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Implicit and Explicit Knowledge Transfer among Korean Adolescents in Online and Offline Environments in the COVID-19 Era

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Abstract

The uncertainty of precautionary measures associated with COVID-19 have forced many sectors to alternate between online and offline activity. With respect to adolescent learning, an essential part of human development, knowledge transfer has been no exception; the alternation between offline and online environments has raised questions about whether appropriate knowledge transfer is taking place. This quantitative survey measured two types of knowledge—tacit and explicit—to examine how much knowledge transfer has occurred among South Korean adolescent students in online and offline spaces during COVID-19. Tacit knowledge is regarded as uncodified and exists at an unconscious level. Explicit knowledge exists at a conscious level and is documented and codified. The survey assessed the frequency and time of students' offline and online interactions, as well as their level of experience with tacit and explicit knowledge. Additionally, this study assessed the mediating role of the urban environment. The expected results are as follows: Adolescent students' accumulation of tacit knowledge is compromised by reduced offline interactions due to COVID-19, whereas this is not the case with explicit knowledge. The urban environment facilitating offline interaction positively affects tacit knowledge accumulation, a finding which will help urban planners to identify ways to improve adolescent students' learning experiences during the pandemic.

Keywords: Tacit knowledge, COVID-19, Explicit knowledge, Knowledge Transfer, Adolescent

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Chapter 1. Introduction

Study Background

Worldwide, COVID-19 has created uncertainty in many areas, especially in terms of knowledge transfer in education. (UNESCO, 2020). Individuals have used technology (e.g., radio, internet, TV) to amass knowledge and learning experiences (World Bank, 2020). According to recent statistics released by UNESCO, it was announced that approximately 1.3 billion learners would not be attending school or university due to the pandemic. Thus, the issue of whether learners have been acquiring proper knowledge through these new online platforms has come to the forefront.

Researchers worldwide have been debating whether knowledge transfer is optimized in online spaces or offline spaces. These scholars tend to subdivide knowledge into explicit knowledge and tacit knowledge (Hvorecký & Kelemen, 2011). Explicit knowledge is defined as an assortment of pure, authentic facts, equations, directions, and logistics (e.g., mathematical equations or symbols). Explicit knowledge can thus be considered conscious and descriptive. On the other hand, tacit knowledge is unconscious, including phenomena such as problem solving, knowing-in-action, hunches, and intuition (Nonaka, 1994) In education, knowledge transfer is essential (Huberman, 1990; Love, 1985; Willmott, 1994). Many different arguments exist claiming that knowledge transfer is more efficient in online settings (Baloran, 2020; Cao et al., 2020; Kong, 2020; Nurmi & Kurmi, 2015; Panahi et al., 2012; Zheyu et al., 2021) However, numerous others have provided empirical evidence of the need for offline learning, especially in terms of tacit knowledge (Wang et al., 2020; Yi, 2006; Zhu et al., 2016).

Nevertheless, there has been little discussion of how urban environments affect offline knowledge transfer. Additionally, in terms of adolescent students' learning, differences between tacit knowledge

and explicit knowledge have yet to be explored in proper depth. As argued by pioneering urban theorists from Jane Jacobs to Jan Gehl, the level of proximity or nearness in space presents social dynamics and opportunities for knowledge to flourish and spill over (Howells, 2002). As an increasing proportion of the population is projected to be clustered near cities in the future, there is ongoing debate about urban areas' role in knowledge transfer—namely, whether cities should be clustered to increase innovation and knowledge transfer or modern online platforms are the new paradigm (Cooke et al., 2013).

The Global Education Monitoring Report advocates for learners' equal access worldwide (GEM, 2020). Especially amid COVID-19, GEM stresses the importance of online learning and inclusivity for all learners. However, due to the pandemic, online learning has taken hold in countries such as South Korea, where students experience higher stress levels as a result (Education Board of S. Korea & Welfare, 2020). This highlights indicator of how offline interaction learning may have been necessary. Prior tacit knowledge can influence one's behavior, which can be negative or positive (Arduin et al., 2021). Tacit knowledge can also impact students' ability to cope with challenges in education (Chamidy et al., 2020).

Furthermore, tacit knowledge is viewed as a core foundation that allows students to identify and explore problems in depth (Collins, 2001). Thus, examining how knowledge transfer differs in different spaces is vital to assess adolescents' learning.

As mentioned above, the shortage of urban built spaces' proximity for offline learning among adolescents contributes to urban planning policy regarding how spaces should be structured for better knowledge transfer. Furthermore, growing online spaces such as the metaverse inform how urban planners address knowledge transfer, with the new reality of imaginary 3D spaces in urban planning studies (Moneta, 2020).

Purpose of the Research

Purpose Statement

This study examines the differences between offline (urban built space proximity) and online space knowledge transfer among adolescent students during COVID-19.

Research Aims and Questions

The research has two main aims. The first aim is to examine whether knowledge (tacit and explicit) has transferred more effectively in offline or online spaces for adolescents during COVID-19. The second aim is to examine the kinds of urban built areas, in terms of proximity, and how they have affected knowledge transfer; this indicates whether urban built areas should be clustered to promote adolescent knowledge transfer. The specific research questions are as follows.

Descriptive Questions

1. What offline spaces (in terms of urban built areas) have adolescents used for social interaction during COVID-19?
2. What online spaces have adolescents used for social interaction during COVID-19?
3. What tacit knowledge do adolescent students possess?
4. What explicit knowledge do adolescent students possess?
5. What are the main antecedents of tacit knowledge among adolescent students? **(controlled)**
6. What are the main antecedents of explicit knowledge among adolescent students? **(controlled)**

Inferential Questions

1. How much have offline spaces affected tacit knowledge transfer among adolescent students during COVID-19?

(Urban built spaces)

2. How much have offline spaces affected explicit knowledge transfer among adolescent students during COVID-19?
3. How much have online spaces affected tacit knowledge transfer among adolescent students during COVID-19?

(Types of virtual spaces)

4. How much have online spaces affected explicit knowledge transfer among adolescent students during COVID-19?

5. How much have offline spaces (urban built areas) and online spaces affected tacit and explicit knowledge transfer among adolescent students when controlling for the antecedents of both types of knowledge?

6. Should urban areas be clustered to improve knowledge transfer? Alternatively, do online platforms allow urban areas to be scattered around the city?

Hypotheses

Based on the SECI model proposed by Nonaka (1998) and previous research findings, it is likely that tacit knowledge transfers better in offline, face-to-face spaces (Zheyu et al., 2021). According to the SECI model, a certain degree of face-to-face interaction might be needed for explicit knowledge to be transferred; however, concrete and codified information tends to be better delivered through online platforms (Yi, 2006).

Again referring to the SECI model, tacit knowledge can be produced through physical interactions, which correspond to offline spaces. Explicit knowledge is then created from articulating such peer-to-peer contact in a codified form. Codified knowledge or written materials can be transferred to online platforms with relative ease (Nonaka, 1998). This leads to the following hypotheses:

A. Tacit knowledge transfers more effectively offline.

B. Explicit knowledge transfers more effectively online.

C. Built environment will lead to more tacit knowledge

D. Better Online Environment will lead to more explicit knowledge

However, because tacit and explicit knowledge are broad and have many definitions, the kind of tacit knowledge and explicit knowledge measured among adolescents would matter. For instance, some

adolescents would agree that tacit knowledge would be more beneficial in an online environment where they are less restricted in terms of the times at which they can interact socially (e.g., after coming home from a friend's house or from school). In terms of explicit knowledge, some might agree that physical interactions, such as providing an actual paper filled with information and verbal confirmation, would lead to more effective knowledge transfer.

Furthermore, Nanoka notes that tacit and explicit knowledge are highly interconnected, which makes it difficult to assess the spaces suitable for each type of knowledge. However, depending on their definitions and scope, further analysis could provide clues about the subtypes of each knowledge type that would transfer better in certain spaces.

Zhang et al. (2022) argue that tacit knowledge is found in urban built areas that allow tacit opportunities. Examples include existing rain gardens, building facades with paintings and graffiti from local artists, play activities such as on-site basketball hoops and hopscotch, residents sitting on streets providing neighborhood surveillance, rooftop play opportunities, and connection with existing playgrounds. Thus, cities still should be clustered to improve knowledge transfer (Boschma, 2005; Seydel, 2016; Sydow et al. 2011).

Chapter 2. Theoretical Background and Literature Review

Education and Urban Environments

Discussions about the relationship between education and urban areas have a common point (Coelen et al., 2017). The word comes from the Latin term "urbanus," which has two meanings. First, it indicates the environmental characteristics of a city. Second, it implies an academic history: During the 17th century, educated, metropolitan individuals were described as "urbane."

As we transition to a more knowledge-based society in the 21st century, according to Coelen, there are currently debates on how urban and neighborhood development could be integrated and function in terms of education. As educational actors have increasingly become part of the urban situation, it highlights how the urban environment reflects educational factors.

Furthermore, Banerjee points out the strong alliance between pedagogy and planning. He identifies seven critical reasons why pedagogy and urban planning are becoming increasingly connected: (1) the transition to a knowledge-based society; (2) the increase of workers needing abundant knowledge, skills, and community experience; (3) the rise of the internet and the advancement of knowledge transfer; (4) humans' cognitive and behavioral shifts; (5) the deluge of information from the internet; (6) unpredictable globalization; and (7) the political focus on education for all.

Adolescents

A national research report in Germany and Switzerland concludes that a well-formed education contingency plan can improve cities' conditions and facilitate social assimilation. Second, it states that

education's contributions to particular areas can enhance the stability of the city and neighborhoods. Third, mixed-used urban planning will create better educational opportunities. Lastly, educational facilities cultivate an excellent image for the city. Thus, prior research suggests that education correlates with the urban environment.

UN-sponsored research reported in 2020 that approximately 1.6 billion children would be drop of school because of the COVID-19 virus. Furthermore, about 91% have been impacted in terms of learning and knowledge acquisition.

Adolescents are at an age where knowledge and education are crucial in their development. Concepts learned during this stage can also be applied to ones learned later. Moreover, Jean Piaget's theory posits that individuals begin to develop theoretical, hypothetical, and counterfactual thinking during adolescence. Additionally, adolescents are developing abstract reasoning skills necessary for strategizing and planning. Individuals ages 11 to 18 are also considered minors, necessitating further examination of how offline and online educational spaces have affected these students' transfer of tacit knowledge and explicit knowledge. (Elkind, 1974; Inhelder & Piaget, 1958; Piaget & Inhelder, 2013).

The UN has announced its sustainable goals, one of which is quality education that allows for better knowledge transfer in our knowledge-based society. Thus, the current lack of attention to adolescents' learning processes and their relationship to the urban environment must be addressed.

Offline Spaces (Urban Built Areas) among Adolescents during COVID-19

According to the OECD (2022), the term "urban built areas" refers to buildings with roofs, and it excludes areas such as paved surfaces, runways and ports, parks, and greenspaces. Prior research indicates that urban built areas have affected humans in multiple ways, such as their leisure satisfaction, mental health, and community safety (Bellair, 1997; Melis et al., 2015; Mouratidis, 2019). In terms of knowledge

transfer, O'Hagan and Green have explored how the increase in linkages of metropolitan areas in Canada and the US could enrich knowledge transfer in one area.

The use of urban built areas has changed globally as countries have implemented lockdowns in response to COVID-19. One example is the Netherlands, during whose lockdown there was a significant decrease in downtown activities; cities were being used for more recreation, play, and exercise; public spaces remained the same; local places gained popularity, and there was increased demand for outdoor activities among locals (Gehl, 2020). In South Korea, according to the Korea Research Institute for Human Settlements (KRISHS) (2020), public buildings that were once shared—such as Airbnb's, shared houses, restaurants, schools, private academies, and offices—showed decreased usage. KRISHS's recent suggestion regarding urban policy was to use larger zoning areas in the future or allow the population to spread throughout the nation. Additionally, they recommended using safety distance measure per-person strategies in construction and to modify building usage.

According to a Pew study, adolescents socialize the most in schools, followed by others' homes, online spaces such as social channels or arcade sites, neighborhoods, coffee shops or malls, religious buildings such as churches or temples, and part-time jobsites. One explanation for this result is the importance of friends and identifying with a community, according to Lazebnik. As knowledge travels from person to person, urban built areas for adolescents should be centralized in places where students can interact and build relationships.

Importance of adolescence

Most agree that adolescence is a crucial period of human development and knowledge formation. (Glass, N., Remy, M. M., Mayo-Wilson, L. J., Kohli, A., Sommer, M., Turner, R., & Perrin, N. 2020) Furthermore, in the pandemic era where knowledge transfer has become problematized, sustainable development and its core philosophies focus on better facilitating knowledge transfer and building a better

environment for the next generation. In 1998, Burt addressed several reasons urban policymakers should focus on adolescents. Among these reasons, he highlights how a healthy and economically productive country depends on the prevalence of a well-educated and healthy population.

According to Kleinert, S., & Horton, R., the key to sustainable development in each city, and one can infer the cultivation of educated, healthy populations, depends on how its adolescents are dealt with. In addition, UNICEF (United Nations Children's Fund) states that the biggest strength of such positive economic and social transformations lies with adolescents. According to their research, any investment in secondary education would bring a dozen times the economic benefits of no investment. Not just in terms of economic benefits, when education and knowledge have been appropriately transferred, adolescents' awareness levels can be heightened and bring less violence, less sexual abuse, and less corruption. (Adolescent development and participation. 2022)

When adolescents do not care about education, and lack of investment for adolescents will negatively impact the economy in the long run. Burt, in 1998, already predicted and warned that billions of dollars were needed to address growing dropout rates among secondary students in the United States. Burt also argues that in countries in Latin America, teenagers lack proper health education knowledge, allowing more investments to deal with unwanted childbearing. In contrast to developing countries such as Latin America, developed countries have more programs for adolescents to gain specific information and knowledge. Despite the increased availability of such programs to adolescents, South Korea has a relatively high rate of adolescent depression and suicide among the OECD nations. These high suicide rates dramatically affect the economy and have been estimated to cost thousands of dollars for each person who commits suicide (Doran, C. M., & Kinchin, I. 2020). Thus, one of the greatest challenges to

sustainable development will be encouraging international and local policymakers to focus on and invest in adolescents.

Knowledge transfer in offline environments

Urban city formation and its effect on knowledge transfer is not a new concept. (O'Connor, J. 2004)(Marshall 1920) Especially when cities are clustered, the agglomeration effect rises. Agglomeration effects are where clusters of different corporations are closely placed together to allow cost reduction and better communication. This is important for knowledge transfer because, as O'Connor states, tacit knowledge must be acquired by being in one place or corporation. This statement builds upon Nanoka's argument that physical and social interactions are needed to produce tacit knowledge. This principle can be illustrated by the example of a student entering a school to understand its culture. To understand that culture or environment, one has to experience the school and its community by physically being there.

The relationship between urban built environments and tacit knowledge transfer is defined as tacit play opportunities by Zhang, Y., Tamminga, K., & Wu, H. They identified the site selection by a Geographic Information System, describing the tacit opportunities that adolescents could experience. Most examples of tacit opportunities included playgrounds and outdoor environments and how connected and accessible they were to urban areas.

Furthermore, learning experiences do not primarily involve one person; collections of people and team collaboration allow tacit knowledge to be transferred. (Lawson, C., & Lorenz, E. 1999) The use of face-to-face interactions needs to be implemented for tacit knowledge to take place. Creative and education firms are also clustered around Silicon Valley, where knowledge is constantly being shared to allow synergy to create positive knowledge transfer.

As mentioned in the previous chapter, through a cycle, from tacit knowledge to explicit knowledge and back to tacit knowledge, knowledge is continuously transformed through physical interaction.

For instance, when one knows how to shoot a basketball, a person needs an instructor and a physical place to practice. One who learns to shoot a basketball would need physical help from the instructor to modify his or her shooting position. When the shooter is lost and has questions, the instructor can give explicit or concrete information about why we shoot the basketball in a certain way. As the shooter practices and spends time with the instructor, the shooter will gain tacit knowledge of how to shoot a basketball.

Regarding geographical economics, Zook, M. A. (2004) emphasizes the need for a regional system and social interactions. Furthermore, Zook argues that when firms collaborate closely in terms of proximity, firms gain continuous feedback for modification and improvement through the iterative process. The study is focused on adolescents about geographical economics and proximity in firms. For example, when teenagers begin learning how to play soccer on a professional level, an expert coach needs to be hired. These teenagers' tacit knowledge or know-how must be assessed by their physical motions. However, the complexity of professional soccer is hard to describe in simple terms. Nash C. & Collins show how expert coaching acquisition occurs in three hierarchical orders; Knowledge of the game is the first priority, the knowledge of teaching and learning, and the knowledge of scientific principles. The figure below suggests that the question of "what do I do?", "how do I do it" and "where do I get the knowledge" all demonstrate tacit knowledge. The teenagers are now ready to acquire the knowledge of professional soccer; however, to fully master it, the students will need modification of their knowledge by an expert coach who has already acquired knowledge through prior training and experience. Expert coaches have acquired experiences from natural physical environments such as soccer fields. The experiences of the expert coach will, by their very nature, resemble their experiences with their students by practicing on a physical soccer field. In addition, teenage students will need continuous modification and feedback to perfect the art of soccer. An expert coach will physically demonstrate or modify their body movement to allow

their kicking motion of the ball to be effective. These modifications of knowledge and aspects of coaching can be compared to financial firms that need feedback from different firms or users to effectively develop their firm. In terms of adolescents, teenagers who wish to learn professional soccer need a physical environment in which knowledge can be produced and connected.

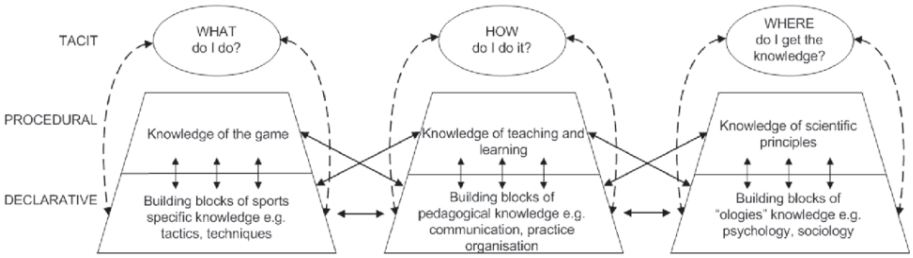


Image depicted by:
Nash, C., & Collins, D. (2006).Tacit knowledge in expert coaching: Science or art? Quest, 58(4), 465-477

Online Spaces among Adolescents during COVID-19

Although physical schools are recognized as venues for social interactions and knowledge transfer, online platforms such as the metaverse have gained widespread popularity during the pandemic (Kye et al., 2021). Their future possibilities are numerous as they impact individuals' daily lives and create new social communication spaces worldwide. The definition and examples of the metaverse were originally fictional concepts created in 1992 by Neal Stephenson. Other studies and popular media, such as the 2009 movie *Avatar*, present similar concepts. "Metaverse" implies a virtual existence above existence. The Greek prefix "meta-" means "with," "across," or "after," and "-verse" refers to the word "universe." This concept has been used widely. In 2020, 47.9 billion USD of market value was tied to this concept, and its use in education and media entertainment is projected to grow (Emergen Research, 2022).

During the pandemic, approximately 2,000 South Korean adolescents completed a survey assessing the demand for, participation in, and satisfaction with youth activities online. Additionally, the study aimed to amass basic data to improve the online youth activity environment (South Korean Youth Service Center, 2020). The results showed how COVID-19 had affected their knowledge transfer. First, 40.6% spent alone time, 28.7% viewed online lectures, 17.5% viewed academy lectures, 6.7% did nothing, and 6.5% reported other activities. The question then arose of what those large proportions of adolescents do in their free time; 45% indicated that they play games online, 21.2% watch television, 10.9% read books, and only 7.7% meet friends physically. Furthermore, these adolescents were uncomfortable with the fact that they could not have a good routine (38%), go outside and play (25%), study (7%), go out to eat (6%), and or do other activities (3.3%). Moreover, the kinds of support that the country could provide were as follows: activity support (28.7%), learning support (25.3%), time management support (20.4%), psychological counseling (13.8%), meal support (10.4%), and others (1.3%). Lastly, adolescents reported spending their day on the following activities: using intelligent devices (51.1%), online class-related learning (24.2%), leisure activities/hobbies (11.6%), academy learning (8.6%), other (2.7%), and family activities (1.8%).

In conclusion, although they spend a vast amount of their time online, students agree that they need time outside to have face-to-face social interaction, which relates to positive behaviors and attitudes. As indicated by prior research, tacit knowledge can affect one's behavior either positively or negatively, and according to the SECI model, social and physical spaces are needed for such tacit knowledge production.

What is knowledge?

To define the knowledge, one must identify the main criteria of knowledge. (Pritchard, D. 2013) For example, when a formative assessment is designed for a student, a list of standards or conventions must be formulated to finalize one assessment's results. While there

are many ways to define knowledge, any helpful definition must rely on truth and belief in which Pritchard argues that for a statement of knowledge to be accepted, it has to be agreed with the believer and the believer has to be believing in a true statement.

For this study, knowledge can be defined as either proposition knowledge or ability knowledge. Propositional knowledge is conventional knowledge that deals with facts accepted in cases that the user asserts, such as how roses are commonly known to be red, pink, and white. Ability knowledge deals with those aspects that determine one's ability to perform a task or action without the need for propositional knowledge. For instance, one can know how to code by explaining the complex dynamic structure of coding.

The focus of this study is tacit knowledge and explicit knowledge. The research will list criteria for formulating tacit knowledge and explicit knowledge. In some respects, explicit knowledge will seem similar to proposition knowledge since it states what the users know in statement expressions such as "I know the mathematical formula to solve an algebra question." Likewise, tacit knowledge will seem to align with aspects of ability knowledge, especially where criteria relate to the ability of a learner.

Comprehensive overview of two primary knowledge

Table 1

Scholars	Tacit Knowledge	Scholars	Explicit Knowledge
Elizabeth Smith (2001)	● Personal Experience ● Intuition related	Elizabeth Smith (2001)	● Able to document ● Printed work
Sanchez, R. (2005)	● Personal Experience	Markellou et al., (2010)	● Codified ● Articulated

	• Transferred by people (offline) • Need motivation		• Documents, signs, drawings • Structured • Easy moved through technologies • Can be discussed, debated and developed
Collins, H. (2010)	• Collective • Somatic • Relational	Masri & Abdelrahma, (2019)	• Written
Augier et al (1999)	• Intuition • Skills	Sequeira et al., (2019)	• Written
Leonard Sensiper (1998)	• Intuition • Insight • Mental Models	Kone (2021)	• Written
Sternberg and Horvath (1999)	• Intuition	Stenmark (2000)	• Verbalized
Durrance (1998)	• Intuition • Beliefs • Mental Models	Anzelak et al., (2009)	• Rules • Manuals
Giunipero et al. (1999)	• Intuition • Insight • Know-how • Practical Intelligence	Markellou et al., (2010)	• Signs

O'Dell and Grayson (1998)	• Intuition • Know-how	Masri & Abdelrahma, (2019)	• Written
Saint-Onge (1996)	• Intuition • Beliefs	Sequeira et al., (2019)	• Written
Cook and Brown (1999)	• Intuition • Skills • Know-how	Kone (2021)	• Written
Polanyi (1958) (1966)	• Knowledge at unconscious level • Skills	Stenmark (2000)	• Verbalized
Nonaka and Takeuchi (1995)	• Know-how • Beliefs • Mental Models	Nonaka and Takeuchi (1995)	• Codified • Articulated

Through various scholars' different perspective about tacit and explicit knowledge are defined. In contrast to each difference, repetitive definition is found through numerous scholars. For example, Sequeira et al., (2019), Kone (2021), Stenmark (2000) would use same expression "written" to define explicit knowledge. For tact knowledge, Nonaka and Takeuchi (1995) and Cook and Brown (1999), uses the word "Know-how" to determine the concept of tacit knowledge. According to Pritchard, D. (2013) in order to define knowledge, certain criteria and keywords are to be used to define them. Thus, the table 1 distinguishes and predefines the comprehensive definition of the two primary knowledges, tacit and explicit.

How do tacit knowledge and explicit knowledge differ?

Tacit knowledge and explicit knowledge are intertwined, and knowledge can be defined as both in certain situations. For example, when cycling on city bicycle lanes, that person must unconsciously know how to maintain momentum by pedaling, braking where appropriate, and shifting their weight to maintain balance. That cyclist also requires explicit knowledge of road safety, where to cross, at what signs and signals they must stop and go, and so on. In such situations, the user activates both tacit and explicit knowledge. It can be challenging to separate between these two kinds of knowledge, but when electing a microelement of these two primary forms of knowledge, it should be possible to measure how tacit knowledge and explicit knowledge can be extracted from each individual. In the example of the cyclist on a city road, the scope can be minimized simply by asking if the individual knows how to ride a bike. For explicit knowledge questions, the individual can be asked if they know the rules of the road, to which they can respond without accessing tacit knowledge.

Tacit knowledge, as previously described, is the knowledge that exists at the unconscious level and where most of the boundaries lie in one's ability to do something. Explicit knowledge, on the other hand, does not significantly define where abilities lie and instead addresses knowledge that has already been stored in one person's schedule or memories. When formulating this knowledge, Nonaka explains how tacit knowledge is formed; first, explicit knowledge is developed later, leading to the formation of tacit knowledge. According to Nonaka, tacit knowledge can be made by physical socialization; consequently, explicit knowledge can be made once a degree of tacit knowledge and social interaction has been completed. Hence, the main difference between tacit and explicit knowledge lies in the order in which knowledge is defined.

Tacit Knowledge

There are many ways to define tacit knowledge. One definition describes tacit knowledge as inherent in actions, in know-how, and carried by the individual who communicates it (Arduin et al., 2021).

However, pioneers of the concept such as Polanyi (1966) argue that tacit knowledge is knowledge that is not articulated and is housed in the intuitive part of the mind (Table 2). Recent scholars agree that tacit knowledge is part of the intuitive or unconscious realm (Brook, 2015). Intuition can be described as feelings or instincts that are used without much energy at the conscious level. Brook argues that the transition between the unconscious and action is brief (e.g., know-how of riding a bike).

However, Nonaka (1994) explains that tacit knowledge has two dimensions. The first is the cognitive dimension, where "gut feelings," opinions, and emotions reside. Then, the more technical or practical dimension includes skills, hands-on experience, and rules of thumb (Haldin-Herrgard, 2000; Leonard & Insch, 2005; Nonaka, 1994).

Table 2

Early Definitions of Tacit Knowledge

Researchers	Definition/Example
Polanyi (1958)	Knowledge at the unconscious level
Polanyi (1966)	Individuals can perceive thousands of faces yet be unable to explain how they do so.

Dilemma on tacit knowledge measurement

Richard Brock describes tacit knowledge as being like a "black hole": difficult to visualize, observe, and define Brocks, an expert in tacit knowledge, does go on to say, however, that one can still gain an understanding of a black hole by studying and observing its properties. Similarly, tacit knowledge can be identified and measured by investigating its properties.

The rarity and scarcity of tacit knowledge have been addressed by previous scholars as well. (Insch, G. S., McIntyre, N., & Dawley, D. 2008) TIt can even be challenging to quantify tacit knowledge. Past scholars (Sternberg et al., 1993, 1995, 2000; Wagner & Sternberg, 1986) experimented with the concept of quantifying tacit knowledge by interviewing individuals on whether they could manage difficult job

situations linked with practical intelligence. Although Sternberg and Wagner describe a comprehensive approach to measuring tacit knowledge, the case study was more geared towards business and management, which has few correlations with adolescents.

Tacit knowledge, in academia, is know-how or procedures that a student can manage throughout a day. Tacit knowledge schema variables developed by Wegner (1987), explain how tacit knowledge is composed by listing oneself, task, and others. Some attempts have been made to measure the role of tacit knowledge in educational settings. Insch (2008) used properties of tacit knowledge, such as cognitive, technical, and social skills, to quantify the relationship between tacit knowledge and school academic performance. It must be recognised, however, that academic performance variables as a dependent variable to quantify tacit knowledge are of only limited use in identifying the relationship between tacit knowledge and urban planning.

Insch, McIntyre, and Dawley (2008) constructed survey items to quantify tacit knowledge. Those variables were, however, more appropriate for business-related by Wegner (1987). A more thorough investigation by Connell (2003) helps distinguish and identify several properties and indicators in figure 1.

Figure 1

The most frequently used epitomes of tacit knowledge were as follows (Figure 4):

- Intuition (Augier *et al.*, 1999; Leonard and Sensiper, 1998; Sternberg and Horvath, 1999; Durrance, 1998; Giunipero *et al.*, 1999; O'Dell and Grayson, 1998; Saint-Onge, 1996; Cook and Brown, 1999).
- Skills (Polanyi, 1966; Augier *et al.*, 1999; Bennett and Gabriel, 1999; Brockmann and Anthony, 1998; Nonaka and Takeuchi, 1995; Cook and Brown, 1999).
- Insight (Leonard and Sensiper, 1998; Durrance, 1998; Giunipero *et al.*, 1999; Bennett and Gabriel, 1999; Brockmann and Anthony, 1998; Brown and Duguid, 1998).
- Know-how (Giunipero *et al.*, 1999; O'Dell and Grayson, 1998; Nonaka and Takeuchi, 1995; Brown and Duguid, 1998; Cook and Brown, 1999).
- Beliefs (Durrance, 1998; Saint-Onge, 1996, Nonaka and Takeuchi, 1995; Brown and Duguid, 1998).
- Mental models (Leonard and Sensiper, 1998; Durrance, 1998; Nonaka and Takeuchi, 1995; Gore and Gore, 1999).
- Practical intelligence (Giunipero *et al.*, 1999; Somech and Bogler, 1999).

Note. This image was created by Connell et al. (2003).

However, Connell et al. (2003) have proposed a more comprehensive definition of tacit knowledge encompassing seven subcategories. As shown in Table 3, the first is **intuition,** introduced by Brook (2015), which can be described as training and perceiving without awareness and deliberate reason or making a judgment without proper inquiry (Brockmann & Anthony, 1998). This type of decision making is mostly automatic. Second, **skills** are similar to intuition and are primarily physical, allocation, or cognitive skills. Examples include riding a bike and twirling (Collins, 2001b; Cook & Brown, 1999). Third, an **insight** refers to sudden realization or comprehension of either one's own or another's knowledge. Fourth, **know-how**, which Nonaka points out in the technical dimension, is knowledge gained through experience (Brown & Duguid, 1998). Examples include understanding how to manage direct interacting auctions or how to expand significant chance transactions events (Wagner et al., 1999), or a bread maker capacity to make delicious desserts (Nonaka & Takeuchi, 1995). Fifth are **beliefs**, as several scholars have pointed out that when someone endorses a religion, it is difficult to explain how one came to believe in it. The abstract feeling and experience may result in a belief in a specific religion (e.g., Christianity). However, several researchers have argued that beliefs are forms of attitudes and opinions (Brown & Duguid, 1998; Giunipero et al., 1999; Leonard & Sensiper, 1998). Sixth, **mental models**, discussed early on by Giuinpero, apply primarily to education, including psychological maps and blueprints. Lastly, **practical intelligence** is individuals' capacity to exercise intelligence in everyday situations (Somech & Bogler, 1999).

Scales assessing students' tacit knowledge transfer are listed below (Somech & Bogler, 1999). The dependent variables of such scales refer to the seven subcategories of tacit knowledge outlined by Connell et al. (2003).

Table 3

Tacit Knowledge Subcategories	
1.	Intuition
2.	Skills
3.	Insight
4.	Know-How
5.	Beliefs
6.	Mental Models
7.	Practical Intelligence

The questionnaires were focused and broadly designed to capture recent trends among adolescents. Although they are based on numerous past studies, the questionnaires were not reliable when used with the target audience of adolescents; thus, modifications were necessary. Mental models and beliefs were omitted from these questionnaires due to their mismatch and repetition. For example, beliefs differ by age and allow for subjective responses. Furthermore, mental models focused on psychological blueprints rather than actual tacit knowledge.

The target age range was middle schoolers. According to the California Department of Education, middle school marks the start of adolescence. Middle schoolers are beginning to think abstractly and understand the world around them, and their growth and development accelerate during this phase. Furthermore, they are becoming more articulate and deciding on their likes and dislikes. Additionally, they begin encountering conflicts and relationship problems. Thus, the questionnaires were designed to measure early adolescents' experience with tacit knowledge (Table 4).

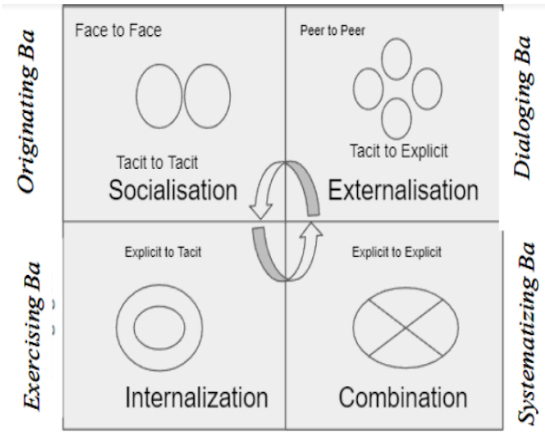
Table 4

Tacit Knowledge Subcategory	Examples
1. Intuition	1. Can you answer questions without much thinking? 2. Can you make fast judgments without reasoning?
2. Skills	1. Can you use a new machine such as a smartphone? 2. Can you shoot a video to make your own YouTube channel?
3. Insight	1. Can you suddenly know why you did something, such as responding to conflicts? 2. Can you suddenly know why you did not like someone?
4. Practical Intelligence	1. Can you use your time efficiently to do your homework? 2. Can you know what my friends are thinking from their expressions?

Knowledge Transfer

Polanyi first discussed knowledge transfer in the 1950s. However, the practical and theoretical approach (dividing knowledge into tacit and explicit knowledge) has been discussed extensively and used in the business sector (Nonaka, 1994; Nonaka & Takeuchi, 1995). As shown in Figure 2, the SECI (Socialization, Externalization, Combination, Internalization) model depicts how knowledge can be transferred in different stages.

Figure 2



Note. Image adapted from Nonaka and Konno (1998).

Existing literature reviews emphasize that research on tacit knowledge transfer via face-to-face interaction is needed. In Nonaka's view, Ba is a place where emotions, feelings, and experiences can be shared. Tacit knowledge that cannot be described begins to be codified through more peer-to-peer interactions (Nonaka & Konno, 1998).

Nurmi and Kiuru (2015) agree that knowledge transfer via face-to-face interaction indicates a positive relationship between students and teachers. Furthermore, Collins (2001) argues that trusting relationships can be established through direct contact by tacit knowledge transfer.

Globally, much research has investigated how offline and online spaces have affected student learning or knowledge transfer. In India, more than 358 undergraduate students were surveyed about their opinions of online learning. Although most agreed that the learning experience and professors' teaching skills improved, the overall verdict was that it was stressful and negatively affected their social life and health (Chakraborty et al., 2021). Furthermore, in a sample of approximately 7,000 Chinese college students, a high percentage responded that they experienced psychological pressure related to economic reasons, their daily lives, and academic activities. (Cao et al., 2020). Additionally, in a sample of approximately 500 Filipino students, many reported being unhappy with the online-blended learning approach due to spotty

internet connections, which made knowledge acquisition difficult (Baloran et al., 2020).

The sudden transition to an online learning experience has also been discussed in terms of tacit knowledge transfer (Arduin et al., 2021). Unlike Nonaka's SECI model, Arduin et al. did not directly conclude that offline spaces are necessary for tacit knowledge transfer. Instead, they emphasize that tacit knowledge can strongly impact individuals' behavior. Thus, repeated stimuli to influence students are needed; continuous human feedback is needed to certify that students are motivated to attain new knowledge and allow the knowledge network to be transferred appropriately.

Panahi et al. (2013) contend that tacit knowledge sharing may be difficult online, highlighting elements such as input methods, tacit level, media depth, and issues of social cues and trust (see methodology section for further discussion). However, previous studies demonstrate that tacit knowledge can be acquired through online means (Zhu et al., 2016). According to Zhu et al.'s (2016) corporate sector research, the online platform is superior to face-to-face interaction in terms of tacit knowledge transfer. However, this research does not clearly define tacit knowledge or connect it to education. Furthermore, Wang et al. (2020) argue that offline spaces do not offer significantly improve tacit knowledge transfer in terms of business transactions. However, Yi (2006) argues from qualitative research results that online education allows for better tacit knowledge transfer.

Table 5

Knowledge Transfer Better Offline	Knowledge Transfer Better Online

• Zheyu et al. (2021) • Kong (2020) • Baloran (2020) • Cao et al. (2020) • Nurmi & Kurmi (2015) • Panahi et al. (2012)	• Wang et al. (2020) • Zhu et al. (2016) • Yi (2006)

As shown in Table 5, whether offline or online spaces are better for tacit knowledge transfer is a contentious issue. In terms of knowledge transfer, South Korea faces numerous problems for adolescent students (김지민 & 손진희. 2021). According to the Gyeonggi Do Women and Family Foundation, South Koreans experience above average levels of stress (2.6 on a 4-point scale), and this is especially true for women and middle schoolers using online learning platforms. Few in South Korea have been able to convey tacit knowledge transfer's importance. Thus, an investigation is needed in the context of South Korea. As argued before, tacit knowledge is vital to individuals' behavioral orientation and a favorable social climate.

Urban Areas, Proximity, and Tacit Knowledge Transfer

The general area and specific geographical location relate to tacit knowledge production and transfer (Howells, 2002). Howells (2002) highlights five ways in which they are interrelated. First, knowledge is centered on an individual who develops understanding through the cognitive, community, ethical, and commercial circumstances that are impacted by geological spaces and cities. Second, human interactions are affected by areas and spaces in between. Third, individuals' knowledge continuously develops through human interaction with more input-codified information which can be hindered by distance in space. Fourth, knowledge is amassed within specific economic, social, and geographical contexts. Lastly, knowledge is shaped by past experiences in different places in which individuals have lived. For example, individuals outside South Korea will have a different

interpretation of South Korean history due to their spatial and experiential limitations.

Proximity—which simply means nearness to one distance, according to Tomer et al.—fosters better knowledge exchange. It creates agglomeration in a more meaningful economic sense, which allows businesses to create positive synergy when clustered in cities near one another. Places like Silicon Valley and the Cambridge area show that clustered cities facilitate better innovation and knowledge transfer (Boschma, 2005; Sydow et al., 2011). However, recently researchers have contended that a more precise interpretation of proximity is required because a high level of proximity might promote closeness and cooperation (Boshma, 2005).

Beyond the argument about clustered cities, the innovation of "smart cities" and new technologies have created a hybrid collaboration between physical cities and virtual cities as large amounts of data and systems allow cities to perform "smartly." Although there are still challenges to the development of smart cities, knowledge transfer shows great potential in a hybrid context as well. (Arroub et al., 2016).

Lastly, high-knowledge cities (for example, where parents have a high demand for students' knowledge acquisition in core subjects) will have clustered urban areas compared cities with less demand for knowledge (Howells, 2002).

Tacit Knowledge among Adolescents

There are many ways to describe tacit knowledge among adolescents, but here Nanoka's two dimensions—cognitive and technical—are adopted. Components of the cognitive dimension include visions, viewpoints, assumptions, creativeness, understanding, ideas, beliefs, insights, mental models, gut feelings, instinct, guesses, feelings, attitudes, viewpoints, principles, ideals, conviction, observations, representations, and procedures. The technical dimension includes skills, expertise, tactical approaches, courses studied, rules of thumb, advice, secrets, knowing-in-action, know-how, and hands-on

experience. These examples can be used explicitly among adolescents to explain how different spaces (offline and online) affect tacit knowledge.

Antecedents of Tacit Knowledge among Adolescents

A considerable number of variables that lead to better tacit knowledge transfer can be delineated as a function of adolescents' socioeconomic status (SES). There are five key demographic characteristics: salary, time of life, married status, household size, belief, employment, and level of degree. Somech and Bogler (1999) have claimed that low-SES students have better tacit knowledge than do high-SES students. Furthermore, individuality attributes, inspiration, own value, and shared faith affect tacit knowledge-sharing behavior (Anwar, 2017; Rahman et al., 2018). In a different vein, organizational culture types and experience can also affect tacit knowledge production (Kothari et al., 2011; Suppiah & Sandhu, 2001). Lastly, parenting can influence tacit knowledge production and thus should be included as a control variable (Rimbau-Gilabert et al., 2008). In terms of online factors, the limitation of IT infrastructure and the ability to use IT affects tacit knowledge transfer (Panahi et al., 2013).

Summary of Controlled Variables on Tacit Knowledge

Socioeconomic status allows for different amounts of tacit knowledge. (Somech, A., & Bogler, R. 1999) Furthermore, the level of education correlates with tacit knowledge. (Leonard, N., & Insch, G. S. 2005). In terms of family number, the family socioeconomic status scale indicates a relationship with the tacit knowledge transfer aspect. (Hou, C., & Liu, Z. 2021). In addition, prior research indicates that gender affects tacit knowledge sharing. (Holste, J. S., & Fields, D. 2010)

Explicit Knowledge

While several researchers have debated whether tacit knowledge and explicit knowledge can be subdivided, Nonaka and Takuchi (1995) argue that tacit knowledge should be distinguished from explicit

knowledge, highlighting that the former can become the latter only through extermination (Figure 2). According to IGB Global, there are about 79 definitions of explicit knowledge in the literature, from which seven themes can be extracted (Table 6).

Table 6

Explicit Knowledge Definitions
1. **Codified** (Heinrichs, 2003; Hélie & Sun, 2010; Nonaka 1998; Zack, 1999b)
2. **Articulated** (Campos et al., 2011; Hélie & Sun, 2010; Kamthan & Fancott, 2011; Markellou et al., 2010; Masri & Abdelrahma, 2019; Nonaka, 1998; Norsafinas & Jedin, 2016)
3. **Signs** (Anzelak et al., 2009)
4. **Manuals** (Alqahtani et al., 2012; Dwivedi, 2009; Härtel, 2009; Maravilhas, 2019; Maravilhas & Martins, 2017; Sequeira et al., 2019; Soliman, 2015; Stenmark, 2000; Tovstiga et al., 2011; Woo Bock et al., 2009; Zárraga-Oberty, 2011)
5. **Rules** (Alqahtani et al., 2012; Stenmark, 2000; Woo Bock et al., 2009)
6. **Verbalized** (Kone, 2021)
7. **Written** (Markellou et al., 2010; Masri & Abdelrahma, 2019; Sequeira et al., 2019)

1. **Codified** knowledge can be defined as academic language included in numerical, linguistic, automated, and allegorical codes. (Heinrichs et al., 2002).

2. **Articulated** knowledge involves the process of diffusion and extraction from tacit knowledge. However, once articulated, it can be used to transfer explicit knowledge (Tell, 2018). Examples include the first words uttered by a child, such as "mom" and "daddy," which show that the child needs its parents immediately.
3. **Signs** refer to knowledge that can be represented as symbols, evaluations, and figures (Anzelak et al., 2009).
4. **Manuals** can vary in their institutional uses; three significant examples of manuals include organizational manuals, policy manuals, and training manuals.
5. **Rules** are viewed as regulations or laws in an organization.
6. **Verbalizations** are the opposite of written forms, wherein users express their opinions.
7. **Written** knowledge involves a process of codifying forms of individuals' experiences, opinions, or thoughts.

Assessment of explicit knowledge in prior research has been more reliable among adults in the business world; thus, must be modified to apply to adolescents. The explicit knowledge that is codified is expressed in terms of school and home activities. For middle schoolers, most activities occur at school and home, based on recent data. Moreover, manuals and articulations were omitted due to their repetition and ambiguity, even with tacit knowledge (Table 7).

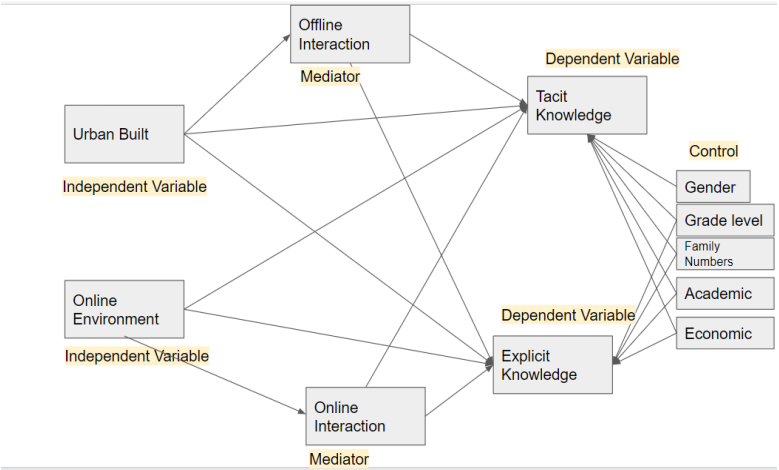
Table 7

Explicit Knowledge Definitions and Example Items
1. **Codified** (Heinrichs, 2003; Hélie & Sun, 2010; Nonaka, 1998; Zack, 1999b)
1. Do you know the mathematical equations that are learned in your grade? 2. Do you know the proper grammar that is learned in your grade?

2. **Rules** (Alqahtani et al., 2012; Stenmark, 2000; Woo Bock et al., 2009)
1. Do you know the rules in your classroom? 2. Do you know the rules in your house?
3. **Verbalized** (Kone, 2021)
1. Do you express words how you don't like something? 2. Do you express words how you like something?
4. **Written** (Markellou et al., 2010; Masri & Abdelrahman, 2019; Sequeira et al., 2019)
1. Do you write words about how you don't like something? 2. Do you write words about how you like something?

Conceptual Framework

This dissertation follows a case study design with an in-depth analysis of the relationship between tacit and explicit knowledge in offline and online spaces in South Korea. The next chapter will explain how these factors were assessed.



Chapter 3. Research Methodology

Data, Target Audience, and Area

Data were collected through an online and offline survey of adolescents in South Korea, as no secondary raw data suitable for research purposes were available online. The questionnaire was initially developed and later modified based on the preceding literature review, with the final version approved by the Institutional Review Board at Seoul National University. A thorough examination of the appropriate age range was conducted. Age significantly affects education and learning experiences. Brooks (2005) highlights that age differences significantly affect the learning experience, as does SES. Thus, the target audience was narrowed to middle school students to control for differences in learning due to age differences.

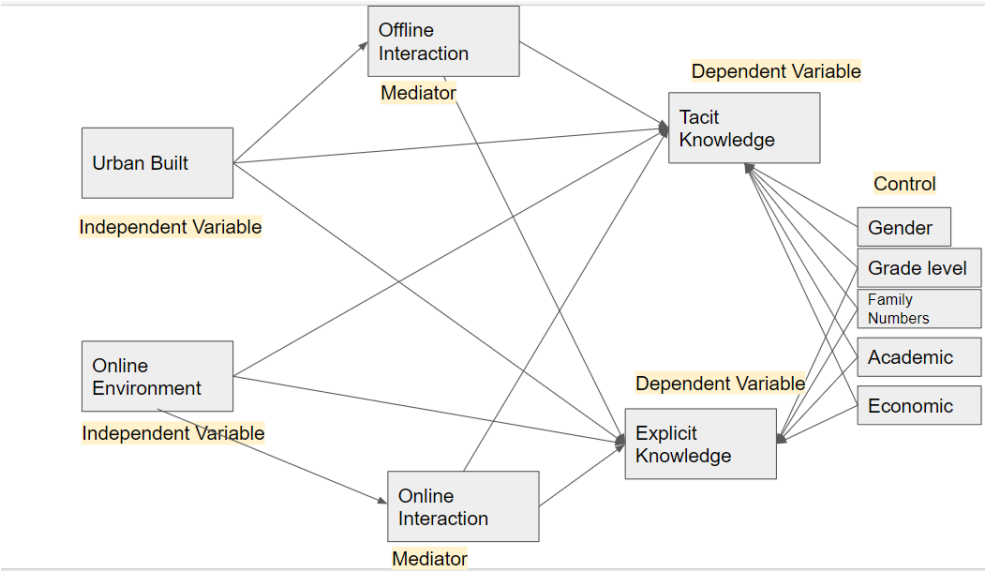
The research examined whether knowledge (tacit and explicit) transfers better in online or offline spaces. It also assessed how different types of urban built areas (in terms of proximity) affect this knowledge transfer. Consequently, the findings shed light on whether urban built areas in cities should be clustered to facilitate knowledge transfer among adolescents. South Korea, especially in cities such as Seoul, has many urban spaces; adolescents here encounter both online and offline spaces, making it an appropriate target area.

Measures

Two important themes emerge from the studies discussed so far. The first is how knowledge (explicit and tacit) is transferred in online and offline spaces, and the second is how other variables in offline and online environments affect knowledge transfer. Figure 3 summarizes the variables measured in this study. The structural equation model constructed in AMOS addresses the research questions by determining how the degree of knowledge differs and relates to different online and offline interactions and mediating variables.

Figure 3

Research Model



Tables 4 and 7 present the questionnaire items. Respondents first quantified their tacit and explicit knowledge using a 5-point Likert scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The current tacit and explicit knowledge measurement is essential when determining the relationship between offline and online interaction frequency and time.

Table 8

Tacit Knowledge Subcategory	Examples
1. Intuition	1. Can you answer questions without much thinking? 2. Can you make fast judgments without reasoning?
2. Skills	1. Can you use a new machine such as a smartphone? 2. Can you shoot a video to make your own YouTube channel?

3. Insight	1. Can you suddenly know why you did something, such as responding to conflicts? 2. Can you suddenly know why you did not like someone?
4. Practical Intelligence	1. Can you use your time efficiently to do your homework? 2. Can you know what my friends are thinking from their expressions?

Table 9

Explicit Knowledge Definitions and Example Items
1. **Codified** (Heinrichs, 2003; Hélie & Sun, 2010; Nonaka, 1998; Zack, 1999b)
1. Do you know the mathematical equations that are learned in your grade? 2. Do you know the proper grammar that is learned in your grade?
2. **Rules** (Alqahtani et al., 2012; Stenmark, 2000; Woo Bock et al., 2009)
1. Do you know the rules in your classroom? 2. Do you know the rules in your house?
3. **Verbalized** (Kone, 2021)
1. Do you express words how you don't like something? 2. Do you express words how you like something?
4. **Written** (Markellou et al., 2010; Masri & Abdelrahman, 2019; Sequeira et al., 2019)

1.	Do you write words about how you don't like something?
2.	Do you write words about how you like something?

Suppose that a respondent reports frequent and lengthy offline interactions, high tacit knowledge, and considerably lower explicit knowledge. In that case, it could indicate a cause-and-effect relationship, with interactions in offline spaces producing tacit knowledge. In contrast, if a respondent reports frequent and lengthy online interactions, high explicit knowledge, and considerably lower tacit knowledge, this could indicate online interactions' causal impact on explicit knowledge. Tables 10 and 11 present the questionnaire items pertaining to the length and frequency of offline and online interactions.

Table 10

Offline Interaction	
How much do you interact with friends per day?	
1.	(Not at all)
2.	(1 to 60 minutes)
3.	(61 to 120 minutes)
4.	(121 to 240 minutes)
5.	(More than 241 minutes)
*According to the Green Umbrella Children Foundation survey 56 percent showed no interactions with friends and the rest of the time intervals showed an even proportion compared to the, not at all interaction response.	
How frequently do you meet your friends per day?	
1.	0
2.	1
3.	2
4.	3
5.	More than 5
Offline Interaction	
How much do you interact with family per day?	
6.	(Not at all)

7.	(1 to 60 minutes)
8.	(61 to 120 minutes)
9.	(121 to 240 minutes)
10.	(More than 241 minutes)
*According to the Green Umbrella Children Foundation survey 56 percent showed no interactions with friends and the rest of the time intervals showed an even proportion compared to the, not at all interaction response.	

Table 11

Online Interaction	
How much do you interact with friends per day online?	
1.	(Not at all)
2.	(1 to 60 minutes)
3.	(61 to 120 minutes)
4.	(121 to 240 minutes)
5.	(More than 241 minutes)
*According to the Green Umbrella Children Foundation survey increase of 4 percent showed students' interaction online than before Covid-19.	
How frequently do you meet your friends per day online?	
1.	0
2.	1
3.	2
4.	3
5.	More than 5

Mediating Variables in the Offline Urban Built Environment and the Online Environment

The mediating variables indicate how the offline urban built environment and the online environment affect the degree of tacit and explicit knowledge transfer.

Table 12

Offline (Urban Built) Environment
I live close to my school.
1. (Strongly Disagree) (About 25 minutes' walk)
2. (Disagree) (About 20 minutes' walk)
3. (Neutral) (About 15 minutes' walk)
4. (Agree) (About 10 minutes' walk)
5. (Strongly Agree) (About 5 minutes' walk)
*
I live close to a neighborhood with parks.
1. (Strongly Disagree) (About 25 minutes' walk)
2. (Disagree) (About 20 minutes' walk)
3. (Neutral) (About 15 minutes' walk)
4. (Agree) (About 10 minutes' walk)
5. (Strongly Agree) (About 5 minutes' walk)
*
I live close to a neighborhood with a playground.
1. (Strongly Disagree) (About 25 minutes' walk)
2. (Disagree) (About 20 minutes' walk)
3. (Neutral) (About 15 minutes' walk)
4. (Agree) (About 10 minutes' walk)
5. (Strongly Agree) (About 5 minutes' walk)
*
I live close to a neighborhood with a hagwon academy.
1. (Strongly Disagree) (About 25 minutes' walk)
2. (Disagree) (About 20 minutes' walk)
3. (Neutral) (About 15 minutes' walk)
4. (Agree) (About 10 minutes' walk)
5. (Strongly Agree) (About 5 minutes' walk)
*
The neighborhood where I live is close to the alleys where I play
1. (Strongly Disagree) (About 25 minutes' walk)
2. (Disagree) (About 20 minutes' walk)
3. (Neutral) (About 15 minutes' walk)
4. (Agree) (About 10 minutes' walk)

5.	(Strongly Agree) (About 5 minutes' walk)
The neighborhood where I live is close to religious facilities	
1.	(Strongly Disagree) (About 25 minutes' walk)
2.	(Disagree) (About 20 minutes' walk)
3.	(Neutral) (About 15 minutes' walk)
4.	(Agree) (About 10 minutes' walk)
5.	(Strongly Agree) (About 5 minutes' walk)
The neighborhood where I live is close to my friend's house.	
1.	(Strongly Disagree) (About 25 minutes' walk)
2.	(Disagree) (About 20 minutes' walk)
3.	(Neutral) (About 15 minutes' walk)
4.	(Agree) (About 10 minutes' walk)
5.	(Strongly Agree) (About 5 minutes' walk)
*	
Where I live is close to a supermarket.	
1.	(Strongly Disagree) (About 25 minutes' walk)
2.	(Disagree) (About 20 minutes' walk)
3.	(Normal) (About 15 minutes' walk)
4.	(Agree) (About 10 minutes' walk)
5.	(Strongly Agree) (About 5 minutes' walk)
The place where I live is close to places like easy-to-eat coffee shops, Lotteria, and fast food restaurants where you can hang out.	
1.	(Strongly Disagree) (About 25 minutes' walk)
2.	(Disagree) (About 20 minutes' walk)
3.	(Normal) (About 15 minutes' walk)
4.	(Agree) (About 10 minutes' walk)
5.	(Strongly Agree) (About 5 minutes' walk)

Table 13

Online Environment	
I have a smartphone and a computer that work well on the internet.	
1.	Strong disagree

2.	Disagree
3.	Normal
4.	Agree
5.	Strongly Agree
*The use of smartphones has rapidly increased after Covid-19; according to the Green Umbrella Children Foundation survey increased by about 20 percent using smartphones. *The use of the internet has rapidly increased after Covid-19; according to the Green Umbrella Children Foundation survey increased by about 15 percent using the internet.	

The main control variables included SES and how much time respondents spend with their parents. A high percentage of students report spending more time with their parents, which affects tacit knowledge production (Rimbau-Gilabert et al., 2008).

Survey Variables Explained

The two survey tables represent instrumental measurement tools to quantify tacit and explicit knowledge. In the tacit knowledge table, intuition, skills, insight, and practical intelligence are the four representative factors. Intuition inquires two questions: 1. Can you answer questions without much thinking? and 2. Can you make fast judgments without reasoning? As stated previously by Collion (2003), intuitions require a set of speed and quick awareness of an individual. To grasp the essence of intuition pair of questionnaires allowed asking the respondent if they were able to ask questions without much thinking and make a quick judgment. Second, skills include two questions: 1. Can you use a new machine such as a smartphone? 2. Can you shoot a video to make your own YouTube channel? These two questions aim to address a growing trend in adolescent skills. Currently, 2.29 billion people use Youtube, and 6.48 billion people use smartphones. Many of these people are adolescents who require frequent use of skills to communicate with others. Insights: 1. Can you suddenly know why you did something, such as responding to conflicts? 2. Can you suddenly know why you did not like someone? It relates to one own's realization of other people, meaning how an individual understands or perceives problems in a relationship. This definition of insight reflects one's understanding of conflict and realizing why one dislikes someone. Lastly, practical intelligence, which Wegner (1987)

used to capture most of the tacit knowledge, requires everyday intelligent skills. When people are bargaining or selling, it is necessary to have skills that could allow the seller or bargainer to scan the buyer's facial. expressions so that they can determine how best to haggle and modify prices so that each party is satisfied. In that sense, practical intelligence requires skills like knowledge to use daily.
Explicit knowledge survey variables include codified definitions, rules, verbalized knowledge, and written knowledge. Codified definitions, the primary definition of explicit knowledge, require a visual representation of knowledge. Visual knowledge can be mathematical questions or grammar content that a person has made. Rules, the second important variable that captures explicit knowledge, represent an understanding of how explicit knowledge needs to be reminded by the users. One cannot efficiently function if one does not comply with the rules governing the classroom or one household. The questionnaire was designed to capture the rules frequently exposed to adolescents at home and home. Verbalized and written are similar to explicit knowledge in that one can represent their knowledge by speaking and writing. Explicit knowledge requires one to visualize its content; thus, written and verbalized are two representative factors, and questionnaires capture the fundamental aspect.

Respondent's socioeconomic characteristics discussed in the previous chapter are input in the survey analysis as controlled variables. The follow survey questions are listed in table 14.

Table 14

Division	Classification
Gender	Male
	Female
Grade level	Middle School (6th Grade)
	Middle School (7th Grade)
	Middle School (8th Grade)
	2 Members

Number of Families together	3 Members
	4 Members
	5 Members
	6 Members
	7 Members
	8 Members
Academic Performance	Very Poor (Very low level) (E)
	Poor (Low Level) (D)
	Normal (Middle level) (C)
	Good (High level) (B)
	Excellent (Very High Level) (A)
Family Economic Status	Very low (Below 1.50million won per month)
	Low (1.50million won to 3 million won below per month)
	Normal (3 million won to 4.5 million per month below)
	High (4.5 million won per month to 6 million per month below per month)
	Very High (Over 6 million won per month)

Chapter 4. Result and Discussion

Respondents Result

Total respondents were about 181 middle school year students. Male 54.7%(99 students), female 45.3%(82 students), grade levels range from grade 6th 15.6%(28 students), grade 7th 14.4% (26 students) and largest 70%(126 students).

For number of families ranged from 2 members to 8 members (including the respondents). Four memebrs were the largest 60.2% (109 students), five members 18.8% (34 students), three members 12.2% (22 students), six members 6.6% (12 students), seven members 1.1% (2 students), two and eight members 0.6%(1 students).

For the academic performances high level B showed 39.2% (71 students), normal academic level C 31.5%(57 students), poor low level D 13.8(25 students), very high level A 13.3%(24 students), and very poor 4 level E 2.2%(4 students).

Family economic status includes: Normal (3 million won to 4.5 million per month below) 40.4% (72 students), very High (Over 6 million won per month) 34.3% (61 students), high (4.5 million won per month to 6 million per month below per month) 21.3% (38 students), low (1.50million won to 3 million won below per month) 3.9% (7 students) and ery low (Below 1.50million won per month) none.

How much do you interact with family per day? : (1 to 60 minutes) 29.2% (50 students), (61 to 120 minutes) 26.9% (46 students), (121 to 240 minutes) 22.8% (39 students), (More than 241 minutes) 20.5%(35 students) and (Not at all) 0.6% (1 student).

How much do you interact with friends per day? : (More than 241 minutes) 54.7% (93 students), (121 to 240 minutes) 20% (34 students), (61 to 120 minutes) 14.7% (25 students), (1 to 60 minutes) 10% (17 students) and (Not at all) 0.6% (1 student).

How frequently do you meet your friends per day? : Over 4 times 58.8% (100 students), 2 times 19.4(33 students), 3 times 9.4%(33 students), 1 time 10% (17 students), and 0 times 2.4% (4 students)

How much do you interact with friends per day online?: (1 to 60 minutes) 45.3% (78 students), (61 to 120 minutes) 23.3% (40 students), (121 to 240 minutes) 14.5% (25 students), (Not at all) 8.7% (15 student) and (More than 241 minutes) 8.1% (14 students),

How frequently do you meet your friends online per day? : 1 time 25.6% (44 students), over 4 times 23.8% (41 students), 2 times 22.7% (39 students), 0 and 3 times both 14.0% (24 students)

How much do you interact in Hagwon (Offline Academy)?: 2 hours to less than 4 hours 55.2% (95 students), 0 hour 21.5% (37 students), 1 hour to less than 2 hours 11.6% (20 students), more than 4 hours 8.7% (15 students) and 0 hour to less than 1 hour 2.9% (5 students).

Respondents Frequency Analysis Summary Table 15

Division	Classification	Frequency (Number)	Valid Percent
Gender N = 181	Male	99	54.7%
	Female	82	45.3%
Grade level N=180	Middle School (6th Grade)	28	15.6%
	Middle School (7th Grade)	26	14.4%
	Middle School (8th Grade)	126	70.0%
Number of Familes together N=181	2 Members	1	.6%
	3 Members	22	12.2%
	4 Members	109	60.2%
	5 Members	34	18.8%
	6 Members	12	6.6%
	7 Members	2	1.1%
	8 Members	1	.6%
Academic Performance N=181	Very Poor (Very low level) (E)	4	2.2%
	Poor (Low Level) (D)	25	13.8%
	Normal (Middle level) (C)	57	31.5%
	Good (High level) (B)	71	39.2%
	Excellent (Very High Level) (A)	24	13.3%
Family Economic Status N= 178	Very low (Below 1.50million won per month)	0	0%
	Low (1.50million won to 3 million won below per month)	7	3.9%

	Normal (3 million won to 4.5 million per month below)	72	40.4%
	High (4.5 million won per month to 6 million per month below per month)	38	21.3%
	Very High (Over 6 million won per month)	61	34.3%
How much do you interact with family per day? N=171	(Not at all)	1	.6%
	(1 to 60 minutes)	50	29.2%
	(61 to 120 minutes)	46	26.9%
	(121 to 240 minutes)	39	22.8%
	(More than 241 minutes)	35	20.5%
How much do you interact with friends per day? N=170	(Not at all)	1	.6%
	(1 to 60 minutes)	17	10.0%
	(61 to 120 minutes)	25	14.7%
	(121 to 240 minutes)	34	20.0%
	(More than 241 minutes)	93	54.7%
How frequently do you meet your friends per day? N=170	0 time	4	2.4%
	1 time	17	10.0%
	2 times	33	19.4%
	3 times	16	9.4%
	Over 4 times	100	58.8%
How much do you interact with friends per day online? N=172	(Not at all)	15	8.7%
	(1 to 60 minutes)	78	45.3%
	(61 to 120 minutes)	40	23.3%
	(121 to 240 minutes)	25	14.5%
	(More than 241 minutes)	14	8.1%

How frequently do you meet your friends online per day? N=172	0 time	24	14.0%
	1 time	44	25.6%
	2 times	39	22.7%
	3 times	24	14.0%
	Over 4 times	41	23.8%
How much do you interact in Hagwon (Offline Academy)? N=172	0 hour	37	21.5%
	0 hour to less than 1 hour	5	2.9%
	1 hour to less than 2 hours	20	11.6%
	2 hours to less than 4 hours	95	55.2%
	More than 4 hours	15	8.7%

Descriptive Statistics & Measurement Model Evaluation

Structural Model Equation (SEM) has become widespread use for cause and effect relations among variables (Tomarken, A. J., & Waller, N. G. 2005). In this study, multiple correlations examined the relationships among tacit knowledge, explicit knowledge, offline interaction, online interaction, online environment, and urban environments.

An essential step is needed to quantify the relationships among the multiple variables in SEM; first, descriptive statistics should indicate the skewness between negative three and positive three and kurtosis from negative 10 to positive 10. (Brown, 2006). The table below shows all the acceptable ranges for skewness and kurtosis.

Table 16

Descriptive

Classification		Mean	Std. Deviation	Skewness	Kurtosis
		Statistic	Statistic	Statistic	Statistic
Explicit Knowledge	E1	4.1657	.95751	-1.106	.839
	E2	3.6796	1.10407	-.689	-.139
	E3	4.3923	.69582	-.908	.373
	E4	4.2541	.77571	-.765	-.038
	E5	3.7735	1.04273	-.545	-.385

	E6	3.3481	1.03030	-.124	-.802
	E7	2.1977	1.07409	.715	.019
	E8	2.1512	1.10837	.844	.204
Tacit Knowledge	T1	2.9186	1.11045	.136	-.720
	T2	2.1744	1.01672	.927	.544
	T3	3.9942	.89506	-.880	.707
	T4	2.8198	1.29645	.080	-1.059
	T5	3.8444	.90820	-.818	.847
	T6	4.0608	.85742	-.812	.480
	T7	2.9890	1.21101	-.036	-.905
	T8	3.9558	.87447	-.771	.841
Offline Built Environment	ME1	3.0387	1.45817	-.231	-1.339
	ME2	3.6519	1.22264	-.690	-.377
	ME3	4.6294	.89592	-2.694	6.961
	ME4	3.1065	1.38462	-.193	-1.157
	ME5	3.0765	1.24036	-.034	-.839
	ME6	3.3647	1.26722	-.362	-.852
	ME7	3.7059	1.44176	-.839	-.635
	ME8	3.2353	1.29767	-.217	-.958
	ME9	3.7778	1.08084	-.754	.072
Online Environment	MT1	4.6111	.72766	-2.417	7.159

In addition, prior to the SEM analysis, a reliability analysis(Cronbach's alpha) was conducted to verify if the variables were appropriate in SEM. Table 17 indicates that the Cronbach's alpha level is all over 0.6, which is an acceptable range, however for offline interaction it indicates low than 0.6 Cronbach's alpha. Numerous arguments are made about what level of Cronbach's alpha is an acceptable range, however, Perry, R. H., Charlotte, B., Isabella, M., & Bob, C. (2004) have argued that over 0.5 can be moderate reliability, therefore it was considered acceptable accordingly.

Table 17

Variable Name	Number of Questionnaires	Cronbach's alpha
Explicit Knowledge	8	.669
Tacit Knowledge	4	.614
Offline Interaction	3	.529

Online Interaction	2	.634
Built Environment	9	.688

Modifications for tacit knowledge were made; all the questionnaires from T1 to T8 did not show higher 0.5 Cronbach's alpha; thus, four questionnaires from tacit knowledge were omitted. (T1, T2, T4 and T7 were eliminated for a higher Cronbach's alpha and later for better SEM analysis.

Analysis of Moment Structures (AMOS) allows SEM to be quantified. The data were then used to conduct a Confirmatory Factor Analysis CFA to verify if the measured variables explicit knowledge, tacit knowledge, online interaction, built environment, and online environment were consistent with the prior research.

Table 18

			Regression Estimate	Standard Estimate	S.E.	C.R.
Skills use of smart phone	< ---	Tacit	1.584	0.606	0.469	3.38***
Insight	< ---	Tacit	1.437	0.581	0.418	3.436***
Practical Intelligence	< ---	Tacit	1.54	0.611	0.456	3.379***
codified	< ---	explicit	0.53	1		
rules	< ---	explicit	0.639	0.851	0.424	2.007**
Close to friends house	< ---	Urban	2.114	0.77	0.427	4.946***
Close to Hagwon	< ---	Urban	1.203	0.584	0.212	5.674***
Close to parks and playground	< ---	Urban	0.951	0.598	0.219	4.343***
Store, Cofffeeshop	< ---	Urban	1	0.521		
Frequency Friends	< ---	Offline	1.206	0.514	0.392	3.078**
Time with friends	< ---	Offline	1.269	0.591	0.436	2.913**

Table 18 denotes the latent variables that verified the tacit knowledge, explicit knowledge, urban built environment, and offline interaction. The observed variables were online interaction and the online environment. The table includes variables lower than the p-value of 0.05, and the standard estimates were over 0.5. Omitted values lower than 0.5 standard estimates include: written, verbalized one of the tacit knowledge insight (T5), and times with parents.

SEM model were acceptable in the model fit, Model fit acceptable: CMIN: P 0.365, TLI=0.986, CFI=0.99, RMSEA = 0.019. The acceptable level includes: p-value over 0.05, RMSEA, lower than 0.1, TLI over 0.9 and CFI over 0.9.

Results

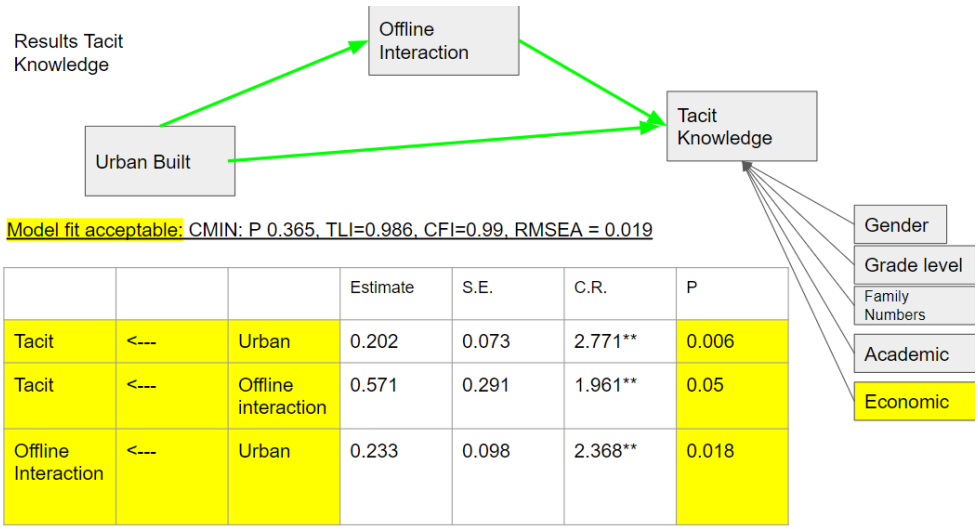
Review hypothesis:

1. Tacit knowledge transfers more effectively through offline interaction.
2. Explicit knowledge transfers more effectively through online interaction.
3. The built environment will allow better tacit knowledge transfer offline in closer built environment spaces.
4. The internet connection and smartphone environments will allow better explicit knowledge transfer in a better online environment.

Urban to tacit knowledge show significant relations, which means more urban built environment will allow for more tacit knowledge. Offline interaction and tacit knowledge also indicate significant relations, meaning more offline interaction leads to more tacit knowledge. Also, the urban built environment had an indirect relationship to tacit knowledge. Figure 4 indicates tacit knowledge from urban to offline interaction to tacit knowledge.

Tacit knowledge analysis also accounted for the control variables. There were significant relationships for gender, grade level, family numbers, and academic performance; however, for family's economic status showed a high correlation meaning higher economic status will lead to more tacit knowledge.

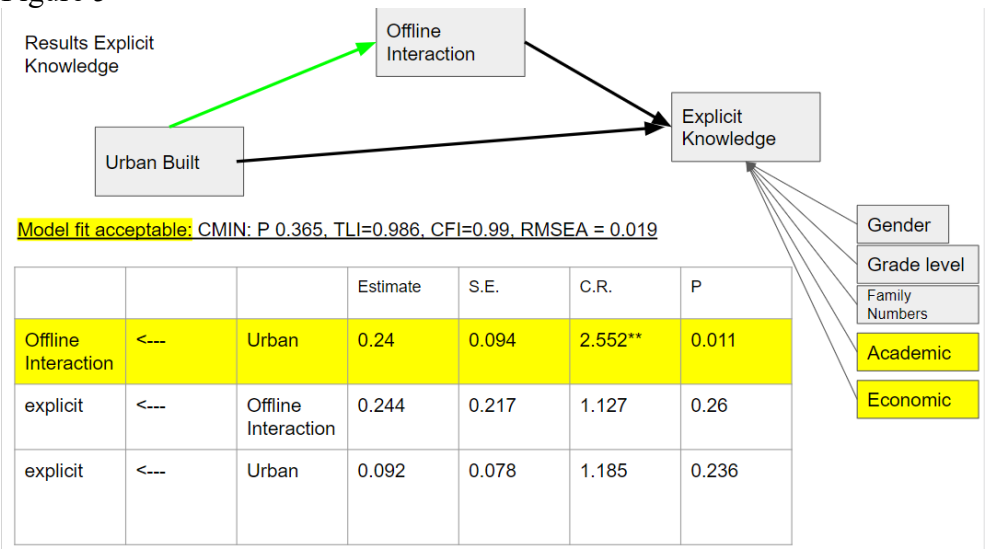
Figure 4



			Estimate	S.E.	C.R.	P
Tacit	<---	Urban	0.202	0.073	2.771**	0.006
Tacit	<---	Offline interaction	0.571	0.291	1.961**	0.05
Offline Interaction	<---	Urban	0.233	0.098	2.368**	0.018

Figure 5 indicates the result for explicit knowledge. Urban and offline interaction showed significant relations, meaning more urban built environments will show more offline interaction. However, offline interaction and explicit knowledge showed no correlations. The urban built environment also had no significant correlations to explicit knowledge. Only academic variables showed significant relations to controlled variables, meaning higher economic status will lead to more explicit knowledge.

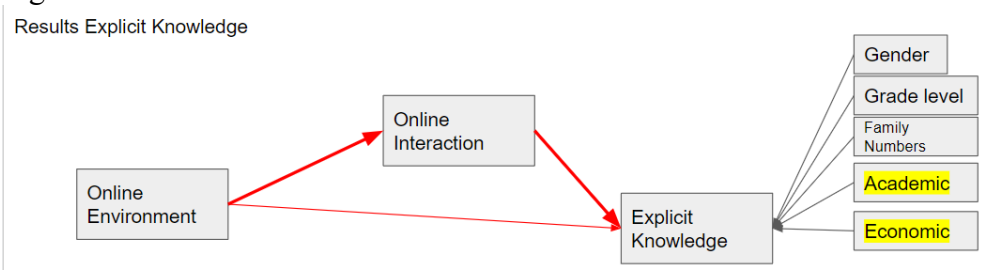
Figure 5



			Estimate	S.E.	C.R.	P
Offline Interaction	<---	Urban	0.24	0.094	2.552**	0.011
explicit	<---	Offline Interaction	0.244	0.217	1.127	0.26
explicit	<---	Urban	0.092	0.078	1.185	0.236

Figure 6 signifies no significant correlations between an online environment and online interaction to explicit knowledge. Only the controlled variables, academic and economic status, showed significant relations. Better academic performance leads to more explicit knowledge, and higher economic status leads to more explicit knowledge.

Figure 6

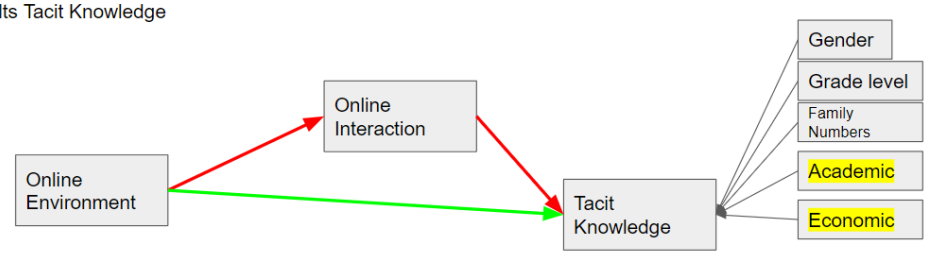


			Estimate	S.E.	C.R.	P
Online Interaction	<---	online environment	0.069	0.108	0.638	0.523
explicit	<---	Online Interaction	1.933	3.316	0.583	0.56
explicit	<---	Online Environment	0.019	0.035	0.551	0.582

Figure 7 indicates no significant relationship between the online environment to online interaction. Furthermore, online interactions with tacit knowledge showed no significant relations. However, the online environment to tacit knowledge showed direct relations. A better online environment leads to more tacit knowledge. Higher academic performance and higher economic status for the control variables lead to more tacit knowledge from the data results.

Figure 7

Results Tacit Knowledge



			Estimate	S.E.	C.R.	P
Online Interaction	<---	Online Environment	0.088	0.108	0.817	0.414
tacit	<---	Online Interaction	3.12	3.903	0.799	0.424
tacit	<---	Online Environment	0.168	0.058	2.928**	0.003

Summary and Discussion

Hypothesis A: Tacit knowledge transfers more effectively through offline interaction.
Hypothesis B: Explicit knowledge transfers more effectively through online interaction.
Hypothesis C: The built environment will allow better tacit knowledge transfer offline in closer built environment spaces.
Hypothesis D: The internet connection and smartphone environments will allow better explicit knowledge transfer in a better online environment.

The results showed that hypotheses A and C were verified and accepted. Tacit knowledge transfers more effectively through online interaction, and the built environment has a direct and indirect effect on tacit knowledge.

However, hypothesis B did not show significant relations between explicit knowledge, online interaction, and the online environment. However, a better online environment allowed more explicit knowledge.

Chapter 5. Conclusion

Major Findings

This study examined how different spaces offline (urban built proximity) and online space knowledge transfer among adolescent students during COVID-19. The offline and online interactions were mediating variables to distinguish how offline and online spaces, directly and indirectly, affect tacit and explicit knowledge.

The results showed that the urban built environment had a direct and indirect effect on tacit knowledge meaning more urban built environment leads to more tacit knowledge. This result is supported by Nonaka (1998), who argued that offline interactions are needed for creating tacit knowledge. Furthermore, Zhang et al. (2022) argue that tacit knowledge is found in urban built areas that allow tacit opportunities, which adds support argument.

However, explicit knowledge showed no significant correlations between online interaction and the online environment. A possible supporting argument for this phenomenon Faraj, S., Von Krogh, G., Monteiro, E., & Lakhani, K. (2016) indicates that online communities allow more tacit knowledge flows. The later results of this research support this by showing direct relations between the online environment to tacit knowledge.

The results indicate that proximity of urban built environment: close to a friend's house, Hagwon, parks and playgrounds, stores, and coffeeshop affect tacit knowledge. Previous chapters in Netherlands and Canada also support the results that more offline interactions in communities lead to more tacit knowledge enrichment. Although the online environment accounts for better tacit knowledge transfer, the result does not directly relate to how online interactions can significantly affect tacit knowledge transfer.

However, the urban built environment did show significant relations to tacit knowledge. The urban policy in South Korea, where Covid-19

continues, can have careful and more practical implications on how urban lockdown during a pandemic can affect tacit knowledge transfer, especially among adolescents. Furthermore, in terms of the controlled variables for tacit knowledge, higher economic status showed more tacit knowledge among adolescents. The urban policymakers could explore and be aware that the particular higher economic class can access specific urban built environments. As Zhang et al. (2022) point out, tacit opportunities allow more tacit knowledge of urban places with numerous open facilities. Gated communities allow specific higher economic classes should be further examined if less tacit knowledge is available for lower economic classes among adolescents.

The study attempted to prove that urban environments and offline social interactions relate to the production of tacit knowledge among adolescents. Current sustainable educational goals in the United Nations aim to bring quality education. For quality education for young students worldwide, proper knowledge transfer needs to be made. In terms of urban policy, the urban environment could be modified so that social interactions could be more effectively made. Urban facilities that foster more tacit opportunities to allow adolescents to engage in social communication would be beneficial at the community level. Furthermore, not just in urban environments, people who are part of the community should be aware of the importance of tacit knowledge transfer in offline urban environments. Communities could try to render more activities and schedule time to allow their children and adolescents to develop more social interactions. In addition, on a personal level, adolescents could be informed of the importance of tacit knowledge through social interaction in an offline environment. Urban policymakers have the means to cultivate more effective tacit knowledge transfer for the next generation

Limitation and Future Research

Examining adolescent behavior requires heavy control variables and an incaved environment where each adolescent group monitoring can

enrich the results and implications during offline interaction and online interaction. However, online interaction and offline interaction frequency and time were measured to validate the experiment. Furthermore, gender, academic performance, and grade level to only middle school were minimized to control the scope of adolescents.

The research and results give meaning to how the urban built environment and offline interactions can, directly and indirectly, affect adolescents' tacit knowledge, as unknown pandemics continuously project and affect offline and online interactions in urban areas.

Overall, quantifying tacit knowledge variables is a difficult task, and it can be especially challenging to accurately measure a respondent's experience acquiring both tacit and explicit knowledge. Time frames before and after Covid-19 need to be indicated to provide useful data for comparison. Hence, participatory observation can be added for future reference. Furthermore, the methodology has some limitations of not including teachers as a controlled variable to see the relationship between how teachers' feedback affects knowledge transfer.

Future research can be implemented to quantify the cost-effectiveness of knowledge transfer between online and offline spaces to assess if a specific type of online and offline interactions are cost-effective in certain situations and spaces.

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Appendix

Survey Korean

변수명	변수 설명	변수값 설명		
A1	1. 성별	1. 남	2. 여	
A2	2. 학교	중학교		
A3	3. 학년	1	2	3

A4	4. 가족 구성	1. 아버지	2. 어머니	3. 할아버지	4. 할머니	5. 형/오빠
		6. 누나/언니 (몇 명)	7. 남동생 (몇 명)	8. 여동생 (몇 명)	9.기타 (몇 명)	

A5	5. 학업 성적	1. 매우 잘함 (상위권) (A)	2. 잘하는 편 (중상위권) (B)	3. 보통 (중위권) (C)	4. 못하는 편 (중하위권) (D)	5. 매우 못함 (하위권) (E)
A6	6. 본인이 생각하는 가정 형편 경제적 수준 은 대략 어느 정도 입니까? (월 평균)	1. 매우 낮은 수준 (150만원 미만)	2. 낮은 수준 (150만원 이상 - 300만원 미만)	3. 중간 (300만원 이상 - 450만원 미만)	4. 높은 수준 (450만원 이상 - 600만원 미만)	5. 매우 높은 수준 (600만원 이상)

B1	당신은 하루에 몇 분을	1. (대면 하지	2. (1~60분	3. (61~120 분)	4. (121	5. 241분

	가족들과 대면하십니까?	않습니다)	) 입니다.		~ 240분)	이상입니다.
B2	당신은 하루에 몇 분을 친구들과 대면하십니까?	1. (대면하지 않습니다)	2. (1~60분) 입니다.	3. (61~120분)	4. (121 ~ 240분)	5. 241분 이상입니다.
B3	당신은 하루에 몇 번 친구와 대면하십니까?	1. 0 번	2. 1 번	3. 2 번	4. 3 번	4. 4 번 이상
B4	당신은 하루에 몇 분을 친구들과 온라인에서 보내십니까?	1. 없음	2. (1~60분) 입니다.	3. (61~120분)	4. (121 ~ 240분)	5. 241분 이상입니다.
B5	당신은 하루에 몇 번 친구들과 온라인으로 만나십니까?	1. 없음	2. 1 번	3. 2 번	4. 3 번	4. 4 번 이상
B6	당신은 하루에 몇 시간을 학원에서 보내십니까?	1. (전혀 그렇지 않습니다.)	2. (1~60분) 입니다.	3. (61~120분)	4. (121 ~ 240분)	5. 241분 이상입니다.

E1	당신은 학교에서 배우는 수학방정식을 잘 풀 수 있습니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
E2	당신은 학교에서 배우는 영어 문법을 잘 구사할 수 있습니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
E3	당신은 학교에 있는 기본 수칙들을 잘 숙지하고 계십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
E4	당신은 집에 있는 기본 수칙들을 잘 숙지하고 계십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
E5	당신은 마음에 드는 것이 있을 때 말로 표현하십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
E6	당신은 마음에 들지 않는 것이 있을 때에 말로 표현하십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
E7	당신은 마음에 드는 것이 있을 때 글로 표현하십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
E8	당신은 마음에 들지 않는 것이 있을 때에 글로 표현하십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다

T1	당신은 누군가 어떤 질문을 했을 때에 생각 없이 바로 대답하는 편이십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
T2	당신은 어떤 결정해야 할 때에 생각 없이 바로 결정하는 편이십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
T3	당신은 스마트폰 같은 기계를 잘 사용할 줄 아는 편이십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
T4	당신은 스마트폰이나 컴퓨터로 유투브 같은 콘텐츠를 잘 만드는 편이십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
T5	당신은 어떤 사람과 문제가 있을 때 왜 이 문제가 발생했는지 인지하는 편이십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
T6	당신은 어떤 사람이 싫을 때 그 이유를 아는 편이십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다
T7	당신은 숙제를 금방 하는 편이십니까?	1. 전혀	2. 대체로	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다

		그렇지 않다	그렇지 않다			
T8	당신은 어떤 사람의 표정을 보면 그 사람이 어떤 감정인지 잘 아는 편이십니까?	1. 전혀 그렇지 않다	2. 대체로 그렇지 않다	3. 보통이다	4. 대체로 그렇다	5. 매우 그렇다

ME 1	내가 사는 곳에서 학교랑 가깝다	1점 완전 그렇지 않다(도보 25분 이상).	2점 그렇지 않다(도보 20분 이내).	3점 보통이다(도보 15분 이내).	4점 그렇다(도보 10분 이내).	5점 완전 그렇다(도보 5분 이내).
ME 2	내가 사는 동네는 공원이랑 가깝다	1점 완전 그렇지 않다(도보 25분 이상).	2점 그렇지 않다(도보 20분 이내).	3점 보통이다(도보 15분 이내).	4점 그렇다(도보 10분 이내).	5점 완전 그렇다(도보 5분 이내).
ME 3	내가 사는 동네는 놀이터랑 가깝다	1점 완전 그렇지 않다(도보 25분 이상).	2점 그렇지 않다(도보 20분 이내).	3점 보통이다(도보 15분 이내).	4점 그렇다(도보 10분 이내).	5점 완전 그렇다(도보 5분 이내).
ME 4	내가 사는 동네는	1점 완전 그렇지 않다(도	2점 그렇지 않다(도보	3점 보통이다(도보 15분 이내).	4점 그렇다(도보	5점 완전 그렇다(도보 5분 이내).

	학원이랑 가깝다	보 25분 이상).	20분 이내).		10분 이내).	
ME 5	내가 사는 동네는 노는 골목길이랑 가깝다	1점 완전 그렇지 않다(도보 25분 이상).	2점 그렇지 않다(도보 20분 이내).	3점 보통이다(도보 15분 이내).	4점 그렇다(도보 10분 이내).	5점 완전 그렇다(도보 5분 이내).
ME 6	내가 사는 동네는 종교시설과 가깝다	1점 완전 그렇지 않다(도보 25분 이상).	2점 그렇지 않다(도보 20분 이내).	3점 보통이다(도보 15분 이내).	4점 그렇다(도보 10분 이내).	5점 완전 그렇다(도보 5분 이내).
ME 7	내가 사는 곳은 친구집이랑 가깝다	1점 완전 그렇지 않다(도보 25분 이상).	2점 그렇지 않다(도보 20분 이내).	3점 보통이다(도보 15분 이내).	4점 그렇다(도보 10분 이내).	5점 완전 그렇다(도보 5분 이내).
ME 8	내가 사는 곳은 대형마트랑 가깝다	1점 완전 그렇지 않다(도보 25분 이상).	2점 그렇지 않다(도보 20분 이내).	3점 보통이다(도보 15분 이내).	4점 그렇다(도보 10분 이내).	5점 완전 그렇다(도보 5분 이내).
ME 9	내가 사는	1점 완전	2점 그렇지	3점 보통이다(	4점 그렇다(	5점 완전 그렇다(

	곳은 놀 수 있는 쉽게 먹을 수 있는 커피샵, 롯데리아, 패스푸드점 같은 곳이랑 가깝다	그렇지 않다(도보 25분 이상).	않다(도보 20분 이내).	도보 15분 이내).	도보 10분 이내).	도보 5분 이내).

MT 1	나는 스마트폰이나 컴퓨터 같은 인터넷 와이파이 기계 환경이 잘 되어있다	1점 완전 그렇지 않다(도보 25분 이상).	2점 그렇지 않다(도보 20분 이내).	3점 보통이다(도보 15분 이내).	4점 그렇다(도보 10분 이내).	5점 완전 그렇다(도보 5분 이내).

Abstract in Korean

COVID-19 와 관련된 예방 조치의 불확실성으로 인해 여러 산업분야에서는 온라인 활동과 오프라인 활동을 병행하기 시작했다. 인간의 발달의 필수적인 요소라고 할 수 있는 청소년 학습에도 영향을 미치게 되었는데, 이와 관련하여 지식 전이에 관해서도 예외가 아니다. 특히 오프라인과 온라인 환경에서 제공되는 학습 방식의 병행은 청소년들에게 적절한 지식 전이가 이루어지고 있는지에 대한 의문이 제기되어왔다.

이를 분석하기 위해 정량적 조사를 실시하였으며 코로나 19 팬데믹 기간 동안 한국 청소년들 사이에서 온·오프라인 공간에서 지식 전달이 얼마나 일어났는지 알아보기 위해 암묵적 지식과 명시적지식 두 가지의 지식을 측정하였다. 암묵적 지식은 공식화되지 않고 무의식적인 지식이며, 명시적 지식은 의식할 수 있고 문서화되고 공식화될 수 있는 지식이라고 할 수 있는데, 본 설문 조사는 학생들의 오프라인 및 온라인 상호 작용 빈도와 시간, 암묵적 지식과 명시적 지식에 대한 경험 수준에 대해 평가하였다. 또한, 도시환경이 주 효과를 매개하는지 여부에 대해서도 평가하였다.

예상되는 결과는 다음과 같다. 코로나 19 로 인해 오프라인 상호 작용이 줄어들어 청소년 학생들의 암묵적 지식은 감소하는 측면이 있지만 명시적한 지식의 경우는 반대의 결과를 보였다. 오프라인에서의 상호작용을 촉진하는 도시 환경은 청소년 학생들의 암묵적 지식 축적에는 긍정적인 영향을 미치며, 이는 도시계획가의 관점에서 볼 때, 팬데믹 기간 동안 도시환경은 청소년 학생들의 학습 경험에 영향을 미치며 개선점을 제시한다고 말할 수 있다.