mainland tea produced by manual kneading. Therefore, as a messenger of folk exchanges, tea maintained the connection between the mainland and Tibet. At that time, tea was called a national defense commodity against colonial invasion. In fact, from Tibetan officials to ordinary horse gangs, porters and merchants, they basically got financial resources from the tea horse trade. The mainland and Tibet resisted the invasion of the East India Company with a spontaneous civil alliance. For example, in 1934, imperialists invaded Cangyuan, and the famous Banhong incident occurred. Long Yun, chairman of Yunnan Province, together with ethnic armed forces such as WA, Tibetan and Han, formed a defense volunteer army of more than 3000 people and went to the battlefield along the ancient tea horse road (Zhu, 2006). Evidently, the ancient tea horse road was the critical line in the anti-imperialist war.

Thoroughfare of Anti-Fascist Aggression

In resisting fascist aggression, the ancient tea horse road was the lifeline of the Chinese nation. During the resistance against Japan, after the enemy occupied China's coast and the Stilwell highway, the ancient tea horse road became China's only land international channel. Over the ancient tea horse road, people opened Mount Camel Airline to fly over Everest to India. Then people urgently held a national transportation conference to restart the ancient tea horse road as a transportation channel for civil and strategic materials. In the most primitive way of carrying horses, the millennium-old road became the front line of the war of resistance against Japan. At the same time, the ancient tea horse road developed rapidly, and the connectivity network in South and Southeast Asia was extended. According to records, the materials contributed by the caravan include bulk tea, bronze ware, mountain medicinal materials, livestock products, cloth and cooking utensils (Sigley, 2013).

Materials transported from India on land include western medicine, blankets, cigarettes and cotton cloth (Suo, 2003). Using the unique geographical conditions, people used their lives to carry out the marathon relay related to the country's fate. The ancient road materially supported the Chinese war zone and played a positive role in the world's anti-fascist struggle.

Ancient Tea Horse Road and Geopolitics

Military and Political Structure

Tea was the material force to maintain friendly relations and the economic means to exert political influence. In addition to providing tea tax for the imperial court to meet the needs of military expenditure, the more important thing is that it not only maintained the security of the Song Dynasty in the southwest, but also met the needs of the Central Plains Dynasty for war horses. The rise of Khitan, Xixia and Jurchen posed a severe threat to the Song Dynasty. Therefore, maintaining peace and tranquility in the southwest was crucial in avoiding a two-line battle for the imperial court. The Song Dynasty could concentrate on maintaining a relative balance of power with the northwest regime. The closeness of contact between political entities affects the possibility of war (Martin, 1994). In this case, the connection of the ancient tea horse road was of great strategic significance to the frontier defense. Compared with the visible blockhouse, tea constituted an invisible Great Wall (Reardon, 2002). Because it had gradually formed an imagined community between different nationalities with different beliefs and cultures.

The ancient tea horse road influenced the military and political pattern of regional forces. Historically, the ancient Southeast Asian countries of Annan, Zhenla, Zhancheng and Danmei in the hot climate zone did not produce warhorses, but only war elephants. Interestingly, Le Country with the same climate had 97000 warhorses (Yang, 2019). Le Country controlled the main tea-producing areas, and the Yunnan-Tibet tea horse ancient road was prosperous. It is entirely possible for Le Country to exchange Pu'er tea for magnanimous warhorses in Bod and Dali. This shows that the ancient tea horse road in the Song Dynasty had been extended to Southeast Asia in the Mekong River Basin. Numerous crucial strategic equipment improved the military strength of the Le Country, so that after the fall of the Song Dynasty in 1279, it could resist the Mongolian army alone for 13 years.

Religious Diffusion and Political Shape

The ancient tea horse road constructed the religious and political order. Le Country, which had powerful combat effectiveness and vast territory, was a robust regime in the Mekong River Basin. Nevertheless, it still accepted the appointment and canonization of the Dali emperor. This recognized the Dali emperor as the joint master of these political entities. According to Le history, the Dali ally leader stipulated that the tribute ceremony was once every five years (Tao, 2010). Dali established a regional international system centered on the ancient tea horse road, and the Pope of Dali was the co-owner of regimes. The tributary system that the neighboring regimes became courtiers, paid tribute and accepted canonization was established. On the other hand, due to the

spread of Buddhism by the ancient tea horse road, ancient countries in Southeast Asia were in the Buddhist cultural circle and generally implemented the system of caesaropapism. Dali was regarded as a paradise by neighboring countries. Therefore, the emperor of Dali was not only the secular leader of Yunnan and surrounding Southeast Asia, but also the Pope of multiple gods.

Conclusion

Historically, the ancient tea horse road was a vital international transportation hub with strategic value. As far as international cultural exchanges are concerned, on the one hand, it was a key channel for the spread of Buddhism, and Buddhism and local culture merged. Multiculturalism collided and improved cultural diversity in Sichuan Basin, Yunnan-Guizhou Plateau, Qinghai-Tibet Plateau, South Asia and Southeast Asia. On the other hand, it bred the Chinese national spirit, expanded the radiation scope of the Chinese cultural circle, and improved China's cultural soft power. In terms of nationalities, the ancient tea horse road was the trade history and the struggle history of many nationalities. Abundant economic ties and cultural exchanges between nations contributed to form a pluralistic and integrated national memory and the bottom thinking similar to the common destiny. Furthermore, the ancient tea horse road played an immeasurable strategic value during the war. As an international channel by land, it played a lifeline role in resisting imperialist and fascist aggression. When it comes to geopolitics, the ancient tea horse road, as an extension of land power, profoundly impacted the ancient military and political pattern. Goods, materials and economic relations became the strategic elements that the rulers needed to consider. Warhorses were strategic equipment to break the balance of strength. Religion constructed a unique pilgrimage system of caesaropapism to maintain the regional political union. With the evolution of society, the ancient tea horse road could find its strategic positioning and practical mission again. It could have a positive and far-reaching impact on the blueprint for integrating Chinese civilization into the world and joint development. Similarly, The Belt and Road and a Community of Shared Future for Mankind, can be enlightened by the strategic significance of the ancient tea horse road.

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Kindergarten Children's Metacognitive Self-Regulated Learning During and After Watching Other Child's Problem-Solving Behaviors

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Abstract: This study invested 24 effective and 16 ineffective problem-solving kindergarten children's awareness of metacognitive self-regulated learning (MSRL) while watching other child's problem-solving behaviors. The model in a video performed a task with a trial-and-error approach and finally asked for help. After watching the video, children were asked how they could help the model. All interviews were transcribed and analyzed using a content analysis method. The research findings indicate that there were several differences between the effective and ineffective children in their awareness of other child's MSRL. Effective children considered monitoring processes related to their understanding of the task goal and nature of a task and using cognitive state as important elements of the model's successful work, whereas ineffective children described separate elements unrelated to a task goal.

Keywords: Metacognitive self-regulated learning, Kindergarten children's metacognition, Young children's problem-solving

Introduction

Recently, much research related to active and meaningful learning has yielded significant insights and has led to theories concerning metacognitive self-regulated learning (MSRL) (Garcia, Falkner, & Vivian, 2018; Kizilcec, Pérez-Sanagustín, & Maldonado, 2017; Winne, 1995; Zimmerman, 1990, 2000). Broadly defined, metacognitive self-regulated learning refers to the active learning process through which individuals direct and

sustain their cognition, behaviors, and motivation to optimize their learning or to reach goals (Pintrich, 2000; Zimmerman, 2008; Zimmerman & Schunk, 2011). As active participants in all phases of learning, MSRL learners engage in such processes as goal setting, planning pre-task, self-monitoring, self-awareness, and self-evaluation (Lee, Watson, & Watson, 2019; Pintrich 2000; Winne, 1995; Winne & Perry, 2000; Zimmerman, 2001). The MSRL phases of planning, monitoring, and evaluation are thought to be cyclical and interrelated. please use 10-point font size.

Planning process involves setting goals, identifying a current problem to be solved, deciding which strategies to use toward goals, what order to follow, and how much time to give to the task and so on (Pintrich 2000; Zepeda, Richey, Ronevich, & Nokes-Malach, 2015; Zimmerman, 2000). Monitoring involves checking on one's current state and progress toward goals and selecting appropriate repair strategies when originally selected strategies are not working (Chou, & Zou, 2020; Hattie & Timperley, 2007; Greene & Azevedo, 2007; Griffin, Wiley, & Salas, 2013; Winne, 2001). Evaluation involves determining one's level of understanding, making judgments about the process and outcomes of thinking and learning towards goals (Zepeda et al., 2015), and need for cognition (Cazan & Indreica, 2014; Cacioppo, Petty, Feinstein, & Jarvis, 1996).

Compared to extensive research on metacognitive self-regulated learning (MSRL) in upper elementary grades through college (Bryce & Whitebread, 2012; De la Fuente & Lozano 2010; Metallidou & Vlachou, 2010), there has been little research on young children's MSRL. Therefore, more extensive examinations of young children's MSRL were deemed warranted. As a first step, the present study explored potential components of 40 kindergarten children's MSRL in a particular context. More specifically, the similarities and differences between effective and ineffective problem kindergarten children in their perception of other's MSRL were investigated during and after watching a model's mathematical problem-solving behaviors that requires MSRL strategies.

Methods

Participants

From a pool of children who gave a written participating consent form for this study and whose parents gave written permission for their children to participate, 40 kindergarten children (22 boys and 18 girls) were randomly selected.

Data Collection and Data Analysis

Before watching the model's performance, children participated in the Self-Directed Learning (SDL) task composed by Glaubman, Glaubman, and Ofir (1997) to elicit children's self-directed behaviors. The SDL apparatus consists of 9 nuts, 9 bolts, and 9 matching holes in increasing sizes on a wooden stand. Twenty-four children were identified as effective problem-solvers because they put the proper sized bolt in each of the nine holes in the wooden board and screwed the proper size nut onto each bolt. Sixteen children could not complete

the task. The model in a video performed the SDL task with a trial-and-error approach and finally asked for help. During and after watching the video, children were asked how they could help the model. Whole sessions were video-taped, transcribed, and analyzed using a content analysis (Strauss and Corbin, 2008). The 24 effective and 16 ineffective problem-solving children's statements and behaviors were analyzed separately, yet in a similar manner. Themes or patterns were developed from the narrative descriptions.

Results and Findings

There were several differences between 24 effective and 16 ineffective problem-solving children in their awareness of metacognitive self-regulated learning (MSRL) processes related to the model's problem-solving behaviors.

Effective Children's Awareness

There were two major themes emerged around the effective children's responses regarding to the model's needs to complete the task successfully: (a) awareness of the critical roles of the monitoring process towards task goals, and (b) recognition of the importance of MSRL cognitive process.

The interview data indicated that effective problem-solving children were awareness of the critical role of monitoring process related to planning process. They evaluated that the model needed to monitor his performances toward the SDL task goal ("to put all things together in the right places") and related to the characteristics of the SDL task such as same sizes among items (bolts, nuts, and holes) ["He has to see how big they are. These (bolts and the nuts) are the same as the holes. And putting things in the holes"]. Their understanding of evaluation and monitoring processes were tied with planning process such as task goals and the nature of the SDL task such as sequential order among each item ("from the smallest to the largest").

"Thinking" was another major theme in the effective problem-solvers' interviews concerning about what the ineffective model needed to solve his problems. They recognized that MSRL process was one function of the brain and thinking toward a task goal was a necessary process for problem-solving ["to find out the right place, he (the model) needs to think. He has to think in his head to put them in the order"]. The effective children suggested the model to use thinking strategy to check on his current problems, reevaluate his progress (outcome), and modify their performances toward the task goal ["he (the model) needs to think which one is right for the hole... He needs to take this one out and put it in right there... He has to stop and think to figure it out... He's sort of thinking, but he is not thinking right because he thinks fast. He maybe gets dizzy. He can't think right"].

Ineffective Children's Awareness

There were two major themes emerged in unsuccessful children's responses regarding to the ineffective model's

needs to complete the SDL task successfully: (a) lack of understanding of MSRL process and (b) a trial-and-error approach with demonstration and simple verbal suggestions.

The ineffective problem-solving children's statements indicated they were also aware of the model's ineffective problem-solving behaviors but did not address any constructs of MSRL when evaluating the model's performance. Some children understood there were size differences among items. However, none of the ineffective children mentioned the relationship among the SDL task items (9 holes, 9 bolts, and 9 nuts), sequential order within each item, and matching all three items toward the task goal.

Another common theme of the ineffective children's responses was to use a trial-and-error approach with demonstration and simple verbal suggestions. Most of the ineffective problem-solving children demonstrated how to solve the model's problems by manipulating the SDL items and showing them to the model on the TV screen with simple statements.

Discussion and Conclusion

The findings of the study indicated that both effective and ineffective problem-solving children were able to identify the problems of the model's problem-solving behaviors. However, the effective children are the only ones who recognized the constructs of MSRL related to problem solving. Their evaluation and monitoring processes were coupled with planning process such as understanding the essential characteristics of tasks and task goals and selecting effective strategies toward goals (Pintrich 2000; Zepeda, Richey, Ronevich, & Nokes-Malach, 2015; Zimmerman, 2000) when evaluating the model's ineffective performances. They were also understood cognitive state (Cazan & Indreica, 2014; Cacioppo, Petty, Feinstein, & Jarvis, 1996) as important components in the model's successful work. Understanding the nature and goal of tasks, monitoring, and self-awareness seems critical in order for kindergarten children to perform certain tasks successfully, as may be seen in other studies (Pintrich, 2000; Zimmerman, 2008; Zimmerman & Schunk, 2011) related to the role that MSRL plays in older children and adults.

However, the ineffective children in this study showed a limitation in integrating separate constructs of MSRL into the SDL task goal. They evaluated the needs of the model's monitoring. However, no one was able to make a connection between monitoring and planning processes. Their responses were based upon a trial-and-error approach with simple verbal statements unrelated to a task goal. This indicate that kindergarten children's evaluation, monitoring, and understanding of the whole task may not be separate elements of MSRL but work as integrated closely toward a main goal (Lee, Watson, & Watson, 2019; Pintrich 2000; Winne, 1995; Winne & Perry, 2000; Zimmerman, 1990, 2001).

The present study suggests that even kindergarten children use MSRL process under certain conditions. However, in order to gain a better understanding of kindergarten children's MSRL, much more remains to be learned. It is crucial to have more models of other kindergarten children's MSRL, including children at different

schools and from different cultures.

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Users' Social Interaction on Online Fitness Videos during the COVID-19 Pandemic in China - Evidence from the Bilibili Website

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Abstract: With the sudden spread of the COVID-19 pandemic, online fitness has entered people's vision. In the online fitness trend, Bilibili Website presents a unique landscape in online fitness videos with its unique bullet screen culture. If bullet screen is regarded as a medium, users of fitness video can share emotions in the space created by bullet screen through this medium symbol. From the perspective of Symbolic Interaction Theory, this paper will study and discuss the interactive mode, interactive content, and the reasons for the popularity of online fitness video in Bilibili through the methods of participant observation, textual analysis, and interview. It is concluded that the Internet interaction of users' online fitness videos on Bilibili is mainly bullet screen, and the main contents of user interaction are participation and joking with other users. The five reasons why online fitness is becoming popular are health awareness, home fitness habits, a strong sense of participation, saving time and money, and future trends. Through the conclusion and discussion, this study will provide enlightenment for the development of online fitness videos and national health.

Keywords: Social interaction, Online fitness, Symbolic Interaction theory, Bilibili website

Introduction

The sudden COVID-19 pandemic swept the world in 2020, cities were blocked, and residents had to stay at home. During the pandemic, the fitness video produced by well-known coaches and athletes mobilized by the State Physical Culture Administration of China has been played more than 2.6 billion times on the Internet platform (State Physical Culture Administration, 2020). As of February 5, 2020, the cumulative number of users participating in online fitness has exceeded 56.5 million, and the highest number of online sports has reached 160 thousand (Fu, 2020). Because of China's urbanization policies, more people are pouring into cities, and compared with other countries, China has a large population, but the penetration rate of fitness is low. In addition, with the vigorous development of 5G and artificial intelligence, online fitness websites came into being. As one of them, Bilibili has been welcomed with its unique user characteristics and bullet screen function. According to the Bilibili Website User Fitness Image Report (Bilibili Inc., 2020) jointly released by the Bilibili website and China Central Television in 2020, more than 5.7 million people participate in online fitness videos on Bilibili every day. Online fitness in China is becoming more popular than before.

With the popularity of online fitness, social interaction plays an irreplaceable role. The interaction of users' fitness videos on Bilibili is mainly through bullet screens. If online fitness is regarded as a culture, the bullet screen in fitness video is undoubtedly an indispensable material for this new fitness culture. Bullet screen can be viewed as a kind of media; it not only conveys the views of video viewers through its text content but also creates a space for instant voice and fragmented expression with its unique media form. As McLuhan said (McLuhan, 2000), the media itself is the real meaningful message, that is, only after human beings have a certain media can they engage in corresponding communication and other social activities, the most important role of the media is to affect our habit of understanding and thinking. Therefore, bullet screen, as a medium, also constructs new ways of fitness. In the Symbolic Interaction Theory, thought, self-knowledge, and society are constructed by communication and change with the progress of communication. Therefore, online fitness video is a meaningful social symbol among its user groups, attracting potential users. With the convenience of Internet communication, the broad symbol of online fitness has been highly spread. While users interact, they also constantly strengthen individual social identity, making online fitness more meaningful.

From the innovative perspective of the combination of Symbolic Interaction Theory and online fitness, this paper mainly focuses on: what are the characteristics of online fitness videos and users on Bilibili? How do users interact on Bilibili online fitness videos? And why has online fitness become more popular to Bilibili users than the traditional fitness model? To answer these questions, this paper uses the methods of participant observation, textual analysis, and interview. Through participating in online fitness, literature review, Python software, and interview content, it attempts to provide significance and enlightenment for the development of online fitness and national health.

Literature Review

Symbolic Interaction Theory

As one of the indispensable interaction theories in the 20th century, Symbolic Interaction Theory also has strong explanatory power for social interaction by the Internet and is also suitable for the study of interaction behavior. It originates from James' Theory of Self. He divides self into material self, social self, and spiritual self. Social self refers to people's perception of self from interaction with others (James, 2013). Mao forwards a new vision of Symbolic Interaction Theory in his paper *On the New Vision of Symbolic Interaction Theory in the 20th Century* (Mao, 2001). He believes that Symbolic Interaction theory is widely used in understanding, cognitive social deviance, gender naming symbols, campus interaction, and family interpersonal interaction by explaining the self-interpretation domain, the natural attribute of symbols, and the importance of human communication. In addition to the research of relevant theories, some scholars use the Symbolic Interaction Theory to explain or study practical problems. Yao analyzes the language symbols and body signs in the video blog with the help of Symbolic Interaction Theory and believes that the author of the video blog has completed the transformation and shaping between the foreground and the background through the division of time and space (Yao, 2019).

As mentioned above, symbols are the media of interpersonal interaction, and individuals are the constructors of

their behavior. Online fitness can be used as a medium of interpersonal interaction and an interactive symbol to conclude social relations with others. According to relevant data, more than 5.7 million people interact online about fitness on Bilibili every day (Bilibili Inc., 2020). Now, Bilibili has become the main platform for online fitness interaction with its distinctive characteristics.

Online Fitness on Bilibili Website

Bilibili website, or Bilibili bullet screen video-sharing website, is an ACG (Anime, Comics, and Games) entertainment site. Due to its continuous growth and increasing users, it began to successfully transform from the original ACG culture to a video website with a mixture of various business models. As a leading role of video-sharing websites, it is an important position for modern young Internet users to have an online carnival. Due to the sudden COVID-19 pandemic, people pay more attention to their physical health. Bilibili has also become the leading platform for online fitness video users.

As a video-sharing website, one of the biggest features of Bilibili is its bullet screen culture. Many scholars pay attention to bullet screens and have done a lot of research, which is the focus of Bilibili's research. "Bullet screen" originates from the military field and refers to the use of a large number of artilleries to provide dense shelling. Since then, the concept of "bullet screen" has been applied to video websites, which means that many video users send their comments in time while watching the video, and the comments sent by users are immediately displayed in the window of the video player (Feng, 2017). By continuously sending text comments, they are projected onto the screen like dense artillery on the battlefield. Such a comment method is commonly known as "bullet screen" by users. Deng (2015) analyzed the bullet screen video viewing behavior of Bilibili users through the Interaction Ritual Chains of sociologist Randall Collins. The rise of bullet screens has brought a new video viewing mode. Based on the Internet, users have broken the traditional and sluggish reply interaction state by sending bullet screens, creating a real-time virtual interaction situation, which is helpful for users to talk about their emotional experience. Xie (2014) believes that the significance of the bullet screen on the bullet screen video is not to spread information but to bring happiness to other users through the bullet screen itself. Through this even feedback comment method, it constitutes a shared viewing experience and eliminates the loneliness of the audience watching alone. Scholars who stand on the opposite view believe that bullet screen makes private aesthetics bind public aesthetics, serious and elegant aesthetic taste gradually disappear, and aesthetic emotion is alienated (Dong, 2016).

By summarizing, it is found that there are many studies on social interaction and other social media such as Twitter and Sina Weibo, but fewer studies on Internet interaction behavior on Bilibili Website combined with Symbolic Interaction Theory, and in the field of fitness and health. Therefore, this research attempts to fill this gap. As one of the critical theories in communication and sociology, Symbolic Interaction Theory has strong explanatory power for social interaction on the Internet and is suitable for studying interaction behavior. This research used Symbolic Interaction Theory as the theoretical background to analyze the interaction of online fitness videos.

Methods

Participatory Observation

To get more intuitive and accurate research conclusions, this study chose participatory observation by downloading and following various online fitness videos on Bilibili, including running, muscle building, yoga, and joining the fitness communication group spontaneously organized by user members to deeply understand its communication ways and characteristics.

Textual Analysis

Users' social interaction on Bilibili online fitness video is mainly completed bullet screens. Therefore, it is necessary to conduct text analysis on bullet screens. First, the paper searched in the video library according to the keyword "fitness". Secondly, it needed the experimental video to have the function of helping users exercise, that is, in the video, it had the functions of action introduction, action timing, action preview, and pause and rest. Finally, I screened out the uploader "@Zoey", whose video files have the function of fitness teaching. According to all her videos, I sorted the number of plays, selected the top 3 videos during the COVID-19 pandemic, and used Python to select 11,424 bullet screens of these three videos for classification and analysis.

Interview

For the reasons why online fitness videos are becoming more and more popular, this study adopted the interview by the Internet. Bilibili membership system stipulates that only people with level 2 and above can make video comments and send advanced bullet screens, and can participate in the interaction of online fitness videos. Bilibili's level can be upgraded by watching videos and sharing; the higher the level, the longer it takes to use. Therefore, for accuracy, the selected interviewees need to be above level 2. Through semi-structured interviews, five users are selected to analyze users' participation in online fitness and their significance to individuals.

Based on the selected user range, after observing the videos and their comments of each category and the bullet screen sent, five users with a high participation rate were interviewed by the Internet. The basic information of the interviewee is shown in Table 1:

Table 1. Basic Information of The Interviewee

NO.	Nickname	Gender	Age	Average time spent using online fitness videos on Bilibili one day
A	Babyi_	female	22	One hour
B	Invincible	male	20	Three hours
C	Cook	male	26	Two hours
D	榕茴	female	16	One hours
E	奶酪	female	19	One hours

Results

The Characteristics of Online Fitness Video and Users on Bilibili

The Characteristics of Bilibili Users

The user scale of Bilibili has gradually expanded in recent years; they have high loyalty to the platform and have the characteristics of high interaction and high retention. According to the Q3 Financial Report of Bilibili in 2020 (Bilibili Inc., 2021), the monthly active users of Bilibili reached 197 million, an increase of 54% over last year, and the monthly paying users reached 15 million, an increase of 89% over last year. The average daily video playback volume reached 1.3 billion, an increase of more than 70% over last year. The average number of monthly interactions reached 5.5 billion, an increase of 117% over last year, and the number doubled.

Bilibili gathers a large number of young users. The Inventory Report on the Development of Short Video Content in the First Half of 2020 (Crowley Inc., 2020) mentioned that in the past three years, the average age of Bilibili's new users was 21, and the proportion of users aged 18-35 reached 78%. In terms of gender ratio, male users account for 57%, female users account for 43%, and the number of male users is slightly higher than that of women. In terms of education, the proportion of Bilibili users with a bachelor's degree or above is 10% higher than that of all Internet users in China. In addition to watching videos, users will also learn or make friends on Bilibili. Through the report, it is also found that among the main purposes for users to use Bilibili, "learning knowledge or skills" accounts for more than 40%, and "looking for partners with the same interests" accounts for 39%. With the development of the Internet, users' social relations and consumption preferences are more inclined to interest. Video trend insight in 2020 (QuestMobile, 2020) shows that only 33.6% of users born after 2000 socialize on the Internet. The younger the users, the more likely they are to communicate with their peers and find partners with the same interests through offline associations, interest associations, star chasing, and other interest social ways. According to these data and characteristics, the Bilibili user portrait is made, as shown in Figure 1.

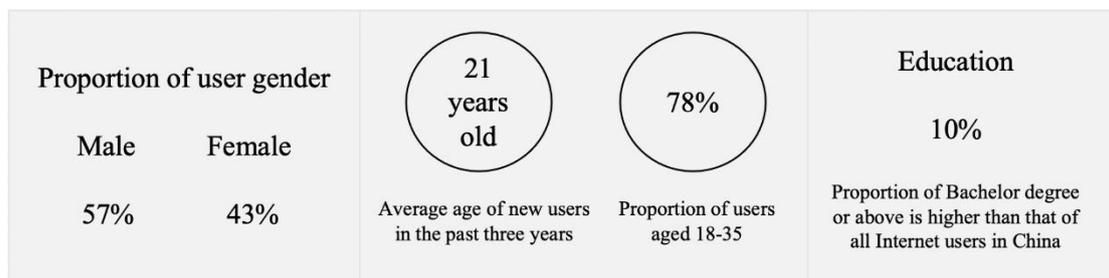


Figure 1. Bilibili Website User Portrait

Bilibili, as an interest-oriented video website, attracts different young groups with "interest". Users are keen to use it to learn skills, communicate with each other, and find common friends. Based on the user attributes of the original ACG (Anime, Comics, and Games) on Bilibili, its fitness video is mainly aimed at young users expanded on this basis. ACG users often have the characteristics of staying at home. Therefore, online fitness video is more suitable for such people because they are staying at home and are unwilling to go out for exercise.

Online fitness video solves this problem very well. The sudden outbreak of COVID-19 makes people realize the importance of having a healthy body. Users can exercise at home through online video, which can not only reduce the risk of virus infection caused by contact but also keep fit while users maintain their original habits.

The Characteristics of Online Fitness Video on Bilibili

Bilibili, once a carnival paradise for ACG users, is now more like a youth culture base. According to the Data of Bilibili Brand Marketing Guide (Crowley Inc., 2020), Bilibili currently has 15 partitions, including more than 7000 core contents. Q3 Financial Report of Bilibili in 2020 (Bilibili Inc., 2021) points out that life, games, knowledge, animation, and entertainment are the top five zones. Bilibili has changed from the original niche video website to the current comprehensive content self-produced video website. It continues to conform to the psychological labels of major users. From niche to pan entertainment, Bilibili started with secondary creation based on original content and later featured ACG, expanded entertainment at the same time, and derived live broadcasting from the beauty area. Then to the encouragement of content production and the introduction of recommendation algorithms to label enthusiasts in different partitions.

Bilibili and other ordinary video websites both have bullet screens, but there are significant differences. Based on the long-time use of Bilibili and the communication with its users, it is concluded that the bullet screen on Bilibili mainly has the following characteristics: (1) unique joking, such as this is the worst time XX has been hacked. (2) Classic animation meme, such as ancient red and blue out of CP. (3) Seize idol characters, such as XX is my wife/husband. (4) Notice, such as high energy ahead. (5) Explanation, such as pausing to read the scarlet letter. (5) Personalized dialogue. Turn the bullet screen into a chat room for communication and dialogue through humorous and engaging personalized dialogue. For example, the previous bullet screen mentioned one thing, and the later bullet screen will keep up with the dialogue. The main reasons why the bullet screen on Bilibili is different from other websites are as follows: (1) the psychological cost of sending bad bullet screens is high. Only when Bilibili becomes a full member after the registered member answers the questions successfully can it send a bullet screen. At the same time, Bilibili has a strong bullet screen culture. Most users are keen to maintain the good order of this bullet screen and condemn the bad bullet screen. If new users accidentally send bad bullet screens, they will be strongly condemned and educated by old users to inherit bullet screen culture. (2) Management mechanism of bullet screen. Due to the high access threshold, ordinary registered members cannot send bullet screens. Only those who pass the examination can send bullet screens, and the more advanced members can send advanced bullet screens. At the same time, Bilibili has a perfect shielding mechanism, which can be shielded according to keywords and other needs. Users can also report a specific bullet screen, and the reported person will be subject to prohibition or seal.

Now the Bilibili has produced many different contents, and the fitness video is one of the new popular. Its online fitness video has an obvious feature different from other platforms, that is, the bullet screen culture of the Bilibili website. Users can send bullet screens while watching online fitness videos. As we all know, the process of fitness is boring, and the time is also very long, so it is difficult for people to adhere to it. The emergence of

the online fitness video bullet screen on Bilibili has increased the interactivity of fitness and increased the interest of users. Therefore, it is easier for users to adhere to long-term fitness and achieve their goals in this way.

Users' Social Interaction on Bilibili Online Fitness Videos

Through the bullet screen data obtained by selecting three videos of @ Zoey during the COVID-19 and combined with the above analysis of Bilibili online video features, I classify and analyze them according to their types. The types of bullet screens are divided into nine categories, namely "training participation", "experience of sports", "comment on the action", "comment on the blogger", "joking with other users", "self-motivation", "self-ridicule", "mood sharing", "achievement sharing" and details as shown in Table 2.

Table 2. Bullet screen text classification and examples of the selected videos

Type of bullet screen	Example
Training participation	"I'm coming", "day three", "D4", "the second day of Jay's girlfriend", "the first day of 77"
Experience of sports	"My back is going to cramp", "the arm is one palm away from the wall", "these minutes are too long", "my knee will hurt"
Comment on the action	"This is a good move", "this action doesn't stretch straight", "It's too hard for me", "it's going to break after this"
Comment on the blogger	"Zoey blackened?", "Zoey is so beautiful", "Blogger is great and thin"
Joking with other users	"Bullet screens are all talents", "Look at bullet screens, laughing exercises my abdominal muscles"
Self-motivation	"Just stick to it", "I've seen it and I'll take it", "It's almost done. Come on", "I can do that", "fight for beauty"
Self-ridicule	"I think it's death to do this", "is it because my legs are short?"
Mood sharing	"Ha ha ha", "today I'm happy", "I'm not myself today"
Achievement sharing	"After three days of practice, it's very effective", "I held on"

The data analysis is carried out in the online fitness video on the selected Bilibili. The largest number is the bullet screen of training participation. This kind of bullet screen mostly appears at the beginning and end of the fitness video, indicating that he starts or completes the exercise. Joking with other user are also one of the main bullet screens. Its objects include a certain action, self-state, and feeling, as well as the bullet screen itself. This kind of bullet screen intuitively shows the mood and feelings of the viewers and followers of the fitness video and their views on the video, making the online fitness video a free voice space. While users follow the video fitness, the mutual communication between bullet screens also turns the whole video from the place of free expression to the place of social communication and collective ceremony.

The Popularity of Online Fitness Video on Bilibili

Through observation and interviews, it is found that the users participating in online fitness are the original users of Bilibili, and most of them are loyal fans of animation games. When Bilibili launched the fitness section, they initially tried to participate in it with a try attitude. Later, they found that the function of the bullet screen was well combined with online fitness, which was creative and interesting. Because these users who love animation like to stay at home and have little time for fitness. Participating in online fitness videos on Bilibili not only meets their daily habits but also lets them can participate in fitness at home. With the outbreak of the COVID-19 in 2020, some people who usually have fitness habits have to stay at home due to the lockdown. At this time, they found that the online fitness video on Bilibili can serve as a fitness coach and fitness partner, and can also have professional guidance and partner communication at home. The epidemic not only increased the contact of those who originally participated in the online fitness video on Bilibili but also made those who were not its users join the ranks of Bilibili users through the online fitness video.

A young woman explained that the awakening of national health awareness and the trend of technological development has promoted online fitness. At the same time, people are used to staying at home because of the epidemic.

Compared with developed countries in Europe and America, China's awareness of health is still very weak in the past few years. However, our living standards have improved in recent years, and our awareness of health has increased. Naturally, we will exercise in various ways. People can only exercise at home during the epidemic, the city was closed for several months last year, and now people have formed the habit of exercising at home, it is also a good way to exercise

A user named "invincible" believed that people were very busy at work and had little extra time and money. He thought that online fitness could not only solve this problem but also provide people with a sense of participation.

As an employee of a financial company, they are really busy every day. These kinds of people don't have a fixed time to go to the expensive gym for fitness, but they want to keep healthy in my busy life, so they participate in online fitness. It's great to participate in the fitness video on Bilibili. People who are weak willpower and are introverted person can urge each other with friends in the online fitness video. At the same time, it's also very convenient to discuss some content about fitness.

Based on the interviews, it is concluded that the main reasons for the increasing popularity of online fitness are as follows: 1. The awakening of health awareness. With the improvement of Chinese people's living standards, the change of fitness ideology, and the sudden epidemic, people pay more attention to physical health and are willing to exercise in various ways to keep healthy. 2. The habit of home fitness. Due to the lockdown caused by the epidemic, people lack activities at home, resulting in obesity. Online fitness can achieve the purpose of

exercise without leaving home. Therefore, people have become the habit of participating in online fitness at home. 3. Strong sense of participation. Due to the bullet screen function of online fitness, users can communicate with partners with the same interests while participating in online fitness, reducing the feeling of boredom and loneliness in fitness. 4. Save time and money. Compared with the traditional fitness industry, online fitness has the advantages of low cost and convenience, which is very important for young people who concentrate on their work. These young people often have little savings and valuable time, so it is difficult to spend the whole piece of time and much money. In terms of fitness, online fitness videos well meet most of their needs. 5. Future trends. Due to the advent of the 5G era, the Internet can help people far more than now. With the improvement of online education and the development of science and technology, online fitness education has become a new trend.

Discussion

Through the above research and analysis, the fitness video on Bilibili and the characteristics of its users are based on the platform culture, which has been pointed out above. Then through the textual analysis, it concludes that the interaction of users' online fitness video on Bilibili is mainly bullet screen interaction, and the content of user interaction is also analyzed. The rise of bullet screens has brought a new video viewing mode. Users create real-time virtual interaction by sending bullet screens, breaking the traditional and slow reply interaction state, which helps users talk about their emotional experience (Deng, 2015). Xie (2014) also demonstrated that the significance of the bullet screen on the bullet screen video is not to spread information but to bring happiness to other users through the bullet screen itself. These views are consistent with this paper, through online fitness video fitness learning, users get far more than a healthy body. Out of their love for fitness, self-display, social networking, and other needs, they communicate and communicate with other users with the help of mobile fitness software. While users interact, it also continues to strengthen individual social identity and social identity, which makes online fitness more meaningful.

The paper also answered five reasons why online fitness has become popular through interviews, which are the awareness of health awareness, the habitat of home fitness, a strong sense of participation, save time and money and future trends. Bilibili's unique bullet screen allows each user to send their feelings when participating in online fitness videos, to interact with others in real-time. At the same time, due to the characteristics of Bilibili users and videos mentioned above, Bilibili has become an online fitness place favored by most people. This also confirms the development trend and characteristics of online fitness. The rapid development of the Internet has prompted changes in the way of social interaction, with its advantages, the Internet has helped people break through the limitations of time and space and developed a form of network interaction across time and space (Chen, 2020). In the current environment of science and technology, the popularity of online fitness is by no means accidental. As mentioned in the reasons for the popularity of online fitness videos listed above in this paper, people's lifestyles, habits, and thoughts are changing with the change of the environment.

Based on the Symbolic Interaction Theory, James (2013) believes that social self refers to people's perception of

self from interaction with others. This paper found that online fitness video is a meaningful social symbol among its user groups, attracting potential users. With the help of the convenience of Internet communication, the broad symbol of online fitness has been highly spread and exposed. For individual users, such online fitness videos are a collection of common hobbies and interests. Therefore, online fitness video is an interactive symbol that can establish social relations with others. In the whole process of online fitness, compared with the previous way, users have become producers from recipients and can also comment on the original content (Li, 2020). Bullet screen is not only the feature of Bilibili's online video, or the core of online fitness video user interaction, but also an essential factor for the increasing popularity of online fitness video. Bullet screen, as a medium, connects individuals in front of different screens through free expression, creative rituals, and shared emotions. Users who follow the video fitness not only join a movement at the physical level but also join an internet interaction at the spiritual level. They participating in the fitness video may not follow the whole exercise seriously, but once they join the fitness, they can mobilize every inch of their muscles to join the exercise and Internet interaction. Bullet screen, video content, and users in front of the screen constitute a new fitness cultural landscape during the COVID-19.

Due to the limitations of Bilibili, this paper only analyzes the online fitness videos through a qualitative approach, without using data statistics. At the same time, only one website was selected, without a detailed comparison of other platforms and websites. So, in future research, we could choose more diverse online fitness websites and platforms for comparison and further analyze through quantitative methods such as questionnaire surveys and content analysis.

In general, social interaction promotes the development of online fitness. It inspires the optimization of online fitness and improving the communication effect. In the future, whether during the epidemic or in the post era, the online fitness video could make use of social interaction to develop online fitness, enrich the ways of fitness, and create a new era of it.

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Innovation and Entrepreneurship Attitudinal Study with Elementary Students

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Abstract: Academic literature and extensive studies indicate that a small fraction of incoming first-year college or university students have a foundational understanding or appreciation of entrepreneurship. Even fewer have the disposition or inclination to pursue an entrepreneurial path. The purpose of this proposed study is to measure the level of innovative and entrepreneurial (I&E) attitudes in elementary students and assess how nurturing activities over time affect those same students' I&E mindsets. Students will be in the fifth and eighth grades in the public-school systems in Jefferson County, Indiana. The study will use quantitative descriptive and explanation research design and will utilize a control group. This study will investigate the correlation of elementary I&E mindset growth and age appropriate I&E leaning activities in order to actively promote and nurture future entrepreneurial intentionality. Presenters will discuss hypotheses related to how nurturing activities over time affect those students' attitudes towards innovation and entrepreneurial thought. Attendees will have an opportunity to engage with presenters.

Keywords: Innovation, Entrepreneurship, Elementary, Attitudinal, Research

Introduction

Policymakers in the United States see, and fully understand, the importance of Innovation and Entrepreneurship (I&E) as a means of growing GDP and maintaining global economic competitiveness. The United States Government has invested nearly a trillion dollars since 2018 for research and development in private I&E initiatives. (Kelly & McCabe, 2021). However, 95% of that research investment is undertaken on behalf of the largest corporations. However, the most significant breakthroughs that have had the greatest impact on the economy and technological progress have come at the hands of small, newly founded ventures, individual inventors, and entrepreneurs, not by major corporations (Baumol, 2004).

Academic literature and extensive studies indicated that only a tiny fraction of incoming first-year college or

university students have a foundational understanding or appreciation of entrepreneurship. Even fewer have the disposition or inclination to pursue an entrepreneurial path (Bliemel, 2014). Recent research has shown that the United States lags behind most industrialized countries for student entrepreneurship intentionality. The Guess Survey shows student entrepreneurship intentionality across 54 countries places the United States at 43rd. The US has work to do to maintain its status as a global economic power. (Sieger et al., 2019) It is incumbent upon K-12 to introduce, nurture and promote I&E mindsets and understanding in our youth so that entrepreneurial interests and intentionality can continue to grow.

Scope of the Study

Participants will be selected based on their responses to a short questionnaire designed to identify initial indicators of both interest and disposition towards innovation and entrepreneurship. Some sample probing questions would include:

- I like to find ways to help others.
- I like challenging activities that solve big problems
- I like to be a leader.
- I like to push a group to be their best.
- I would like to own my own business.
- I would like to be my own boss.
- I want to change the world.

Additional probing questions would be intermixed to allow for participant freedom in association. Two groups of approximately twenty participants each will be formed. Students in grades 5 and 8 are highlighted, primarily because those grade levels typically include transition-related activities that allow students to begin thinking about their future endeavors. The authors will serve as principal investigators, securing Institutional Review Board approval before implementing the questionnaire selection instrument. The authors will have established relationships with the selected school locations in Jefferson County, Indiana. Students will be invited to participate in the I & E group once the questionnaire responses are screened for a predisposition to Innovation and Entrepreneurship; students will be invited to participate in the I & E group. Prior to group orientation, a parent/guardian permission form will be sent home. The authors will collaborate with the local school district to host the student groups on the Hanover College campus. These special activities will occur around and in accordance with the school calendar and schedule parameters, functioning like an extracurricular activity.

Group Interaction and Initial Discussion

Once groups are vetted, the authors will begin hosting I&E sessions that will focus on curriculum that is both age-appropriate and designed to feed student interest in I and E. Within the scope of this curriculum, students will be given access to Project-based Learning opportunities that mimic an I&E environment. Not only will this serve to orient students into what it is like to be innovative but highlight how entrepreneurial activities can be

fun and engaging.

Student participation will be evaluated by both surveys and interaction tools, both formatively showing the depth of impact the program may have on an I and E mindset. As the program expands, the authors will incorporate new and innovative designs based on the pedagogical data.

Potential Next Steps

The authors hope to eventually expand their research to include multiple school districts and the addition of high school students. This continued research hopes to shed light on the necessary processes and teaching techniques to nurture long-term student entrepreneurial inclination. The ultimate goal is to increase I&E-focused university study and assist in driving more new business startups in Indiana.

I&E concepts are messy, nonlinear, and filled with uncertainty. A student's fear of failure is fatal to successful I&E outcomes. Therefore, it is necessary first to introduce I&E mindsets, design thinking, and open creativity early in an elementary student's academic career, all wrapped around the tenacity to question, explore and discover. Fruitful, long-term investment in I&E education requires introducing and nurturing design thinking and entrepreneurial mindsets to teachers and students in primary and secondary schools.

There is little academic literature or research focused on I&E education at the elementary or high school level. It should come as no surprise that our present-day digital global economy has created unique real-world challenges, demanding distinct problem-solving skillsets and novel ways of thinking (Cachia et al., 2010; Hassi, 2016). The K-12 educators of tomorrow must be equipped with the foundations of entrepreneurial teaching methods and steeped in innovation-oriented mindsets to develop the thoughtful, creative, and entrepreneurially centered university students of the future, not to mention productive citizens of the world (Cachia et al., 2010; Komarkova et al., 2015).

There are over 1,800 colleges and universities in the United States that offer Education Majors and teaching certifications. Higher Education offers a natural springboard to introduce I&E concepts and principles to future elementary and high school teachers and students. There is no clarion call to completely re-write or re-develop elementary and high school curricula from the ground up in order to seed valuable I&E concepts. Instead, integrating design-thinking, co-creativity, and collaborative concepts into current cross-disciplinary curricula offers a solid beginning (Androutsos & Brinia, 2019; Hassi, 2016).

Conclusion

University Schools of Education can and should develop local after-school, age-appropriate programming for young students to introduce and promote I&E concepts. Entrepreneurially oriented activities can foster future I&E intentionality and provide invaluable exposure to higher education paths for elementary and high school

learners. The successful entrepreneurs of tomorrow are grade school students today. True I&E cannot be relegated to prescriptive, adult-only training. Entrepreneurship is a mindset, a holistic way to view the world, and can only be fully leveraged through life-long learning. Much work, investment, and research must be done in K-12 I&E development (Hassi, 2016). This ground is fertile for the substantial introduction of the concepts of innovation, co-creation, open collaboration, design thinking, and entrepreneurship to our youth so that future entrepreneurial inclinations can ultimately take root (Aparicio et al., 2020). Life-long I&E education is relatively meaningless if it does not have the opportunity to result in value creation. “Entrepreneurs innovate. Innovation is the specific instrument of entrepreneurship. It is the act that endows resources with a new capacity to create wealth. Innovation, indeed, creates a resource” (Drucker, 1993, pg. 30). I&E is a lifelong learning endeavor.

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Teaching Complex Probability Problems Using Simple Simulations with Applications to the Broken Stick Problem

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Abstract: Probability is generally considered one of the most challenging areas to teach in mathematics education due to its intricate nature. However, the simulation-based teaching method can increase students' accessibility significantly to the probability problems because it enables students to resolve the problems with minimal mathematical skills. By substantially reducing the stress caused by complex mathematical calculations, simulations help students focus on the key concepts of complex probability problems. Furthermore, the programming languages, such as R and Python, can be easily implemented in classrooms to perform simulations that allow students and teachers to discuss the idea to solve the probability problems step by step. This article presents a classical probability problem known as 'the broken stick problem' to show the efficiency of the simulations in teaching probability. It contrasts the effectiveness of mathematical and computational simulation approaches to the solutions of the broken stick problems with several variations. For concrete illustrations, a series of R codes and their examples are provided at the end of the article, which can be used for the simulation study in probability class with various versions of broken stick problems. The extension of the computational approach to other historic probability problems is also discussed.

Keywords: Geometric probability, Acute, Obtuse, Heron's formula, Computational solution

Introduction

Probability and statistics literacy is essential for preparing students for life as informed citizens since it is needed in many decision-making situations such as voting, medical diagnosis, finance and insurance, and forecasting (Gal, 2005). It is important to use the opportunities technology offers for teachers and students to discuss and build models to describe real-world scenarios through simulation (Lee & Hollebrands, 2008). In this article, we discuss the classical probability problem, known as the broken stick problem. We present various versions of the broken stick problem and illustrate both the mathematical solution and the simulation-based approach.

The broken stick problem originates from an examination of Cambridge University in the mid-19th century (Univ. of Cambridge, 1854). It says,

“A rod is marked at random at two points, and then divided into three parts at these points; the probability of its being possible to form a triangle with the pieces is 1/4.”

The exam presented the solution using a direct mathematical approach to solving the inequalities required to form a triangle on the $x - y$ plane. Lemoine (1875) used the combinatorial method with the discrete points evenly spaced on the stick. Poincare (1981) introduced a geometric approach, transforming the sample space of the two random points to the inside of an equilateral triangle. All methods conclude that the probability for the three pieces to form a triangle is 1/4. Since it was introduced in 1854, various versions of the broken stick problem have been proposed: for example,

- What is the probability of forming an acute (or obtuse) triangle?
- What is the probability of forming a triangle with an area less than 1?
- What is the probability of forming a triangle with the largest angle greater than 60° ?

The mathematical solutions to the probability problems above can be challenging and inaccessible for high school or college students in introductory statistics courses. However, students can comprehend these problems using experimental approaches, such as the simulation study with the aid of technology. For example, we cannot conduct actual experiments for the broken stick problem, but we can have students do virtual experiments in classrooms with an elementary level of programming skills. The innovations in technology have made programming languages (such as R, Python, and JAVA) accessible to students for free. Furthermore, computers and statistical packages have been recommended as teaching tools (Carver et al., 2016). Using computational tools in probability/statistics class can be very efficient and provide great insight into understanding complex mathematical problems (Benakli et al., 2017; Koparan & Yilmaz, 2015). The simulation-based approach can be an effective alternative to help students without a solid mathematical background understand probabilistic phenomena without becoming lost in the steps of complex mathematical calculations.

Probability Questions on the Broken Sticks

The First Question: Forming a Triangle

Question 1: *A stick, dropped on the floor, breaks at random into three pieces. What is the probability that the three parts of the broken stick form a triangle?*

Let a , b , and c denote the lengths of the three pieces and, without loss of generality, let the length of the stick be one, or $a + b + c = 1$. For the three pieces to form a triangle, the sum of the two sides should be greater than that of the other side (triangle inequality theorem). Namely, for $0 < a, b, c < 1$,

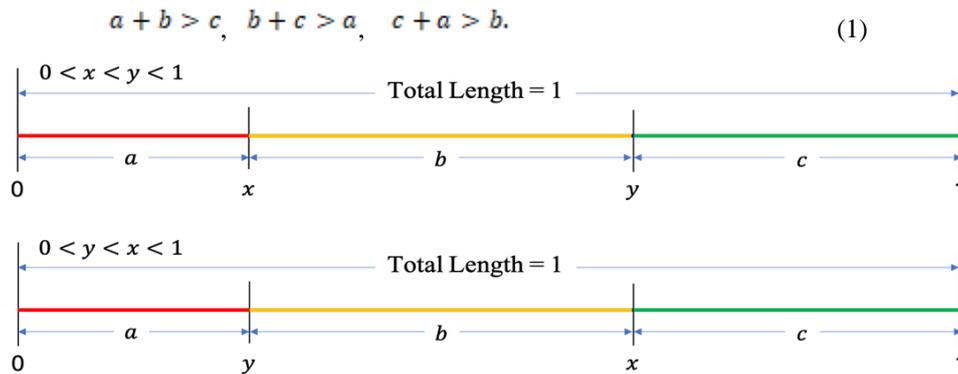


Figure 2. Three pieces of broken stick with the broken points x and y .

With $a + b + c = 1$, the condition (1) can be simplified and represented by one inequality: $\max(a, b, c) < 1/2$. But, throughout this paper, we maintain the original conditions in (1) since it is more intuitive and much easier for students to understand. In Figure 1, the points x and y represent two real numbers randomly selected in the interval $(0, 1)$. Thus, the points x and y can be considered two random points described on the Cambridge University exam aforementioned above. Using two points x and y on the stick, we break the stick into three pieces. Then, the lengths of the three pieces a , b , and c can be written in terms of x and y :

$$a = x, \quad b = y - x, \quad c = 1 - y, \quad (2)$$

provided $0 < x < y < 1$ (see Figure 1). By substituting (2) for (1), we can see the inequalities in (1) are equivalent to

$$y > \frac{1}{2}, \quad x < \frac{1}{2}, \quad y < x + \frac{1}{2}. \quad (3)$$

We can graph these inequalities using the Desmos graphing calculator. The intersection of all three inequalities shows the region where a triangle is formed. Including the case of $0 < y < x < 1$, two regions exist where the three pieces form a triangle (Figure 2). Then, the probability of forming a triangle is the sum of the areas of the shaded regions, which is $1/4$, as depicted in the graph.

To answer Question 1, we can also calculate the probability using calculus based on the probability distribution theory. Let E_1 be an event that the three parts of the broken stick form a triangle. Since x and y are independent uniform random variables on $(0,1)$, the joint probability density function of x and y is given by $f(x, y) = 1$ with $0 < x < 1$ and $0 < y < 1$. Hence, the probability that the three parts of the broken stick form a triangle is obtained by solving the system of the inequalities (3). Let E_1 denote the event that the broken sticks form a triangle. Then

$$Pr(E_1) = 2 Pr \left(y > \frac{1}{2}, \quad x < \frac{1}{2}, \quad y < x + \frac{1}{2} \right) = 2 \int_{1/2}^1 \int_{y-1/2}^{1/2} dx dy = \frac{1}{4}. \quad (4)$$

$Pr(E_1)$ is obtained by multiplying 2 to $Pr \left(y > 1/2, \quad x < 1/2, \quad y < x + 1/2 \right)$ since we have two cases to

consider: $0 < x < y < 1$, and $0 < y < x < 1$. Though Question 1 is the simplest case among the broken stick problems, the mathematical solution provided in (4) is not easy to understand unless students have comprehensive knowledge in many mathematic topics such as a system of the inequalities, double integral, probability distribution theory, etc.

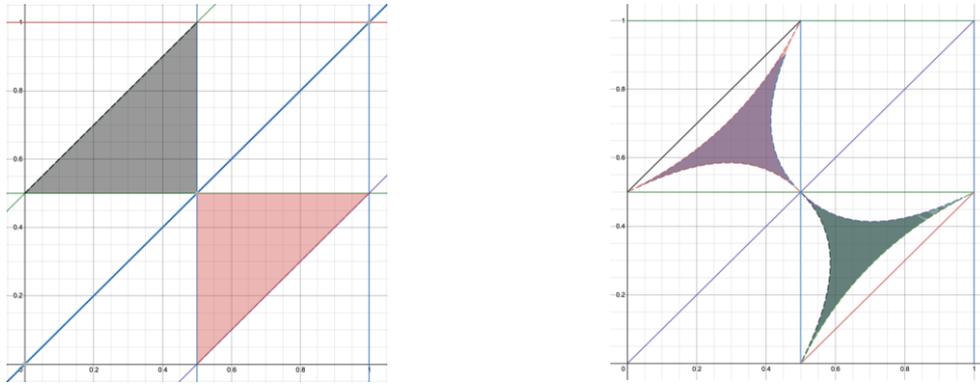


Figure 3. Geometric Representation of Question 1 (left) and Question 2 (right). The Shaded Regions Include All of The Pairs (x, y) Forming a Triangle (left) and An Acute Triangle (Right).

Next, we explore an alternative solution: the computational approach. Imagine having a stick with a length of 1 and breaking it at two random points to make three pieces. Since x and y are random numbers between 0 and 1, we have two cases: $0 < x < y < 1$, or $0 < y < x < 1$. Thus, the lengths of the three sides can be formulated by $a = \min(x, y)$, $b = \max(y, x) - \min(x, y)$, $c = 1 - \max(x, y)$ (see Figure 1). After we obtain the lengths of three sides (a , b , and c), we determine whether these three pieces can form a triangle and record the result by checking the inequalities in (1) are true or not (yes or no). We repeat these steps sufficiently many times, say 10,000 times. Among the 10,000 repetitions, we count the number of yeses. Then, the probability is given by the number of yeses divided by the number of repetitions. The whole procedure is summarized in Algorithm 1.

Table 1. Algorithm of The R Code for The Simulation Study: Question 1.

Algorithm 1.
[1] Set $Counter = 0$.
[2] Generate x and y from $U(0,1)$ independently.
[3] Set $a = \min(x, y)$, $b = \max(y, x) - \min(x, y)$, and $c = 1 - \max(x, y)$.
[4] If $a + b > c$ and $b + c > a$ and $c + a > b$, then $Counter = Counter + 1$.
[5] Repeat Step [2] - Step [4] N times.
[6] Result: $Pr(E_1) = Counter / N$.

In Algorithm 1, $U(0,1)$ denotes a uniform distribution over (0,1). Thus, x and y represent the broken points in

Figure 1. Table 2 shows an R code based on Algorithm 1. Since many online R compilers are available, such as <http://makemeanalyst.com/run-your-r-code>, https://rextester.com/l/r_online_compiler, <https://rdr.io/snippets>, and we can compile this code wherever the internet is available without installing a software for the R compiler.

Table 2. R Code for Question 1.

R code
<pre># Step[1] Initialize variables N = 10000 # The number of repetitions Counter = 0 # Variable for counting the number of cases to form triangles # Step[5] Repeat Step[2]-Step[4] N times for (i in 1:N){ # Step[2] Generate random variables x and y from uniform(0 ,1) x = runif(1,0,1); y = runif(1,0,1); # Step[3]: Three sides of the triangle a = min(x,y) b = max(x,y)-min(x,y) c = 1-max(x,y) # Step[4]: Condition for forming a triangle (the Core Part) if (a+b>c & b+c>a & c+a>b) Counter=Counter+1 } # Step [6]: Calculate the probability to form a triangle Prob = Counter/N Prob # Print out the result</pre>

The core part in the R code above is Step [4], which determines whether the three pieces can form a triangle or not. The condition is the same as (1). One of the advantages of the simulation-based approach is that students can compute the probabilities for different variations of the broken stick problem by modifying Step [4] only. The following sections discuss this point in detail with specific examples.

The Second Question: Forming an Acute Triangle

Question 2: *A stick, dropped on the floor, breaks at random into three pieces. What is the probability that the three parts of the broken stick form an acute triangle?*

Question 2 is one of the extensions of Question 1. For the three pieces to form an acute triangle, the sum of the squares of any two sides should be greater than that of the third side (Pythagorean inequality theorem). That is,

$$a^2 + b^2 > c^2, \quad b^2 + c^2 > a^2, \quad c^2 + a^2 > b^2 \quad (5)$$

and these inequalities can be represented in terms of x and y , where $0 < x < y < 1$, in the same manner used for Question 1 by using (2):

$$x^2 + (y - x)^2 > (1 - y)^2, \quad (y - x)^2 + (1 - y)^2 > x^2, \quad (1 - y)^2 + x^2 > (y - x)^2 \quad (6)$$

The area of the region created by the points (x, y) satisfying the inequalities in (6) represents half of the probability of forming an acute triangle since it covers the case $0 < x < y < 1$ only. By including the case of $0 < y < x < 1$, we can find two regions where an acute triangle is formed (Figure 2). Then, the sum of the areas of the shaded regions provides the probability of forming an acute triangle. However, it is much more difficult to calculate the sum of the areas mathematically by solving a system of inequalities in (6). The equation in (7) demonstrates how it can be computed using calculus. Let E_2 denote the event that the broken sticks form an acute triangle. Then the probability of E_2 is given by

$$\Pr(E_2) = 2 \int_0^{\frac{1}{2}} \left(\frac{1}{2(1-x)} - \frac{1}{2} \right) dx - 4 \int_0^{\frac{1}{2}} \left(\frac{2x^2 - 1}{2(x-1)} - \frac{1}{2} \right) dx = \ln\left(\frac{8}{e^2}\right) = 0.0794. \quad (7)$$

In the mathematical approach for $\Pr(E_2)$, it is impossible to avoid using complex integration, which makes students digress from the main idea of the problem. However, when we use the computational methods, we need to add the conditions in (6) only to Step [4] of Algorithm 1 as follows:

Step [4]: Condition for Forming an Acute Triangle (Question 2)
[4] If $(a + b > c \ \& \ b + c > a \ \& \ c + a > b)$ and $(a^2 + b^2 > c^2 \ \& \ b^2 + c^2 > a^2 \ \& \ c^2 + a^2 > b^2)$, then $Counter = Counter + 1$.

The Third Question: Forming an Obtuse Triangle

Question 3: A stick, dropped on the floor, breaks at random into three pieces. What is the probability that the three parts of the broken stick form an obtuse triangle?

Let E_3 denote the event that the three parts of the broken stick form an obtuse triangle. Using the Pythagorean inequality theorem, the conditions for a triangle with lengths of sides a , b , and c to be an obtuse triangle are

$$a^2 + b^2 < c^2, \quad b^2 + c^2 < a^2, \quad c^2 + a^2 < b^2 \quad (8)$$

or, in terms of x and y , for $0 < x < y < 1$,

$$x^2 + (y - x)^2 < (1 - y)^2, \quad (y - x)^2 + (1 - y)^2 < x^2, \quad (1 - y)^2 + x^2 < (y - x)^2 \quad (9)$$

Figure 3 (left panel) presents the graphical representation of Question 3. The shaded parts indicate where an obtuse triangle forms. For example, the shaded parts of the upper triangle denote the region created by (3) and (9). The total area of shaded regions of the left panel in Figure 3 directly gives $\Pr(E_3)$, and can be calculated as follows:

$$\Pr(E_2) = 2 \int_{\frac{1}{2}}^1 \int_0^{1-\frac{1}{2y}} dy dx + 4 \int_0^{\frac{1}{2}} \left(\frac{2x^2 - 1}{2(x-1)} - \frac{1}{2} \right) dx = \frac{9}{4} - 3 \ln 2 = 0.1706 \quad (10)$$

Again, we emphasize that $\Pr(E_2)$ can also be obtained without employing the complicated mathematics stated in (10). By only adding the conditions in (8) to Step [4] in Algorithm 1, we obtain the value for $\Pr(E_2)$.

Step [4] Condition for Forming an Obtuse Triangle (Question 3)
[4] If $(a + b > c \ \& \ b + c > a \ \& \ c + a > b)$ and $(a^2 + b^2 < c^2 \ \& \ b^2 + c^2 < a^2 \ \& \ c^2 + a^2 < b^2)$, then $Counter = Counter + 1$.

Remark: $\Pr(E_2)$ can also be calculated using the results of Questions 1 and 2. Since $\Pr(E_1) = \Pr(E_2) + \Pr(E_3)$, we can conclude $\Pr(E_2) = \Pr(E_1) - \Pr(E_3) = 1/4 - 0.07944 = 0.17056$. In the left panel of Figure 3, when a point (x, y) is exactly on the dotted curves, the three sides $(a, b, \text{ and } c)$ form a right triangle. However, since the area of the region comprising the points on the dotted curves is zero, the probability that the three sides form a right triangle is zero.

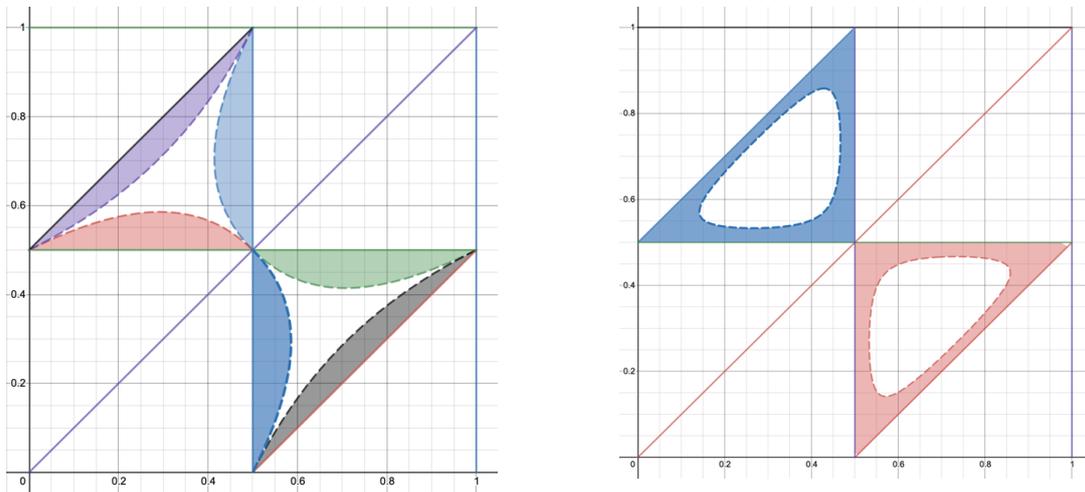


Figure 4. Geometric Representation of Question 3(left) and Question 4 (right). The Shaded Regions Include All of the Pairs (x, y) Forming an Obtuse Triangle (left) and a Triangle with An Area < 0.03 .

Beyond Forming a Triangle

The Fourth Question: Forming a Triangle with an Area Less Than 0.03

Question 4: A stick, dropped on the floor, breaks at random into three pieces. What is the probability that the three parts of the broken stick form a triangle with an area less than 0.03?

Let E_4 denote the event that the three parts of the broken stick form a triangle with an area < 0.03 . Since we have the lengths of the three sides, Heron's formula can be used to solve this problem. With Heron's formula, the area of the triangle is given by

$$Area = \sqrt{\frac{1}{2}(\frac{1}{2} - a)(\frac{1}{2} - b)(\frac{1}{2} - c)} < 0.03 \quad (11)$$

because $a + b + c = 1$. Moreover, the inequality (11) is easy to demonstrate that this is equivalent to the quadratic inequality for x and y by inserting (2) in (11), for $0 < x < y < 1$,

$$(2x - 1)y^2 + (1 - x - 2x^2)y + x^2 < 0.2536. \quad (12)$$

The right panel in Figure 3 displays the region created by the points (x, y) satisfying the obtuse triangle conditions. The upper-left part is for $0 < x < y < 1$, and the lower-right part is for $0 < y < x < 1$. Solving the quadratic inequality (12) for y (using the quadratic formula) results in the complement set of $b_1(x) + b_2(x) < y < b_1(x) - b_2(x)$. Here, $b_1(x)$ and $b_2(x)$ are defined as follows:

$$b_1(x) = \frac{2x^2 + x - 1}{2(2x - 1)} \quad \text{and} \quad b_2(x) = \frac{\sqrt{(2x^2 + x - 1)^2 - 4(2x - 1)(x^2 - 0.2536)}}{2(2x - 1)}$$

Hence, with the condition (3), the following algebraic derivation provides the probability that the three parts of the broken stick form a triangle with an area less than 0.03:

$$\Pr(E_4) = \frac{1}{4} - 2 \int_{x_1}^{x_2} \int_{b_1(x)+b_2(x)}^{b_1(x)-b_2(x)} dy dx = \frac{1}{4} - 2 \int_{x_1}^{x_2} \sqrt{x^2 + \frac{0.12^2}{2x - 1}} = 0.1156, \quad (13)$$

where $x_1 = 0.1418$ and $x_2 = 0.4670$, which are the solutions for $b_2(x) = 0$, for $0 < x < y < 1$.

We can calculate this probability through a simulation by using the condition (11) and modifying step [4] of Algorithm 1 in the following way.

Step [4] Condition for Forming a Triangle with an Area less than 0.03
[4] If $(a + b > c \ \& \ b + c > a \ \& \ c + a > b)$ and $\sqrt{\frac{1}{2}(\frac{1}{2} - a)(\frac{1}{2} - b)(\frac{1}{2} - c)} < 0.03$, then $Counter = Counter + 1$

Figure 4 displays a part of the results of the simulation study. With the number of replications large enough, each graph shows the computational solution converging to the theoretical solution of each Question 1-4.

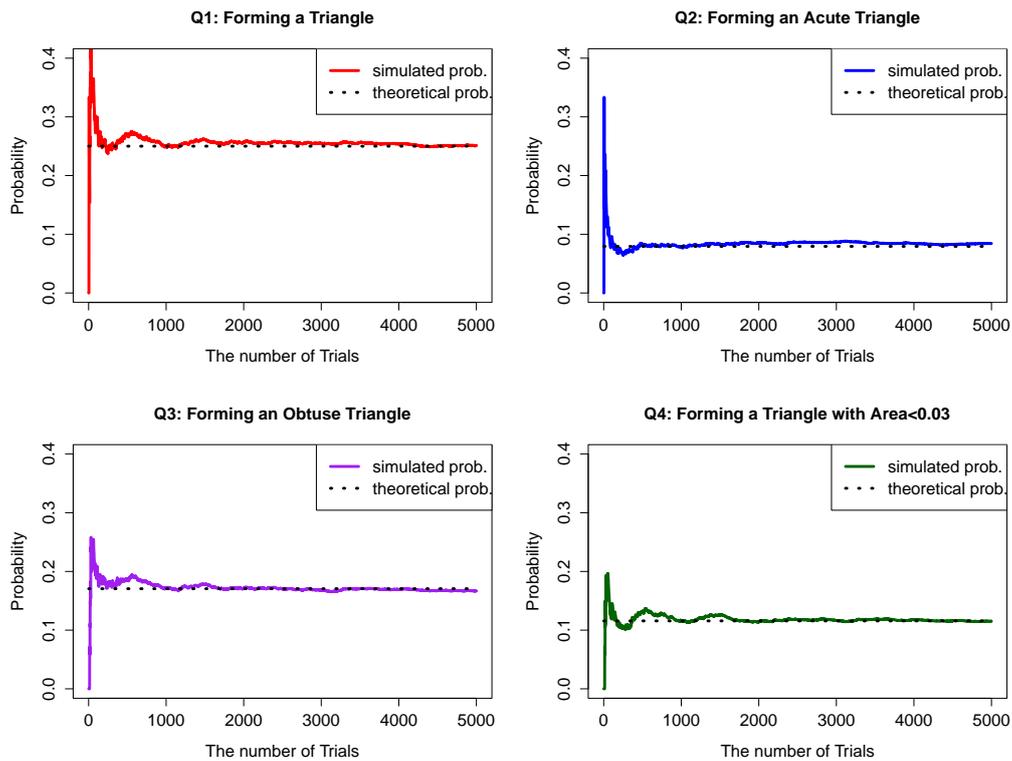


Figure 5: Simulation Results for Question 1-4. The Computational Solutions Converge to Theoretical Solutions

The Fifth Question: Mixed Conditions and Beyond the Broken Stick Problems

Question 5: A stick, dropped on the floor, breaks at random into three pieces. What is the probability that the three parts of the broken stick form an acute triangle with an area greater than 0.03?

Question 5 contains the conditions for Questions 2 and 4. Obviously, the mathematical approach for Question 5 is much more intractable. Since it is very challenging to deliver the mathematical procedure for Question 5 within a single class period, the mathematical approach tends to make the class inefficient and demotivate the students. However, the computational method does not require substantial mathematical work and knowledge to answer Question 5. It is enough to write two conditions together in Step [4] as follows.

Step[4] Condition for Forming an Acute Triangle with an Area greater than 0.03 (Question 5)

[4] If $(a + b > c \ \& \ b + c > a \ \& \ c + a > b)$ and $(a^2 + b^2 > c^2 \ \& \ b^2 + c^2 > a^2 \ \& \ c^2 + a^2 > b^2)$ and $\sqrt{\frac{1}{2}(\frac{1}{2} - a)(\frac{1}{2} - b)(\frac{1}{2} - c)} < 0.03$, then $Counter = Counter + 1$

Moving from Question 1 to Question 5, we observed the mathematical solutions becoming more complicated and requiring a high level of algebra and calculus. However, the computational approach enables students to find the answers by only revising the mathematical conditions in the R code. Furthermore, the computational

approach is much more intuitive since each line of code reveals the corresponding geometric expression directly. For instance, in Question 4, the mathematical solution includes complex mathematical works such as (11) to (13), which are hard to understand for most students in elementary statistics class. In contrast, the computational approach directly states Heron's formula (11) only in code, which is the core formula for this problem. Thus, for the simulation-based approach, we do not need to employ daunting mathematical works beyond Heron's formula to solve Question 4, and students can enjoy the probability problems without unnecessary stress caused by complicated mathematics.

This article illustrated the advantages of the computational approach in teaching probability problems using the broken stick problem only. However, we can apply this approach to the extended areas such as the following:

- Advanced geometric probability: forming quadrilaterals, pentagons, and n -sided polygons with numerous variations (Crowdmath, 2019).
- Historic probability problems
 - Buffon's needle (Buffon, 1777)
 - Monty Hall problem (Selvin, 1975)
 - Gambler's ruin problem (David, 1998).
- Dynamic model simulation: the wildland fire behavior and disease/virus spread.

We can create interesting and exciting classes that motivate students by implementing the computational approach to probability problems. If instructors keep developing simulation examples for various probability problems, we can expect to provide students with more friendly probability classes in the near future.

Conclusion

In modern society, it is crucial to have the ability to solve problems in a multi-dimensional approach. Often, we think of only mathematical rules and formulas to solve problems, but today's advances in technology offer further opportunities to comprehend problems from multiple points of view. In general, solving a probability problem may require advanced knowledge of mathematics, and it is still essential for students to understand and value mathematical solutions. However, using technological tools that are available online and offline, students can solve complex mathematic problems with minimal effort. Moreover, providing students with different approaches to solving problems helps them be more flexible and creative in problem-solving. As shown in 'the broken stick problem', in teaching probability, the simulation-based approach can be an attractive alternative for transforming a heavy and flat math class into an inspiring and exciting event.

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Appendix (R code for simulation study)

```
# A function obtaining the simulated probability -----  
  
Triangle <- function(n) {  
  # Generate two random variables between 0 and 1  
  v <- runif(n,0,1); w <- runif(n,0,1);  
  
  # The Lengths of three broken pieces  
  a <- pmin(v,w); b <- pmax(v,w)-pmin(v,w); c <- 1-pmax(v,w)  
  
  # Sort a, b, c in Increasing Order  
  s1 <- pmin(a,b,c) # The shortest side  
  s3 <- pmax(a,b,c) # The longest side  
  s2 <- 1-s1-s3    # The middle length side
```

```

s <- 1/2      # Half perimeter for Heron's formula
Trials<-seq(1,n,1)

# 1. Q1: Forming a Triangle
count1 <- ((s1+s2)>s3)
cumul1 <- cumsum(count1)
Prob1 <- cumul1/Trials

# 2. Q2: Forming an Acute Triangle
count2 <- (((s1+s2)>s3)&((s1^2+s2^2)>s3^2))
cumul2 <- cumsum(count2)
Prob2 <- cumul2/Trials

# 3. Q3: Forming an Obtuse Triangle
count3 <- (((s1+s2)>s3)&((s1^2+s2^2)<s3^2))
cumul3 <- cumsum(count3)
Prob3 <- cumul3/Trials

# 4. Q4: Forming a Triangle with Area<0.03
count4 <- (((s1+s2)>s3)&(sqrt(abs(s*(s-s1)*(s-s2)*(s-s3)))<0.03))
cumul4 <- cumsum(count4)
Prob4 <- cumul4/Trials

Prob=cbind(Prob1, Prob2, Prob3, Prob4, Trials)
Prob  # Return the results
}     # The end of Triangle Function

# Graph function -----
Graph <- function(Prob,Qnum,title){
  color <-c("red","blue","purple","darkgreen","black")
thsol <-c(0.25, 0.0794, 0.1706, 0.1156)

plot(Prob[,5],Prob[,Qnum], type="l", lty=1, lwd=3, ylim=c(0,0.4),
  xlab="The number of Trials", ylab="Probability", col=color[Qnum],
  cex.axis=1.3, cex.lab=1.3, cex.main=1.3, main=title)
  lines(Prob[,5],rep(thsol[Qnum],n), type="l", lty=3, lwd=3, col=color[5])
  legend("topright", legend=c("simulated prob.", "theoretic prob."),
  lty=c(1,3), lwd=3, col=c(color[Qnum],color[5]),cex=1.3)
}

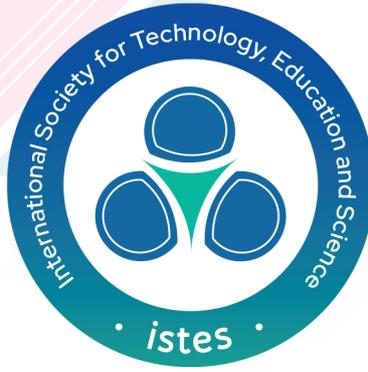
```

```
# The end of Graph function
#-----

# Execute the functions: 'Triangle' and 'Graph' -----
n <- 5000 # The number of simulations
Prob <- Triangle(n)
#-----

# Print the results out: Probabilities
paste("The probability to form a triangle is", Prob1[n])
paste("The probability to form an Acute triangle is", Prob2[n])
paste("The probability to form an Obtuse triangle is", Prob3[n])
paste("The probability to form a triangle with an area<0.03 is", Prob4[n])

# Print the results out: Graphs
par(mfrow=c(2,2))
Graph(Prob,1,"Q1: Forming a Triangle")
Graph(Prob,2,"Q2: Forming an Acute Triangle")
Graph(Prob,3,"Q3: Forming an Obtuse Triangle")
Graph(Prob,4,"Q4: Forming a Triangle with Area<0.03")
```

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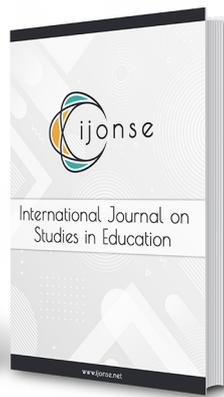
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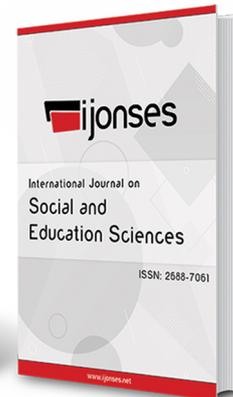
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