Development of a New Media Literacy Scale for University Students:

From 21st Century Skills Perspectives

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21 世紀型スキルの視点から

A Dissertation Presented to
the Graduate School of Arts and Sciences
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Acknowledgments

First, I would like to sincerely express my deepest appreciation to my committee members, Dr. Akiko Fujii, Dr. Jung Joo-Young, Dr. Hiroshi Okawa, and Dr. Jung Insung, for providing invaluable insights and tremendous encouragement toward this dissertation. Without their support, I could have never completed this project.

I would like to extend my heartfelt gratitude to Dr. Jung Insung for her unwavering support from the beginning of my degree journey until today. I will forever be indebted to Dr. Insung for showing me the ideal image of a researcher and educator. At all times along the way she provided encouragement, and mentored me in a respectful manner. She gave me the determination to stay on the long road of producing this dissertation. Even in times of tears and frustration, Dr. Insung was there for me.

Many teachers and students helped me during this research. I would like to express my sincere gratitude to all of them. They willingly accepted the challenge of working with me in the midst of their extremely busy schedule, and in the unexpected and unprecedented difficulties of the COVID-19 emergency. Without their generous cooperation, I could never have accomplished this research.

I would also like to thank Ms. Miyoko Misumi at ICU for all her unwavering help and support. She always encouraged me in a gentle and calm manner, which helped to carry me through my years of lonely research.

Finally, I could not have accomplished this without the support of my family. I would like to thank them from the bottom of my heart for their continuous encouragement throughout this long journey.

Abstract

The rise of digital media in the 21st century has profoundly impacted schools and society. Social media and other digital media are characterized by blurring the boundaries between consumer and producer, formal and informal communication, and in-class and out-of-class learning. In response to this changing landscape, some have argued that students who grew up with these new media, often called "digital natives" (Prensky, 2001), do not require education in digital usage. However, studies have shown that actual digital competence among students is often limited to a certain area, such as games (e.g., Bennett et al., 2008; Selwyn, 2009). Despite this, the concept of digital natives has been in use for over two decades. The literature reports changes in students' characteristics and preferred learning methods. Society and industry have also changed what they want from students, and digital-related *literacy* has become an essential pillar of global 21st century skills frameworks.

Three well-known types of literacy: information literacy, media literacy, and digital literacy, tend to be used synonymously, but each has a different academic background. Historically, information literacy focused on positivism, media literacy dealt with multifaceted perspectives, and digital literacy covered the usage of digital devices. However, the digital revolution has facilitated an environment where all information and media content are gathered on the same digital platforms. This situation has made it necessary to learn the three types of literacy, and to dialectically or synergically integrate them. This study combined these three types of literacy into one and treated it as new media literacy.

With the evolution of digital devices, schools and teachers often warn students about the theft of false information; however, they have little opportunity to understand how students use such warnings, what issues they face, and what skills are standard from the perspective of students. Given that students are using new media outside of the classroom, traditional literacy scales have limitations. In particular, existing scales are often built on conceptual frameworks from the perspective of educators rather than that of students. Further, higher education in Japan tends to assess the level of software usage, including Word and Excel, as media literacy or information literacy education. Focusing on only technical aspects or alerting particular issues may not necessarily improve students' literacy.

This study developed a new media literacy scale for Japanese university students (NMLS-J), from students' perspectives, based on 21st century skills. Three research questions for this study were:

(1) What is the underlying structure of new media literacy among current undergraduate students in Japan?

(2) How well does the NMLS-J assess current Japanese university students' new media literacy development?

(3) Can the structure of the NMLS-J be applied to a performance-based test?

First, to conduct this study, existing scales developed between 2000 and 2018 were scrutinized based on twenty criteria. Three scale frameworks were selected: Digital Literacy (DL; Eshet-Alkalai, 2012), New Media Literacy (NML; Koc & Barut, 2016), and Media and Information Literacy (MIL; UNESCO, 2013). They are used globally, adapted locally, and comprehensively considering new media. However, it is not necessarily clear

what the components of new media literacy consist of, based on the 21st century skills frameworks.

This study used the 21st Century Digital Skills Framework (21st-C DSF; van Laar et al., 2017) as a theoretical framework. The 21st-C DSF is comprised of 12 digital literacy components: technology, information management, communication, collaboration, creativity, critical thinking, problem-solving, ethical awareness, cultural awareness, flexibility, self-responsibility, and lifelong learning. The 21st-C DSF is a compilation of essential elements accomplished through a systematical review of 21st century skills literature from around the world, reflecting that in the 21st century, society and education are being profoundly transformed by digital technology, and knowledge alone may not measure competence.

The study first examined the scale items of the three frameworks: the DL, the NML, and the MIL, with 18 experts on three different methods. The three examination processes reduced the total number of items from 79 to 59 by categorizing the items into 12 dimensions of the 21-C DSF. An initial version of NMLS-J was developed, consisting of 59 items on a 5-point Likert scale.

In addressing research question one, in May 2020, the initial NMLS-J was distributed to 295 students. The response rate was 72.9%. Preliminary data analysis utilized the following five criteria: (1) no outliers, (2) normality within the data, (3) internal consistency, (4) inter-item score correlation, and (5) sampling adequacy of individual items. As a result, 28 items remained from the 59 items, and two of the 12 constructs of the 21-C DSF (self-responsibility and lifelong learning) were removed.

The 28 items were subjected to EFA with a random split-half sample, which produced the NMLS-J with 15 items in three dimensions. The KMO index (.842) and

Bartlett's sphericity test (χ^2= 124.109, *df* = 87, *p* = .006) confirmed the sample adequacy for factor analysis. The initial principal axis factorization with varimax rotation yielded six factors with eigenvalues above Kaiser's criterion of one. However, following the scree plot test result, a three-factor structure with 15 items loading above .30 was selected. It had the cleanest factor structure with items loading .30 or higher and the fewest cross-loading items.

CFA was conducted using another split-half sample of 15 items with three constructs. The CFA indicated that the three-factor model of the NMLS-J fit the data well (χ^2/df = 1.426; TLI = .915; CFI =.930; RMSEA =.063 [CI=.035–.087]). The CFA using SEM confirmed that this three-factor, 15-item NMLS-J model is a good fit for the data from the perspective of Japanese undergraduates. Intercorrelations among the factors in this model also supported the discriminant validity of the construct.

Through EFA and CFA, three distinguishing factors were named. Factor 1 was labeled *Critical and Ethical Thinking* skills from two non-overlapping constructs of the original theoretical model, the 21st-C DSF. A central theme of media literacy is basically to improve critical thinking skills. Combined with ethical thinking skills, it showed that students appreciate that diverse people openly use the Internet for various purposes based on relative rather than absolute standards in a democracy. The second factor was named *Media Content and Tool Management* skills because it consisted of items related to media content and the usage of technology tools. The non-overlapping component of the 21st-C DSF was collaboration skills. This factor assesses the ability to use technology effectively, participate in networks to gain information, and connect distributed pieces of information on the Internet. The third factor was named *Technical and Communication* skills, based on the two components of the theoretical model. The factor indicates that the students value

the use of basic technical and communication skills required for network connectivity rather than advanced technological skills.

Furthermore, the NMLS-J may be able to propose that Critical and Ethical Thinking skills (Independence), Media Content and Tool Management skills (Collaboration), and Technical and Communication skills (Networks) may be vital for new media literacy. The center that drives these three factors appears to be autonomy. The autonomy comes from the fact that NMLS-J does not have any protectionist and passive items, such as “can ignore” and “careful not to post.” All the items in the NMLS-J were intended to be proactive and empowering by new media. From the student’s perspective, the focus on new media literacy evaluation may be to actively engage with a large amount of media information and make judgments based on their own critical and ethical thinking skills.

Three of the 12 components of the 21st-C DSF were removed: creativity, self-direction, and lifelong learning. Self-direction and lifelong learning were not addressed in the DL and the NML; thus were deleted. This result supports the suggestion that self-direction and lifelong learning may not be best categorized as skills or abilities but rather as an approach (van Laar et al., 2017).

Creativity had the largest number of question items in the initial NMLS-J. All the DL, the NML, and the MIL also regard creativity as one of the important dimensions of their frameworks. Previous literature also indicates that creativity is vital in various 21st century skills frameworks and media literacy. However, several reasons for removing creativity can be considered. Current university students may be more consumers than producers and may value exchanging and sharing information more than creating activities outside the classroom. Recent media literacy education at universities may excessively

focus on making students good media content producers, ignoring the fact that students are also media consumers (Alagaran, 2012). Furthermore, creativity in technologically advanced media literacy is more ambiguous than creativity with paper and pencil, which is broader in meaning. What constitutes creativity is ambiguous (Banaji et al., 2010). Some of the items deleted in this study required high technical skills. On the other hand, the latest research revealed that across the globe, students' technology operational skills had improved more than creativity skills, regardless of income (Livingstone et al., 2020). This result may indicate that it will be necessary to clarify what will ultimately be called creativity and what skills will be expected to improve through education.

By comparing the items that remained in the NMLS-J with those deleted, it may be clear that the students who participated in this study reflect the characteristics of the latest digital natives that previous studies have reported. An international comparison of the NMLS-J should be one of the topics for future research.

In response to Research Question two, pre-post *t*-tests were conducted with two known groups. The first was conducted in the autumn semester of 2020 with 174 participants, and the second was conducted in the spring semester of 2021 with 241. Both classes increased their NMLS-J scores with moderate effect size results. These results may be attributed mainly to the fact that both classes gave the students assignments, had the students work in groups after class, and had them do research on the Internet.

To answer the third research question, two performance-based assessments were conducted in 2022. After the interrater reliability of scores by two examiners was confirmed (Cohen's k = .83– .86), they evaluated students' works and reports, following the criteria based on the NMLS-J. The NMLS-J developed from the students' perspectives

may be used not only to confirm the level in a self-reporting assessment but also to confirm guidelines for faculty and educational institutions.

This study has three major implications and contributions. First, it enables faculty to understand how Japanese digital natives use new media in relation to 21st century skills. Second, the NMLS clarifies what Japanese university students should do to maximize new media use. Third, the limitations of this study have implications for further research. In particular, future studies should investigate whether the removed items and dimensions are limited to current Japanese university students, the relationship with academic performance, knowledge construction, and information sharing.

Abstract

21 世紀のメディアは学校や社会に数多くの変化をもたらした。ソーシャルメディアやその他のデジタルメディアは消費者と生産者、公式と非公式、クラス内と外の境界を曖昧にする特徴を持つ。このデジタル環境で育つ若者たちは「デジタルネイティブ」（Prensky, 2001）と称され、高いデジタル技術を持つ世代の呼称として世界中に広まった。実際の若者のデジタル能力はゲームなど特定のものに限られ、世代間ではなく個人差であることが報告されている（e.g, Bennett et al., 2008; Selwyn, 2009）。しかし、このデジタルネイティブという概念が登場してから２０年が経過した。さまざまな研究から若者の特性や好みの学習法が変化していると報告されている。デジタルは社会や産業界が学生に求めるものも変化させ、メディアや情報に関するリテラシーはグローバルな 21 世紀型スキルの重要な柱となっている。

リテラシーは一般に、「情報リテラシー」、「メディアリテラシー」、「デジタルリテラシー」、あるいは日本では「情報教育」といった言葉で同義的に使用される傾向があるが、それぞれ異なる歴史的、理論的、学問的背景を持つ。伝統的に情報リテラシーは実証主義、メディアは多面的な視点に、またデジタルはデジタル機器の使用を対象としてきた。しかし、デジタルの進化は、あらゆる情報やメディアコンテンツがデジタル上に集まる環境を促進させた。これにより、それぞれのリテラシーが培ってきた背景を相乗効果的に統合していく必要がでてきた。この研究では、ネット上で利用が可能なメディア、及びメディアコンテンツを新しいメディア New Media とし、現在の大学生の実態を反映したリテラシー尺度を開発することを目的とした。

現在、日本の大学のリテラシー教育の中心はワードやエクセルの使用法や偽情報や盗用への注意喚起が主なテーマとされている。これらはデジタルが引き起こす問題がきっかけとなり、その対策として取り入れられることが多いためだが、学生が実際に教室外でどのようにメディアを使用し、どのような問題があり、どのようなリテラシーが標準的なのかを積極的に理解する機会は少ない。学生のメディア利用がますます増加していることを勘案すると、従来の

リテラシー尺度には限界があることがわかる。とりわけ新しいメディアは社会生活にも不可欠となり、デジタルに関する能力は 21 世紀型スキルの柱となっている。本研究は、様々な場面や授業で汎用的に使用が可能な新しいメディアリテラシー尺度（NMLS-J）を開発した。研究課題として挙げたのは次の 3 点である。

(1) 日本の学部学生のニューメディアリテラシーの基礎構造は何か？

(2) NMLS-J は、現在の日本人大学生のニューメディアリテラシーをどの程度評価できるか？

(3) NMLS-J は、現在の日本大学生のパフォーマンスを評価できるか。

この研究をするにあたり、まず 2000 年から 2018 年の間に開発された世界で使用されている尺度を比較検討した。検討には 20 の基準を設け、データベースで 3 つの尺度が選択された。Digital Literacy (DL; Eshet-Alkalai, 2012), New Media Literacy (NML; (Koc & Barut, 2016), Media and Information Literacy (MIL; UNESCO, 2013) であった。本研究は、これらのフレームワークから開発された調査質問項目を用いて開発を行った。これらは世界的に認知され各地域で利用されている。また包括的な尺度であり、新しいメディアも適宜考慮されている。しかし、21 世紀型スキルとの関連性が曖昧である。

そこで理論的な枠組みとして、本研究では 21 世紀型デジタルスキルの枠組み（21st-C DSF; van Laar et al., 2017）を利用することとした。 21st-C DSF は、技術、情報管理、コミュニケーション、コラボレーション、創造性、批判的思考、問題解決、倫理的認識、文化的認識、柔軟性、自己責任、生涯学習の 12 のデジタルリテラシーの要素で構成されている。これは、世界で研究されている 21 世紀型スキルの文献を調査し必要不可欠な要素をまとめたものである。21 世紀スキルは、社会と教育はデジタル技術によって大きく変化しており、知識のみでは能力を測れないことを反映している。

本研究は、まず 21-C DSF の 12 の構成要素の定義に基づき、3 つの選択された尺度 DL、NML、MIL の尺度項目を 3 回に渡って専門家と検討した。1 回目は 6 名の上級生、及び学生を推薦したメディアリテラシーの教員 1 名と本研究者によるフォーカス・グループ・ディスカッショ

ンで、MIL の項目を検討し削除した。MIL は教員向けの基準で構成されているため長文や難易度の高い単語が含まれているものは削除検討となった。これにより、全質問項目数は 113 から 79 となった。2 回目はメディアリテラシー、情報リテラシーの専門家 2 名と本研究者の 3 名で、3 回に渡って項目分析を行い、21-C DSF の 12 の側面に 79 項目を分類分けした。3 回目の尺度項目開発は 7 名の学生と 2 名の専門家教員、及び本研究者の 10 名で 79 項目と分類分けの妥当性を検討し 20 項目を削除した。3 回の尺度検討手法を経て、5 段階リッカート尺度を用いた計 59 問からなる NMLS-J の初期版を作成した。

研究課題 1 のために、2020 年 5 月に NMLS-J の初期版を計 6 クラス、295 名の学生に配布した。回答率は 72.9%であった。予備的なデータ分析では、以下の 5 点の基準、(1）外れ値がない、(2）データ内の正規性、(3）内部一貫性、(4）項目間得点相関、(5）個別項目のサンプリング妥当性を利用した。その結果、59 項目から 28 項目が残り、21-C DSF の 12 構成要素のうち、2 項目（自己責任、生涯学習）が削除された。

28 項目は、単純無作為で折半したデータで、それぞれ、探索的因子分析(EFA)、検証的因子分析を行った。KMO 指標（.842）とバートレットの球形性検定（χ^2= 124.109, *df*=87, *p*=.006）により、因子分析のためのサンプルの適切さが確認された。バリマックス回転を用いた最初の主軸因子分解（PAF）では、カイザーの基準である 1 を超える固有値を持つ 6 つの因子が得られたが、スクリープロット検定の結果、.30 以上の負荷が 15 項目ある 3 因子構造が選ばれた。これは、最もきれいな因子構造であった。

最終版の NMLS-J の妥当性を評価するために、3 つの構成要素を持つ 15 項目についてもう 1 つのサンプルデータを用いて CFA を行った。CFA の結果，NMLS-J の 3 因子 15 項目モデルはデータによく適合していることがわかった（χ^2/df = 1.426; TLI = .915; CFI = .930; RMSEA=.063 [CI=.035 –.087]）またこのモデルの因子間の相関は、構成要素の判別妥当性を中程度に支持することが示された。

EFA と CFA により、3 つの特徴的な因子が見出された。第 1 因子は、当初の理論モデルである 21st-C DSF の重複しない 2 つの構成要素から、Critical and Ethical Thinking skills と名づけられた。メディアリテラシーの中心的なテーマは、批判的思考能力の向上である。この因子は、倫理的思考力と組み合わせることで、インターネットが民主主義において絶対的ではなく相対的な基準に基づいて、多様な人々が多様な目的のためにオープンに利用されることを学生が評価していることを示した。第２因子は、メディアコンテンツをテクノロジーツールで適切に利用する項目から構成されていることから、Media Content and Tool Management skills と名付けられた。このファクターは、インターネット上のあらゆる情報を必要に応じて利用し、結びつける技術を上手に活用する能力を評価する。21-C DSF の重複しない構成要素はコラボレーションであった。第３因子は、理論モデルの 2 つの構成要素から、Technical and Communication skills と名づけられた。高度ではなく基本的な技術を使うことが、学生の視点からのほかのスキルとの関連上高く相関していると認識していることがわかった。

この尺度構成から学生の視点から、自律性、コラボレーション、ネットワークの 3 点がニューメディアリテラシーに欠かせないことがわかった。この 3 つの要素の中心は自律性と考察できる。これは NMLS-J には、「投稿しないように気をつける」などの保護的で消極的な項目が項目分析段階ですべて削除されたことからの示唆である。NMLS-J の項目はすべて、メディアによる主体的な活動を意図したものであった。学生は、新しいメディアリテラシーは、大量のメディア情報に積極的に関わり、自らの批判的・倫理的思考力に基づいて判断することで評価されるとしたのである。

21-C DSF の 12 の構成要素のうち、創造性、自己責任、生涯学習の 3 つが削除された。しかし、自己責任、生涯学習は、DL と NML で取り上げられておらず、サブスキルの項目検討ができなかったため削除された。この結果は、自己責任と生涯学習は能力ではなく、アプローチに分類されるのではないかという van Laar ら（2017）の指摘を支持するものである。一方、当初の NMLS-J では、創造スキルに関する質問項目数が最も多かったが、NMLS-J では削除された。

DL、NML、MIL もすべて創造性をそれぞれの枠組みの重要な次元の 1 つとみなしている。21 世紀型スキルのフレームワークやメディアリテラシーにおいても、創造性の要素は認知面や社会性などあらゆる側面から重要であることは、これまでの文献でも取り上げられている。

創造スキルに関する項目が削除されて件に関して、いくつかの理由が考えられる。現在の大学生は、生産者よりも消費者であり、また創造することよりも、情報の交換や共有を利用することに価値を感じているのかもしれない。最近の大学におけるメディアリテラシー教育は、学生を優れたメディアコンテンツのプロデューサーにすることに過度に注力し、学生がメディアの消費者でもあるという事実を無視している可能性があるとの指摘もある(Alagaran, 2012)。さらに、技術的に高度なメディアリテラシーにおける創造性は、紙と鉛筆による創造性よりも意味が広く、何をもって創造性とするのかが曖昧である（Banaji et al 2010）。今回の調査で削除された項目の中には、高度な技術力を必要とする記述や、既存のものに手を加えることに関する記述があった。一方、最新の研究では全世界で所得に関係なく、学生の技術運用能力が創造性能力よりも向上していることが報告されている（Livingstone et al.,2020）。技術はあらゆる方法に利便性をもたらすことができる一方、技術のみが社会のすべてを決定する極端な技術決定論に傾かない教育目標が必要であろう。

研究課題 2 に対して、2 つの既知集団を対象に授業の事前事後 *t* 検定を実施した。1 回目は 2020 年秋学期に 174 名、2 回目は 2021 年春学期に 241 名に NMLS-J を配布し、約 90％の回答率を得た。両クラスともに NMLS-J のスコアにおいて中程度の効果量を得ることができた。これは、両クラスともにグループで創作活動をさせる課題、授業外でもインターネットで調べ物をさせる課題をさせたことによるものかもしれない。しかし、学生間に差が生まれていたことは今後の課題といえる。

研究課題 3 に答えるため、 2 つめのパフォーマンスベースの評価を行った。3 人の評価者が、NMLS-J に基づく基準に従って、相互信頼性確認 (Cohen's k = .83– .86) を行ったあと、学生

の作品とレポートを評価した。学生の視点から開発したNMLS-Jは、自己申告式での確認だけでなく、教員や教育機関にとっても確認指針として活用できる可能性があるがわかった。

NMLSは、理論面で既存の尺度とは主に２つの点で異なる。まず、エンパワーメントの項目で構成されたことである。メディア利用が増加することにより、メディアに関しての危機管理も養われることは過去の研究からも報告されている。もう１つは、メディアコンテンツの利用が尺度に加えられたことである。これは、技術がネットワーク学習に重要であり、デジタル上に分散されたリソースをうまく操り利用していくことが必要であると判断しているのかもしれない。技術を利用した人やモノとのネットワークの重要性を理論化したデジタル時代の新しい学習理論、Connectivism (Siemens, 2005) にNMLS-Jは解釈できるかもしれない。

この研究は主に3点の意義と貢献がある。１点目は日本のデジタルネイティブがどのように新しいメディアを活用しているのか、21世紀型スキルとの関連性の中で教員が把握できることよう試みたことである。２点目はNMLSによって日本の学生自身が新しいメディアを最大限に利用するために必要なことを確認することができるだろう。３点目はこの研究の限界がさらなる研究の示唆を与えたことであるといえよう。とりわけ削除された項目と次元が現代の日本の大学生に限定されるのか、学業との関係、情報と知識の構築関係なども含め、さらなる調査が必要だ。最後に今回の研究はCOVID-19以前から計画したが、COVID-19による様々な制約の中で研究が遂行されたことを記しておきたい。また、この未曽有の経験を境に、学生のリテラシーが変化したことを想定し、NMLS-Jを改定していく必要があろう。

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1 INTRODUCTION

This chapter provides an introduction to the current study, discussing the background related to the study, problem statement, research purpose, and significance. Firstly, the background of youth who use new media is introduced, and relevant theories, concepts, and definitions are discussed. Secondly, the problem statement addresses important research gaps identified from the analysis of prior studies on media literacy scales. Finally, the purpose of the study is presented, outlining the potential theoretical and practical contributions of the research.

Background of the Study

The word "media" is a plural of "medium," which, beginning in the late 19th century, has connotated myriad vehicles for the communication of information (Guillory, 2010). With technological developments in the 21st century, media have rapidly evolved, giving rise to *new media*. Scholars and educators have chronicled this emergence, highlighting the differences between old media and new media (e.g., Gauntlett, 2007; Jenkins, 2006; Bezemer & Kress, 2015; Manovich, 2002; Merchant, 2007). In general, old media are analog or print, and new media are digital, multimodal, interactive, hypertextual, ubiquitous, virtual, networked, creative, personalized, collaborative, and simulated (e.g., Chen et al., 2011; Gauntless, 2007; Lin et al., 2013; Lister et al., 2009). These characteristics of new media have increasingly blurred boundaries, such as the boundaries between mass communication and interpersonal communication (Lüders, 2008), the

boundaries between consumer and producer (Chen et al., 2011), and the boundaries between formal and informal contexts (Meyers et al., 2013). Significantly, in recent years, new media have been even evolving with advanced digital technologies, including artificial intelligence or algorithm, which make it possible to imitate human-like behaviors (Davenport et al.,2020).

The features of new media also promote interconnectivity and globalization among countries. Scholars in various fields have studied the phenomenon of globalization as given by new media (e.g., Jin, 2021). In the 1960s, McLuhan already advocated a new community called the "global village" (McLuhan, 1962), based on the impact of media technology on society. The term global village is used to describe a phenomenon in which the entire world is connected on a global scale through media technology. A new community has developed on the Internet, and a similar phenomenon is occurring around the world.

Chen et al. (2002) investigated new media usage and influences among 178 countries. They found that internet users around the world use new media in a similar way, regardless of whether they live in a democratic or westernized country. Frequent internet users tend to use the Internet in social, instrumental, and recreational modalities. Societies in each country obtain information through their individualized networks, with resultant impact at the interpersonal, governmental, organizational, and global levels (Chen et al., 2002).

Similarly, in Japan, there are reports concerning globalization for internet users. Ikeda (2018) points out that Japanese people are changing their characteristics through interaction on social networking sites (SNS). Iwabuchi (2021) also argues that digitalization has facilitated cross-border communication and international cultural mixing

among the Japanese, which has also increased Japanese nationalism. Buckingham (2007) suggests that, globally and equally, new media present opportunities for self-expression online and inevitably penetrate young people's everyday lives everywhere in the world.

In the 21st century, with the rapid global proliferation of new media, adults around the world are likely to believe that young people who have grown up surrounded by new media are better technology users (Howe & Strauss, 2000; Oblinger & Oblinger, 2005; Prensky, 2001). Tapscott (1999) described those young people as "the Net generation." Prensky (2001) also introduced the notion of a generation gap, referring to "digital natives" as those who are born and have grown up in a world surrounded by new technologies, and "digital immigrants" as those who emigrate to the new technology world after they are born. These descriptions have been reflected in the creation of new terms, such as "Millennials" (Howe & Strauss, 2000), "Generation Y," "Generation Z," and "iGen" (Twenge, 2017). Although definitions of these new terms vary slightly (Eynon, 2020), the basic notion of all these terms is that people who have grown up surrounded by new media are expected to automatically and homogenously possess multiple new media knowledge and competencies (Bennett et al., 2008; Eynon, 2020).

However, in reality, many scholars from around the world do not support the notion of an intrinsically tech-savvy digital native generation. A number of empirical studies have shown that many young people do not have very high digital skills, and that considerable differences exist among students regarding technological skills, and that their use of technology is often limited to games and SNS (Bennett et al., 2008; Corrin et al., 2010; Cote & Milliner, 2017; Eshet-Alkalai & Chajut, 2010; Gobel & Kano, 2014; Hargittai, 2010; Helsper & Eynon, 2013; Kimura & Kondo, 2018; Margaryan et al., 2011;

Murray & Blyth, 2011; Rodríguez-Moreno et al., 2021; Selwyn, 2009; Tatsumi et al., 2012).

Nevertheless, compared to the early 21st century, when the concept of digital natives emerged, digital devices are far more ubiquitous and have become necessary for students, who are constantly exposed to complex interactions and negotiations on the Internet (Selwyn, 2009). Ng (2012) found that university students can learn new technologies with ease and meaningfully integrate within a short period of time. Additionally, Costa et al. (2012) pointed out that young people used new media differently inside and outside of school, and they felt that schools lacked effective use of digital equipment in class. Obari et al. (2022) surveyed university students in Japan and found that learning with smartphones and smart speakers increased their motivation to learn. Social conditions and the information-rich digital environment are related to students' new media habituation and usage in academic contexts (Giraldo-Luque et al., 2020; Rabah, 2015).

Many studies have also reported that new media influences recent young people's distinctive characteristics. For example, current university students are visual observers and learn by watching others complete tasks (Shorey et al., 2021). They also prefer learning that is practical and useful in the real world (Loveland, 2017; Seemiller & Grace, 2017; Shorey et al., 2021). Young people are open-minded and tend to accept differences (Katz et al., 2021). They also prefer thinking and learning independently prior to discussing topics in a group (Shorey et al., 2021). Recent digital natives know how to use social media platforms such as Twitter to make their own voices heard in society and are highly interested in making the world a better place (Seemiller & Grace, 2017). Research on current university students is an emerging topic, and while that research is fluid and

inconclusive, there are reports of differences between the characteristics of current university students as compared to previous generations (e.g., Seemiller & Grace, 2016; Shorey et al., 2021).

Kellner and Share (2005) state that educational settings need to consider how to provide appropriate media education and the use of media in the classroom in order to keep pace with a changing digital environment. According to Palfrey and Gasser (2011), educators should focus on understanding and sharing what students need to learn and improve, instead of labeling them by their generation, such as Millennials or Generation Z. Faculty needs to understand students' expectations of schools and classes and their characteristics new media have changed.

The development of new media has also been changing what society and industry demand of students and schools (e.g., Binkley et al., 2012). Diversification and new forms of communication, as well as globalization, have been facilitated by new media, and as society becomes more unpredictable and chaotic, traditional, well-organized educational content is no longer sufficient (Rychen, 2016). Concerns also arose that traditional written assessments solely focused on knowledge acquisition would not measure the ability to cope with the real-world challenges that emerge in the 21st century (Levy & Williams, 2004). As a result, various educational institutions advocated frameworks of the 21st century skills that are different from the 20th century (Dede, 2009). In particular, the ability to use new media is the key pillar in 21st century skills frameworks and is expressed in terms of digital literacy or competence (e.g., Kellner & Share, 2005; Leu & Kinzer, 2000).

The concept of literacy in the 21st century has been expanded by the growing importance and evolution of new media. Generally, the word literacy, defined in

dictionaries, refers to “the ability to read and write” (e.g., Oxford English Dictionary, n.d.; Pilgrim & Martinez, 2013). However, literacy is a social practice, not just a technical skill such as writing and reading the alphabet (Street, 1985). The Organization for Economic Cooperation and Development (OECD; 2021) states that “literacy in the 21st century is about construction and validating knowledge” (p. 5). Hobbs (2017a) emphasizes literacy as “the sharing of meaning through symbols” (p. 5). In the 21st century, literacy becomes more pluralistic and dynamic as new media become indispensable in every context of life.

The term literacy is used to indicate some degree of competence or ability, combed with a particular domain (McGarry, 1991). In response to the growing impact of the new media, literacy-related terms that combine words related to new media with the suffix literacy have increased rapidly (the United Nations Educational, Scientific and Cultural Organization [UNESCO], 2013). These include computer literacy, e-literacy, information and communication technology (ICT) literacy, internet literacy, network literacy, social media literacy, visual literacy, and many other terms (Bawden, 2001; Koltay, 2011). Researchers and educators have defined and utilized new literacy compound nouns in different contexts, focusing on the analysis, evaluation, and critical reflection of individual skills as they relate to the literacies required for new media.

Park et al. (2020) investigated 728 articles carefully selected from 3,424 written in English between 2000 and 2018 in order to identify research trends on various literacy-related terms. Park et al. (2020) found that media literacy was the most frequently used term, followed by digital literacy and information literacy. Digital literacy was the most studied in interdisciplinary fields, including science, media and information, and language education. Many other scholars also pointed out that these three general terms (i.e., media literacy, information literacy, and digital literacy) have gradually been used

interchangeably with no evident distinction between them and recently tend to combine into digital literacy (Bawden, 2008; Buckingham, 2006; Koltay, 2011).

Historically, however, the two most prevalent terms, information literacy, and media literacy, have evolved separately based on well-established concepts with unique backgrounds and purposes of each term (UNESCO, 2013). By contrasting views of these two literacies (i.e., information literacy and media literacy), there is even a movement to conceptualize one as a subcategory of the other (Lee & So, 2014).

The concept of information literacy was developed in library and information science education in the United States beginning in the 1970s (Whitworth, 2014). Zurkowski, who was president of the Information Industry Association, initially used the term information literacy in a report by the US National Commission on Libraries and Information Science in 1974, where the term encompassed a set of abilities to be required for academic work (Behrens, 1994). These abilities included not only utilizing tools to gain observable information but also manipulating information for efficient and effective problem-solving and decision-making (Behrens, 1994). Theoretically, information literacy has existed in positivist epistemology that emerged from the rejection of metaphysics (Kaptizke, 2005). Hence, information literacy education has, in general, emphasized recognizing authentic, reliable, and credible information, which requires cognitive higher order thinking skills (Fitzgerald, 1999). Literacy education in Japanese higher education has been highly influenced by these concepts of information literacy (Ichikawa et al., 2013; Nozue, 2014; Okabe, 2017).

The concept of media literacy, on the other hand, has a long history in the United Kingdom (UK), beginning in the 1930s, with a protectionist approach aimed at inoculating young people against the perceived dangerous effects of media (Leavis & Thompson,

1933; as cited in Burn, 2015). Subsequently, an empowerment approach became central to media literacy education, with the goal of developing "critical autonomy" stemming from Freire's pedagogy in order to liberate rather than oppress or protect students (Masterman, 1985). Furthermore, while paying attention to what students already know about media content, media literacy education aims to develop "critical literacy" (Kellner & Share, 2005), including analysis, evaluation, and critical reflection skills to enable democratic participation (Buckingham, 2003). Media literacy education has emphasized being aware of constructing or representing texts and the economic functions of media industries through critical viewing (Buckingham, 2003). Theoretically, media literacy emerged from the learning theory of constructing meaning (Hobbs & Jensen, 2009).

The concept of digital literacy, on the other hand, has not been as narrowly defined or clearly understood as those of information literacy and media literacy (Koltay, 2011). Since the advent of computer technologies in the 1980s, the concept of digital literacy has been broadly, complexly, and inconstantly described (Buckingham, 2006). Some scholars insist that digital literacy involves a set of functional skills relating to digital technologies (Gilster, 1997; Prensky, 2008; Hargittai, 2005). They consider digital literacy as in the field of ICT and computer science, with the objective of understanding digital sources, creating digital content, and making good use of digital tools in various digital formats. Other scholars suggest that digital literacy should include the use of technology in the context of social, political, and economic changes (e.g., Buckingham, 2003; Lankshear & Knobel, 2008). In this respect, there is some overlap between digital literacy and media literacy (e.g., Buckingham, 2006; Hobbs, 2010), as well as overlap between information literacy and digital literacy (e.g., Badke, 2009; Cordell, 2013).

Thus, media literacy, information literacy, and digital literacy each have different backgrounds and academic disciplinary focuses. Information literacy takes the library and information science as its starting point and focuses on substantiated factual data. Media literacy originates from the social sciences and humanities and focuses on critical and constructed views that include political and ideological aspects of data. Digital literacy encompasses a set of functional skills in digital technologies in a digital environment.

In Japan, due to translation variances, the term information literacy is often treated like the term digital literacy (Nemoto, 2017; Yamauchi, 2003) and the term digital literacy is often regarded as the term media literacy (Suzuki, 2008). In addition, the historical timeline of the formal introduction of media literacy into school education in Japan is much shorter than in the UK, and the focus of research and teaching by scholars and educators is different (Sakamoto & Yamawaki, 2022).

Whatever the background of each literacy in Japan and other counties around the world, in today's fast-paced new media evolutions, the concept of literacy needs to be considered holistically, going beyond the individual, compartmentalized notions of media literacy, information literacy, and digital literacy (Fu, 2022; Okabe, 2017; Gretter & Yadav, 2016; UNESCO, 2013). New media has made media information and media content more accessible, allowing for all kinds of connections on single platforms. Students are using new media in all kinds of ways. New media content is becoming increasingly difficult to distinguish between formal, informal, academic, professional, amateur, and in and out classrooms and all new media content cannot be excluded from education (e.g., Chen et al., 2011; Lüders, 2008; Meyers et al., 2013). Each new media platform in the 21st century knowledge-based society is synergistically influenced by a wide variety of new media content.

Importantly, it would be crucial to consider what education in new media literacy in the 21st century society should be. Many researchers and educators have noted that despite the global emphasis in educational institutions, it is unclear how digital media relates to 21st century skills (Gretter & Yadav, 2016; Lewin & McNicol, 2015; Tibaldo, 2021; van Laar et al., 2017; Voogt & Roblin, 2012). In today's knowledge-based society, where new media are available in all aspects of life and in a variety of subjects, there is a need for educational and students' perspectives that integrate the three concepts of literacy: media literacy, information literacy, and digital literacy in a concept of 21st century skills. Given this complex background, this present study combines these concepts and utilizes the term *new media literacy*, assuming a tentative working definition of this term as *the ability to accurately read facts and construct media meaning in new media environments in the 21st century*. It is assumed that new media literacy can be an essential skill and approach to education and society in the 21st century, a time of rapid technological development.

Statement of the Problem

In the 21st century, three major problems have emerged in literacy. First, while many 21st century skills frameworks include the three core literacy concepts (media literacy, information literacy, and digital literacy) as important dimensions, the relationship between these literacy concepts and 21st century skills should also be investigated.

Second, it is unclear how current university students perceive new media. They obviously, use new media as an entertainment tool, but also should make use of academic purposes outside of class. As digital natives, today's college students spend much of their time outside of class using new media to construct their own knowledge (Dingli & Seychell, 2015; Mihailidis, 2014).

Third, few scales or measures of new media exist in universities in Japan (Goto, 2021; Kodera, 2017) for two main reasons. First, Japanese education has traditionally tended to make a clear distinction between academic and non-academic (Mizukoshi, 2019), which may likely cause a failure to recognize the effectiveness and influence of new media in class. In other words, the traditional academic approach to literacy education has articulated its components primarily from the preparation of educators. Media literacy has focused on traditional mass media and protectionism, information literacy on library usage and the accuracy of the information, and digital literacy on the usage of computers for academic use. These have made it relatively easier to identify the problems students encounter.

The second reason for no new media literacy scale in higher education may be related to a transitional period in which formal schooling in media literacy began in 2020 in junior high schools. There is a gap in the literacy skills of students enrolled in universities (Fu, 2022).

The current study addresses these three issues; that is, the integration of three key literacies in the relationship with the 21st century skills, the students' perception toward new media, the construction of a scale to measure their use.

In developing the scale, it was decided to compare and apply new media literacy-oriented scales in use worldwide. However, many of these scales had their own limitations. Some scales made some elements of information literacy and media literacy sub-concepts of digital literacy (e.g., van Deursen et al., 2016). Others created scales by adding a digital component to existing media literacy concepts (e.g., Ashley et al., 2013). Others required specific cultural knowledge (e.g., Maksl et al., 2017), or focused only on academic (e.g., Clark & Catts, 2007) or entertainment aspects (e.g., Literat, 2014). In addition, many of

these are of limited scope most are for elementary or junior high school students (e.g., McDougall et al., 2018), or many of the scales did not make the question items public, making them difficult to reuse. More importantly, despite the essential 21st-century literacy, existing scales had not been developed in a manner that fully leveraged the 21st century skills frameworks. The researcher of this study carefully selected 15 scales from three databases: Google, ProQuest, and ScienceDirect, and created selection criteria (Appendix A), and selected three scales that met the criteria (Appendix B). The minimum requirement was that all questions in the scale be open to the public.

The three frameworks selected for the purpose of the current study were the New Media Literacy (NML) framework (Koc & Barut, 2016), the Digital Literacy (DL) framework (Eshet-Alkalai, 2012), and the Global Media and Information Literacy Assessment Framework (MIL) (UNESCO, 2013). The term framework here refers to a set of factors or dimensions of the scale.

The selection criteria included the requirement that the frameworks have been used globally and adapted locally. All of these three, the DL (Eshet-Alkalai, 2012), the NML (Koc & Barut, 2016), and the MIL (UNESCO, 2013), have been used and studied in several countries with adaptation to diverse cultural contexts (e.g., Becerra & Lau, 2020; Gutiérrez-Martín et al., 2022; Holma et al., 2014; Li et al., 2017; Livingstone et al., 2020; Tibaldo, 2022).

Another selection criterion was that the frameworks had been widely used as versatile assessment tools in a range of controlled comparative studies. Thus, their concepts and wordings are generally adaptable to a variety of settings and classes. For example, Burnham et al. (2022) used the NML framework to investigate the correlation between students' sharing of false information content and their new media literacy levels.

Zheng et al. (2017) applied the NML framework to research the relationship between new media literacy and English learners' self-efficacy. Porat et al. (2018) investigated the correlation between students' actual performance in a specific class and perceived skills using the DL framework. Ng (2012) also studied pre-and post-class differences regarding digital literacy by adopting the DL framework in order to investigate students' learnability. The MIL assessment framework (UNESCO, 2013) considers international standards and provides a guideline to generate an assessment appropriate to each country or context, such as school or community (e.g., Li et al., 2017; Tibaldo, 2022).

Selection criteria further included the fact that these three frameworks consider new media literacy necessary in updated and transferrable digital environments, integrating all three literacies: information literacy, media literacy, and digital literacy. The NML scale includes advanced digital functions, such as automation of operations and variability in media production. These functions require users to possess new skills and competencies different from the previous century. The NML also considered "prosuming" a term which simultaneously refers to both producing and consuming (Chen et al., 2011). The DL framework considers new media literacy to be a set of survival skills for digital environments, such as photo-visual competency (Eshet-Alkalai, 2012). The MIL combines elements of other literacies, such as television literacy, radio literacy, and news literacy, and divides these elements into three components: access, evaluation and creation, for use in a digital environment (UNESCO, 2013).

However, each of these three frameworks has a few limitations. First, the NML framework (Koc & Barut, 2016) does not acknowledge the dynamic relationships among comprising factors or dimensions. The NML framework consists of four factors, which lie along a simple linear continuum, from basic functional skills to higher-order critical

thinking skills. It means that variables in the basic functional skills subscales are only prerequisites for variables in the higher-order critical thinking skills subscales. Dimensions in new media literacy are assumed to be in complex and dynamic relationships interacting with each other (Buckingham, 2003) rather than in a linear, hierarchical order.

Another limitation is that UNESCO's MIL assessment framework requires each institution's efforts to implement the practical assessment. It consists of three-level components: basic (access, retrieval), intermediate (understanding, evaluation), and advanced (creation, utilization). Each level has four constituents with from 35 to 42 performance criteria. In total, there are 12 components with 113 performance criteria items. While this provides high adaptability and flexibility to a diverse variety of institutions, it takes time to develop the assessment for each occasion, due to the need to receive and analyze data about a large number of performance criteria (Holma et al., 2014). In addition, most of the survey's lengthy sentences may be challenging for Japanese undergraduate students to interpret English accurately.

Furthermore, the three conceptual frameworks (the DL, the NML, and the MIL), were developed based on what faculty and researchers consider to be the ideal skills needed in a digital environment, rather than on student perceptions or perspectives. The DL is a composite set of skills as survival skills, with an emphasis on developing proficiency in appropriately using digital tools. The NML is the current state of digital environments divided into difficulty levels. The MIL was developed in an attempt to encompass all of the goals and objectives that general literacy education should achieve in the 21st century (UNESCO, 2013). This means that these frameworks determine, in advance, the dimensions of student literacy, primarily from the perspective and observation of faculty and experts. The aspects that students find valuable or challenging are not

necessarily the same as those of teachers (Rambousek et al., 2016). As noted earlier, digital natives are often invisible to teachers, and students' use of new media mostly takes place outside the classroom.

Considering the research gaps and the limitations of the already existing media literacy frameworks discussed above, the current study will clarify the concept and underlying factors crucial to introducing a new media literacy framework in the context of Japanese higher education in the 21st century. An instrument called a New Media Literacy Scale for Japanese university students (NMLS-J) will be constructed and validated with Japanese university students.

This study uses the abbreviation "NMLS-J" with a "J" at the end of NMLS to distinguish it from the New Media Literacy Scale (NMLS) developed by Koc and Barut (2016) and to indicate that the NMLS-J was designed for Japanese university students.

Significance of the Study

This study is significant in three ways. First, it will develop the NMLS-J for current university students in the context of skills needed for the 21st century. In developing it, this study will be adapted and integrated into a conceptual, theoretical framework titled the 21st-Century Digital Skills Framework (21st-C DSF; van Laar et al., 2017). van Laar et al. (2017) noted that that digital literacy in the 21st century requires more than just digital or technological skills, and articulated these skills in relation to 21st century skills. The 21st-C DSF was developed by systematically reviewing 75 peer-reviewed digital literacy articles that dealt with 21st century skills. Their research identified 12 components: technical, information management, communication, collaboration, creativity, critical thinking, problem-solving, ethical awareness, cultural awareness, flexibility, self-direction, and lifelong learning. By investigating how the

NMLS-J relates to these 12 components, this study will propose the new media literacy framework inevitable for the 21st century.

Second, this study will identify the dimensions of new media literacy that are deemed valuable from the perceptions of digital native students born and raised in a 21st century digital environment. The results of this study, which include capturing the characteristics of digital natives, will clarify how the literacy needed by students differs from traditional media literacy and information literacy. The results will provide valuable insights for educators responsible for media literacy, information literacy, and digital literacy education.

Third, the results of this study will offer versatile suggestions for the use of new media in a wide variety of classes. New media is a potentially valuable digital technology in all classes, and it is assumed that students will use it more outside the classroom, whether or not the faculty mentions or incorporates its use in the formal curriculum. Thus, much remains unclear to educators regarding how students use technology. The NMLS-J will provide students, educators, and institutions with guidelines and useful suggestions on how to use the new media.

The dissertation will discuss and recommend a new direction for media literacy education and the use of new media for educators teaching current university students. It is hoped that this study will also open the door for future research on new media literacy assessment and new dimensions, by stimulating the refinement and development of new media use in a variety of classes in diverse cultural contexts. This study will also be beneficial to a wide range of stakeholders.

CHAPTER 2 LITERATURE REVIEW

This chapter reviews and discusses previous research to highlight key topics essential for this study. It begins with an overview of the new media and digital natives, followed by a discussion of traditional and fundamental ideas and conceptual frameworks of media literacy, information literacy, and digital literacy. Subsequently, this chapter identifies the crucial concepts of global 21st century skills, particularly the 21st-C DSF, which was adopted for this study as a theoretical framework. Finally, this chapter ends by analyzing the frameworks selected for use in this study, as well as their survey items, and discussing the research gaps.

New Media and Digital Natives

Changing Media Environment

The emergence of *new media* in the digital age has caused a significant paradigm shift in scholarship, pedagogy, and creative practice (e.g., Bezemer & Kress, 2015; Buckingham, 2019). New media has had an incomparably broader impact on society than the print media, and even photography in the 14th and 19th centuries, respectively (Manovich, 2002). New media, including text, photography, film, audio, spatial

organization, and all other media, are interrelated with each other and have a profound impact on effecting change.

In particular, the interactivity of new media has transformed the modality of media, and communication, as well as the value and nature of information and education. Whereas old media, such as television and newspapers, have been controlled and organized by professionals and authorities, in new media, every public member has the potential to impact society (Gauntlett, 2007; Tapscott, 2009). Jenkins (2006) calls this new media culture "convergence culture," highlighting the interdependence between old and new media rather than suggesting the complete elimination of old media. In the convergence culture, media participants freely come and go to explore, transmit, and utilize information. In new media, all participants share their opinions equally and ubiquitously in democratic societies (Jenkins, 2009). At the same time, the number of implicit commercial messages is increasing in new media, as participants' interests take the lead (Buckingham, 2019).

In the 21st century, the various influences brought about by the nature of new media have created new challenges for educators. Thus, educators and researchers advocate the need for a new type of literacy education that goes beyond traditional media literacy and information literacy (Buckingham, 2006; Jenkins, 2009; Gretter & Yadav, 2016). Education for students who use media on a daily basis is no longer limited to specific subjects and areas (Felini, 2008). The fact that many 21st century skills frameworks place media literacy, information literacy, and digital literacy as important skills indicates that these are key in our society. Higher education, in particular, feels no small amount of pressure and confusion regarding the changes in education required by

society and businesses (van Laar et al., 2017). There has also been an increase in research on how these new media have changed student characteristics.

Digital Natives and Their Characteristics

Scholars and educators have attempted to analyze and develop descriptive labels for students' technical abilities and characteristics in the new media environment. The two most commonly used labels are "digital natives" and "digital immigrants." According to Prensky (2001), digital natives are those who grew up in the presence of new media since birth, whereas digital immigrants started to use the new media later in life. Prensky (2001) insisted that these two generations are fundamentally different in media usage and preferences, suggesting that digital natives have an intuitive ability to deal with digital tools, and efficiently use the digital language necessary for computers, video games, and the Internet.

Many scholars and authors have also coined other label terms for digital natives, such as "Millennials" and "Generation Z," and identified their characteristics (e.g., Gauntlerr, 2007; Oblinger & Oblinger, 2005; Tapscott, 2008). Digital natives can be summarized as follows. First, they are independent before collaborative (Isaacs et al., 2020) and accept diversity (Katz et al., 2021). Second, digital natives are more adept at immediately expressing visual messages, including photos and videos than text messages (Cook & Macaulay, 2017; Seemiller & Grace, 2016; Shorey et al., 2021). Third, they are inquisitive, analytical, and self-reliant, so that they can multitask with partial attention (Katz et al., 2021). Furthermore, research shows that recent college students are active in volunteer work (Plochocki, 2019), make social contributions (Marcus et al., 2022), engage

in environmental and sustainability activities (Seibert, 2021) as well as in caring about human rights issues (DiMattio & Hudacek, 2020).

Scholars in Japan have reported some features of Japanese digital natives. Kimura (2012) classified Japanese students into four generations: the pager generation, the Keitai-mail generation, the broadband generation, and the smartphone generation. Members of the latest generation, now at the university level, confidently use several social media platforms, especially Twitter, to air concerns. Kimura (2012) speculated that the immediacy and anonymity of Twitter might be the reason for its popularity. Japanese digital natives are sensitive and concerned about the content of e-mail responses and the time they spend waiting for them.

Harada (2010) found that Japanese students prefer smartphones to personal computers, because traditionally, Japanese society is said to be structured in the format of village communities, so that people mutually help each other and maintain relationships. Thus, Japanese digital natives use smartphones to maintain and expand friendships, rather than to obtain information (Harada, 2010).

However, it is debatable whether the uniqueness of the Japanese has brought about these characteristics of Japanese digital natives. Some studies conducted elsewhere reported online characteristics similar to those of young Japanese people. For example, research in other countries revealed that young people preferred smartphones over desktop computers (Mascheroni & Cuman, 2014). Reyero et al. (2021) also found that the preference for anonymity, immediacy, and sensitivity is a global phenomenon. Young people around the world appear to share roughly the same characteristics.

Takahashi (2014) pointed out that more and more young Japanese people are connecting with non-Japanese citizens online. Emoticons, stickers, and other universally understood visual images or depictions promote transnational understanding as an affordance. Takahashi (2014) concluded that social media offers Western and non-Western communication styles that transcend time and space. Japanese young people are gradually assimilating a global self through online interactions with global others in a participatory culture.

Needs for Redefining Media Literacy

In the 21st century, the demand for media literacy has changed dramatically for two main reasons. First, new media has erased the boundaries between reader and writer, receiver and sender, and formal and informal. Second, while the nature of students has changed with the development of new media, teachers and adults are not entirely aware of how students inhabit digital environments.

White and Le Cornu (2011) propose the metaphor of visitor and resident as alternative continuum concepts to “digital natives” and “digital immigrants.” This typology is not generational but represents different ways of using and thinking about new media. New media “residents” live together on media platforms, routinely using and collaborating with new media applications and all tools their cohabitants use. New media residents see digital content as the same as the individual who creates the content. This is different from “visitors,” who use new media when they need it. One of the significant differences between residents and visitors is the concept of digital privacy. Visitors are less comfortable digitally revealing their identities than new media residents.

Palfrey and Gasser (2011) also take a different view on the distinction between digital natives and digital immigrants. Digital natives can be considered not as one generation, but as a "population." This population may possibly create a new global online culture in the 21st century, by even comparing and combining some different cultural perspectives. Palfrey and Gasser (2011) emphasize that part of new media literacy education aims to reduce the participation gap of those who produce such a new global culture.

Jenkins (2006) also pointed out the participation gap. The new media environment brought about by democracy is so open to everyone that there is a danger that some students are not able to participate for whatever reason. Jenkins (2006) notes that new media literacy education requires three pedagogical interventions. These are "the participation gap," meaning equal access to digital world experiences, "the transparency problem," meaning recognition of constructed media, and "the ethics challenge," meaning public online rules.

As digital immigrants and visitors, adults tend to believe that young people are digitally skilled and enjoy the new media environment. In fact, as provided in the previous chapter, many empirical studies have revealed that young people's skills in handling digital devices are rather limited and more diversified (e.g., Buckingham, 2006; Livingston, 2008; Selwyn, 2009). The critique is also related to the notion of technological determinism, which is the belief that technology autonomously changes society (Buckingham, 2019). Buckingham (2006) questions the tendency to short-circuit media literacy education and to seek only what is new.

The next section reviews the literature on literacy education from a historical perspective and discusses the theoretical frameworks that contribute to this study.

Literacy Education: Theoretical Frameworks

Media Literacy Education

Many scholars and educators, especially in the UK and Canada, where media literacy education is well developed, have proposed various historical divisions of media literacy and diverse theoretical perspectives and approaches (e.g., Buckingham, 2003; Hobbs, 2006; Masterman, 1997; Mizukoshi, 2019; Sakamoto, 2020; Yamauchi, 2003). The perspectives often overlap each other and often relate to the main theoretical frameworks of education (Penman & Turnbull, 2012). These perspectives can be divided into three major theoretical approaches: *protection*, *demystification*, and *participation*. Each of these approaches has appeared in overlapping ways throughout history without being completely replaced, and they are still included to some extent in various types of media literacy education (Buckingham, 2019).

Protection. An approach to media literacy education that has old origins historically is known as the protectionist approach, which became popular around the 1960s (Buckingham, 2003; Hobbs, 1998; Masterman, 1983). This approach became central to media literacy education at the time for two main background reasons. First, it was adopted as a countermeasure to the decline of highbrow media and high culture, which resulted from the popularization of television programs and the spread of lowbrow culture to ordinary households (Storey, 2021). The other reason was to avoid the media influence caused by the increasing familiarity of media content. Both background reasons were

premised on the negative effects of media content and the purpose of media literacy education was to protect students from the dangers or risks of such content.

A typical protectionist approach to reducing the negative effects of the media is to use inoculation theory (McGuire, 1961). Inoculation theory is used as a vaccine that prepares students to resist potent dangers or risks in the future by exposing them to similar or weaker versions of opposing arguments. For example, people are informed in advance of tactics that promote misinformation to make misinformation less persuasive (Braddock, 2019). Today, the inoculation approach is also widely adopted as an empowerment approach to help students develop critical thinking skills and become resilient, which empowers them to resist manipulation and misinformation (Blair, 2003).

The primary demand of many educators and adults for media literacy education is to protect students from the dangers of the media (Hobbs, 1998). Thus, the impetus for introducing media literacy education has generally been the need to educate students on how to confront the evils of the media. In fact, a number of studies have reported that a protectionist approach has led students to be more cautious with the media and has resulted in changes in behavior, such as smoking and alcohol influence (e.g., Austin & Johnson, 1997; Duran et al., 2008).

However, there is a backlash to an emphasis on a protectionist approach (Buckingham, 2003; Hobbs, 1998; Masterman, 1997). For one thing, this approach fails to accommodate diversity (Buckingham, 2003). The democratization movement has led to a greater appreciation of the value of different cultures. As a result, experiences and discussions about popular media have become more acceptable. An undemocratic behaviorist approach that warns against negativity and dangers or risks in advance from

the teacher's point of view may narrow students' perspectives. In addition, as students begin to use media on a daily basis, their areas of interest are broadening, and they are actively seeking to understand media themselves, more so than adults and teachers assume (Buckingham, 2007).

Demystification and Empowerment. Beginning around 1970, there was a widespread movement that the purpose of media literacy education should be to engender active critical analysis rather than subordination to the values and images of mass media (Penman & Turnbull, 2012). The ideological aspect and variety of media content have shifted educational attention to the fact that inoculation does not necessarily prevent danger (Buckingham, 1998).

In addition, as academic disciplines developed, culture and language came to be seen as factors that determine human behavior, rather than the result of human behavior (Leaning, 2019). In other words, the purpose of media literacy education has been to reveal the ideological assumptions behind the media and to demystify them for students (Penman & Turnbull, 2012). In doing so, students were empowered to analyze media content and encouraged to free themselves from media influence (Masterman, 1985).

In the academic discipline, semiotics has contributed to an understanding of ideology (Masterman, 1985). For example, the work of Barthes (1972) work in semiotics made it significant that the media are only representations of the world and how they reinforce ideology. Bathes (1972) states that the media represent not an unproblematic external reality, but a symbolic system that needs to be actively read and understood. Semiotics not only informed linguistic communication, but also contributed to the

understanding that all representations in everyday life have meaning and are not neutral (Hobbs, 2016).

The practical roots of demystification can be found in "critical pedagogy" (Kellner & Share, 2005; Penman & Turnbull, 2012). Critical pedagogy spread internationally from Freire's work, building a solid foundation and influencing subsequent media literacy education (Kincheloe & Steinburg, 1997). Freire described literacy as understanding and communication about the world and stated that change is achieved "with reflection and action directed at the structures to be transformed" (Freire, 1972, p. 126). In other words, Freire emphasized the importance of developing literacy and critical consciousness through dialogue between teachers and students, rather than through what he called a "banking system" of education that deposits knowledge in the hands of students. In learning theory, demystification marked a transition from behaviorism to constructionism. Education began to focus on individual experience and social negotiations (RobbGrieco, 2014).

Livingstone et al. (2005) suggest that this critical perspective has led to significant changes in media education and has been endorsed as an empowering activity for students. Media literacy education has moved from protectionism to empowerment. Masterman (1997) posited that this demystification approach lies in a critical analysis of the language, representations, and ideologies constructed in the media. On the other hand, however, there are also indications of a critical left-wing bias and consequent overemphasis on being critical. This leads to education on enjoying and participating in the media (Buckingham, 2003).

Participation and Empowerment. The participation approach aims to get students to know the media by having them actively participate in it. This approach has been central to media literacy education since 1990 and is underpinned by constructivist and social constructivist learning theories (Leaning, 2019). Whereas constructivism, which emerged from the work of Piaget (1964), focuses on the individual learner, social constructivism, which emerged from the work of Vygotsky (1978/2012), views learning as a collaborative process.

The interactive nature of new media adds to the notion that media production is a collaborative effort and transcends the notion that media is a one-person endeavor (Jenkins, 2009). This implies that the skills required for media participation, and by extension, the learning methods and theoretical frameworks offered have been changing. Media participation has encouraged media production or creativity, and a variety of media literacy education has been proposed to emphasize aspects of media empowerment (Burn, 2009; Livingstone, 2008).

Buckingham (20129) and Jenkins (2009) are scholars known for encouraging media participation and production. They offer a media literacy pedagogical perspective on new learning as media devices become newer and each student's cultural experiences become more diverse.

Buckingham (2003) uses Vygotsky's theory to explain how classroom students learn new "scientific" concepts in a way different from before, due to the use of media. Vygotsky (1978/2012) distinguishes between "spontaneous" concepts that students acquire through their own experience and metacognitive scientific concepts that are acquired only through education. Scientific concepts should not be simply taught in a non-contextual

setting but should be constructed through scaffolding. Spontaneous concepts become explicit through reflection. Importantly, the theory states that the two concepts (scientific and spontaneous) are interdependent and are gradually understood and conceptualized in a linear fashion (Vygotsky, 1978/2012). However, Buckingham (2003) reported that students were acquiring scientific concepts not linearly or gradually but dynamically and recursively, or dialectically. In addition, the learning process differed from student to student. Buckingham (2003) concludes that students' cultural preferences and experiences are becoming more diverse, so that what students need to learn is changing.

Jenkins (2009) proposes a number of new learning skills in the digital environment necessary for a participatory culture. They are "play, performance, simulation, appropriation, multitasking, distributed cognition, collective intelligence, judgment, transmedia navigation, networking, and negotiation" (Jenkins, 2009, p. xiv). In addition, Jenkins (2009) states "visualization" and "technical skills" are also necessary to develop (Jenkins, 2009, p. 30). These represent the skills are needed to share resources with others across disciplines, manage information across multiple media, identify meaning across different communities, and combine and disseminate information, which are all required for media participation and creativity. Furthermore, Jenkins (2009) adds that active participation also makes students aware of the risks present in the media and develop their ability to avoid those risks. Jenkins (2009) suggests that students become able to participate in the media by actively engaging in the process, with appropriate scaffolding wherever and whenever necessary.

Various teaching methods have been proposed for the participation approaches, whereby students learn by way of practice through group activities (Fernback, 2014;

Hobbs, 2017b). For example, Hobbs (2017b) uses a cyclical media literacy framework of "accessing, analyzing, creating, reflecting, and taking action" (p. 18), explaining what skills are acquired in the process of each in the framework. In a "reflecting" phase, for example, new discoveries are made by critically evaluating work from both inside and outside, and in a "taking action" phase, the need to check how the work changes as it reaches its audience and whether it achieves its goals is emphasized.

In the section above, the past literature on media literacy education was reviewed, and organized into three major approaches: protection, demystification, and participation. These approaches are based on practices in the UK, where media literacy has a long history, and in the US and Canada. The literature on Japanese media literacy education is reviewed at a later point. Table 2.1 provides an overview of the three approaches. Interestingly, each of the three approaches overlaps, and can still be useful and necessary, in particular, with digital evolution. Many scholars have stated that a dialectical approach incorporating a protectionist approach and empowerment approach is essential for the new media era (e.g., Buckingham, 2019; Hobbs, 2010; Potter, 2022).

Table 2.1

Summary of Three Media Literacy Perspectives

Approach	**Protection**	**Demystification**	**Participation**
Perspective	Inoculation / Protectionism	Critical pedagogy (Educational theory) Empowerment (Masterman, 1985) Empowerment (Buckingham, 2003)	
Learning Theory	Behaviorism	Constructivism Socio Constructivism	
Concepts	Media content can have a negative effect	Media content exists in power relations	Media content can be used, created, and shared by students

	Media literacy education can protect or inoculate students	Through media literacy education, students can analyze and be aware of the ideological premises behind media	Media literacy education can encourage students to do collaborative work
Critics	Each student has different views Students are not as vulnerable as teachers think (Buckingham, 2003)	Students are urged to analyze media content Students' subjective responses and pleasures are neglected (Buckingham, 2003)	Autonomy is crucial, which causes some invisibility (Livingstone, 2008)
Teaching approach	Teacher-centered	Learn by analysis	Inquiry-based learning Learn by creating

Information Literacy Education

The following section reviews the literature on information literacy education in comparison with media literacy. Information literacy has a shorter history than media literacy and has developed significantly differently (Carlsson & Ac, 2019; Limber et al., 2012; Secker, 2017). Importantly, the concept of information literacy education has been nonetheless similar to that of media literacy in a digital environment (Bawden, 2001; Secker, 2017).

Traditional Information Literacy. Originally, information literacy evolved from library use education as it focused on the ability to access and use scholarly, unquestionable, and reliable information (Kapitzke, 2005). The focus of information literacy is on reducing ignorance and uncertainty about information (Tuominen et al., 2005). Thus, it is customary in information literacy education to evaluate producers of information based on whether they are academic or non-academic (Tuominen et al., 2005).

Most learning theories of information literacy have been studied from a behaviorist or cognitivist perspective (Limberg et al., 2012; Lundh et al., 2013). Information literacy approaches focus on acquiring skills, such as specific techniques for

obtaining that information, retrieving information, and evaluating information (Lundh et al., 2013). It is the cognitive activity in an individual's brain that assembles a set of skills. Some have even suggested that information literacy education should be teacher-centered, in line with behaviorism (Johnson, 2008), based on the idea that information is external to the learner and can be found, possessed, and used by individual students (Foasberg, 2015).

Media literacy education, on the other hand, has developed from research on the sociological aspects of information from multiple perspectives on media production, distribution, access, and meaning. These sociological perspectives have differed from those targeting school education and libraries, which firmly propose improving information literacy from an educational perspective or instructional design perspective (Yamauchi, 2003). Media literacy focuses on the fact that behind information are commercial and political meanings and that information varies from sender to receiver (Hoechsmann & Poyntz, 2012). Thus, from a learning theory perspective, media literacy education is dominated by constructivism, which indicates a different focus from information literacy.

One significant difference in practical educational perspectives is the concept of critical thinking. Both information literacy and media literacy stress the importance of critical thinking. However, media literacy education emphasizes scrutinizing the construction of information from multiple perspectives and its multifaceted nature, whereas information literacy education advocates the importance of asserting oneself against academic authority and social hierarchy (Hoechsmann & Poyntz, 2012).

New Approaches to Information Literacy. The 21st century has brought new theoretical proposals for information literacy. The direction of enhancing information

literacy not only in a primarily academic context, but also in a social context, is on the rise. For example, Lloyd (2010) takes the widely used Bryan Street model of literacy and suggests the importance of sociocultural aspects of information literacy and the sociocultural theory perspective. Street (1985) advocates two literacy models: an "autonomous model" and an "ideological model." The autonomous model views literacy as an individual's cognitive abilities independent of social context. It is literacy positioned as a skill or ability that is normative, universal, and easily measurable. In contrast, the ideological model views literacy as sociocultural in practice, indicating that literacy is complex and multifaceted.

Limberg et al. (2012) also propose three theories of information literacy. They include a phenomenological perspective, a sociocultural perspective, and a Foucauldian discourse analysis. Phenomenology is grounded in a constructivist view of learning and the construction of meaning between student and teacher in educational activities. It proposes that education should focus on how to use information, not how to search for or select information. In other words, it is about understanding the diversity of information and experiencing how individual uses and learns from that information.

The sociocultural perspective, proposed by Limberg et al. (2012), considers information literacy from Vygotsky's perspective. According to Vygotsky, human development does not occur solely within the stimulus-response framework of behaviorism. Instead, it is mediated in the interaction between humans and their environment, using socially created tool systems (i.e., specific to human activities) and symbol systems (i.e., language, writing, number systems) in the course of human history and cultural development (Scribner & Cole, 1978). In other words, information is not

placed inside the individual, but is considered in connection with society, and furthermore, "the meaning of information and information is formed through interaction with artifacts in practice" (Limber et al., 2012, p. 106).

Limberg et al. (2012) also proposed a new theoretical perspective from Foucault's theory. According to Foucault's theory (Foucault, 1969/1982) (i.e., critical discourse analysis), a limited understanding of a particular topic that focuses on information from books or those who have access to that knowledge is not enough to understand its essence. It is necessary to critically analyze the power relations and influences of society as a whole. Limber et al. (2012) advocate that information literacy should consider the need to cultivate critical thinking from multiple perspectives, including consideration of the implicit social and cultural order. From the three theoretical perspectives of phenomenology, sociocultural perspectives, and Foucault's discourse analysis, Limber et al. (2012) argue against viewing information literacy skills as a narrow skillset, and insist on seeing them from social practice.

With the advent of the 21st century and the digitization of information, the learning theory of information literacy must undergo significant change. Through a review of the literature on information literacy, it is obvious that the trend in learning theory has become social constructivism in both media literacy and information literacy. The following section reviews the literature on digital literacy education in comparison to information literacy education and media literacy education.

Digital Literacy Education

Digital literacy has so many explanations and frameworks with the digital evolution. Basically, it refers to a set of functional skills related to the use of digital

technology (Lankshear & Knobel, 2008; Hague & Payton, 2011). Following Gilster (1997), who coined the concept of digital literacy to include the skill of acquiring ideas, many scholars have pointed out that the concept of digital literacy is not ideological (Bawden, 2008).

In the 21st century, digital literacy has rapidly evolved from a behaviorism perspective to cognitive and constructivist perspectives. It is often expressed in the form of a "conceptual framework" (Lankshear & Knobel, 2008). For example, Ng (2012) theorizes digital literacy through technical, cognitive, and social-emotional perspectives. The technical perspective refers to operational literacy. The cognitive perspective refers to the ability to analyze digital information critically, and the social-emotional perspective includes communicating from ethical, moral, and legal standpoints.

Similarly, Calvani et al. (2008) propose a framework for digital literacy that includes three components: technical skills, cognitive skills, and ethical knowledge. Technical skills represent the ability to explore new technological environments flexibly. Cognitive skills signify the ability to access, select, analyze, and critically evaluate data and information. Ethical knowledge refers to a sense of responsibility, including respect for the rights or obligations necessary for Internet communication.

van Deursen et al. (2014) and van Dijk and van Deursen (2014) proposed four skills for the digital literacy framework initially, and later added two more. The first four skills include operational skills, formal skills, information skills, and strategic skills. Two additional skills include communication skills, and content creation skills. Operational skills denote the ability to use a basic command of a browser; formal skills represent the ability to understand and use the formal characteristics of computers and the Internet;

information skills refer to the ability to search, select, process, and critically evaluate information; strategic skills represent the ability to make use of the Internet. Communication skills and content creation skills are positioned at a higher level.

The digital literacy framework has rapidly transformed learning theory as the Internet has become more prevalent in the 21st century (Aviram & Eshet-Alkalai,2006; Eshet-Alkalai, 2012). The framework expanded from behaviorism, in which students repeatedly learn the functional ability to use computers, to aspects of cognitivism, which emphasizes processing information, problem-solving, and reasoning, and further to constructivism, which centers on interpreting the entire online society through experience.

The section above reviewed the literature on three types of literacy: media literacy, information literacy, and digital literacy—primarily from a learning theory perspective. In the knowledge-based society of the 21st century, there is a worldwide movement toward the same axis of these three types of literacy education on the same new media platform. The next section reviews the situation in Japan through a literature review.

Media Literacy, Information Literacy, and Digital Literacy in Japan

Current Situation

Media literacy in Western countries centers on the ability to think critically through the media, while in Japan, it has developed into a different concept (Morimoto, 2021; Sugaya, 2000; Suzuki, 2008; Yamauchi, 2003). Critical thinking in media literacy in Japan is centered on proactive reading (Sakamoto, 2020a). This is because media literacy in Japan is strongly colored by the information literacy aspect of accessing and understanding correct information (Yamauchi, 2003).

Traditionally, two ministries in Japan's government have provided their respective media literacy-related frameworks (Suzuki, 2009). The first derives from a media literacy framework. It was developed in 2000 and is still in use today. It defines media literacy as follows (Ministry of Internal Affairs and Communications [MIC], 2021, para 2):

1. The ability to subjectively read and comprehend media content
2. The ability to access and use media
3. The ability to communicate through media, especially interactive communication

The other framework was developed by the Ministry of Education Science, Sports and Culture (MEXT) in 2008 under the term called "joho katsuyo noryoku" [the skills to utilize information] (MEXT, 2020, p. 18). This framework consists of three fundamental components:

1. Practical usage of information
2. Scientific understanding of information, and
3. Attitude toward an information society

While keeping these three components, the details have been revised several times, and the latest version was published in 2019 for curriculum revisions and new curriculum development (MEXT, 2020). The latest version was developed based on the new education guidelines officially stipulated by MEXT in 2019, which differs in the way that "the skills to utilize information" is particularly integrated into the whole national curriculum, primarily focusing on computer usage skills and computer programming (MEXT, 2020). The new education guidelines are implemented sequentially and completed in 2022.

These two national frameworks and their practical use reveal at least three unique aspects of the current media literacy education in Japan. First, Japanese media literacy is

defined by MIC, not MEXT. MIC is responsible for telecommunications and internet-related business, while MEXT develops national curriculums, with support from MIC, particularly regarding the collection and use of the data (e.g., young internet usage and penetration rate) (MEXT, 2020). These agency roles often cause some inconsistency and confusion, as in other countries (Wada, 2020). Especially in Japan, literacy education including media literacy, information literacy, and digital literacy, has historically branched off from *joho* [information] education, which has led to further confusion (Yamauchi, 2003).

For example, Tsuruta and Nakahashi (2019) investigated the latest 21 nationally approved *joho* [information] textbooks' definitions of media literacy and found that half of the textbooks created their own original definitions and mentioned only one or some constituents of the national media literacy frameworks. Notably, five textbooks did not mention the interactive features of media. Tsuruta and Nakahashi (2019) were concerned with the potential for the contradiction of skills students might learn in class.

Second, at the beginning of the 21st century, the MEXT coined the term "jyoho katsuyo noryoku" [the skills to utilize information] as a new course in the process of curriculum development. When this new term was introduced, some confusion and ambiguity arose. Some scholars suggested that this term and concept emphasize the importance of computer usage and programming and are not the same as the globally used terms: "information literacy" or "media literacy" (Suzuki, 2008; Mizukoshi, 2019; Yamauchi, 2003). Other scholars expressed that this term should be the same as the globally used concept of "information literacy," such as in the American Library Association (ALA) in the US and Society of College, National and University Library

(SCONUL) in the UK. These scholars also pointed out that the Japanese language, "the skills to utilize information" should have had a good opportunity to establish a relationship with library science (Kawanishi, 2017; Nozue, 2014; Oda, 2016).

Third, although both MIC's and MEXT's frameworks share some dimensions of information literacy and media literacy, including the ability to analyze information, communicate, and access and use media content, neither MIC nor MEXT explicitly states the term, "critical thinking" ability and "critical viewing" ability, which are crucial variables for media literacy (Sakamoto, 2020b).

Therefore, literacy education in Japan has a different tone than that in Western countries. In particular, media literacy in Japan has been formally introduced in the wake of avoiding the dangers posed by the infiltration of technology into children's lives (Suzuki, 2008). However, its origins, similar to Western countries, can be traced back to the audiovisual education that accompanied the advent of radio and television in the early 20th century (Kondo et al., 2015). Furthermore, looking at subsequent developments, it can be said that literacy education has developed from three large common theoretical perspectives—protection, demystification, and participation—and eventually from a mixture of media literacy, information literacy, and digital literacy perspectives. The next section reviews the literature on Japanese literacy education from these three perspectives.

Media Literacy Education in Japan from the Three Theoretical Approaches

Protection. In Japan, early media education began in the 1920s with educational radio programs and films, followed by NHK (the Japan Broadcasting Corporation) in the late 1940s (Yoshioka, 2015). After the 1960s, when television began to spread to

households, a movement addressing the need for education emerged (Nakahashi, 2014). The purpose of the education was to eliminate harmful media content and protect children by exposing them to good content.

During this period, the protective or inoculation model, which was mentioned above, was introduced in Western countries. This model views children as sheets of black paper, on which the media can draw images (Buckingham, 2003). Viewers and cultural values were protected from being contaminated by content that reportedly had a bad influence, and the goal was to develop an aesthetic appreciation for good media as well as the ability to see content differentially (Buckingham, 2003).

Demystification and Empowerment. The second perspective on fostering media literacy was developed primarily in the fields of civic movements that focused on critical analysis of media content in response to the proliferation of television content deemed harmful television content to youths in the 1990s (Mizukoshi, 2019; Nakahashi, 2014; Suzuki, 2008). During this period, the debate over media literacy education versus media regulation was sparked mainly by the violent characters in television drams, which was believed to have a violent influence on youths. This also led to discussions on regulating media or the V-chip introduction. However, the strong public criticism resulted in no regulations being passed nor V-chip being introduced. This stage identifies well with Freire's critical literacy (Sakamoto, 2019; Suzuki, 2008). Citing Paulo Freire, Kincheloe (2008) described that critical literacy is raised from critical consciousness about social and political contradictions under no oppression. It empowers students to act as responsible citizens with social consciousness (Masterman, 1985). The pedagogical shift from the

traditional authority system in the 1960s to research-based education in the 1990s was in line with the shift from behaviorism to cognitivism (Yamauchi, 2003).

Participation and Empowerment. In Japan, as in Western countries, perspectives and approaches of media literacy education have transferred from protectionist to constructivist perspectives. In addition, an increasing number of pedagogical focuses have been on developing students' creative thinking. Creative activities are expected to improve students' essential skills such as collaboration, critical thinking, and problem-solving. Improving literacy through participatory teaching may be more suited to the Japanese than ideological critical analysis.

For example, Kodama (2001) investigated the students' analyses and exchange of opinions regarding the Nazis in Germany, and reported that students were not as actively involved as the teacher expected. Yanagida (2014) also examined the improvement of students' analytical and critical thinking skills through reading ideological newspapers and writing their opinions individually. In his study, the students were aware of constructed media stories, but did not provide many of their analytical opinions. Yanagida (2014) concluded that the students were not good at discussing and analyzing ideological standpoints.

On the other hand, researchers and educators have been increasingly interested in creative activities with more beneficial outcomes. For example, Oda (2020) reported that by having students work on documentary production, they became more proactive and engaged in the class. Similar outcomes can be seen in a radio program production activity (Goto et al., 2019).

Tezuka et al. (2021) reviewed peer-review articles related to media literacy research conducted in Japan from 1995 to 2018. The researchers found that out of 381 studies, 104 were related to creativity, 60 pertained to critical thinking, and 54 were about communication.

Tsuchiya (2021) also reviewed research articles about media literacy practice in undergraduate classes from 1990 to 2016, and found that an increasing number of articles were related to production activities in class. Digital environments have made it easier to integrate creative activities into classrooms, while expecting to enhance students' motivation and critical thinking skills (Burn, 2009; Hobbs, 2017a).

Digital Literacy and Information Literacy Education in Japan

When the 21st century was just around the corner, formal introductions regarding the ability to use information and digital technology were made in junior high and high school education (Horita & Sato, 2019). In the course "gijyutsu katei" [technology and home economics] education in junior high school, and the course "jyoho kyoiku" [information education] in high school, the concept of information education was explicitly stated (Horita & Sato, 2019).

In the 1990s, computer equipment was systematically introduced into schools, where developing the technical skills required using information devices. Information moral education has been emphasized in classes in elementary, junior high, and high schools since 2006 to cultivate students' information and digital literacy (MEXT, 2019). Compared to Canada or some European countries where media literacy education was already well-developed as part of English language education, it is Japan's computer industry that added impetus to developing media literacy, including skills to use a

computer effectively. Thus, it is assumed that computers were introduced to schools first, and then followed information literacy education on media (Suzuki, 2008). Digital literacy education has been further developing since 2020, with the rapid advancement of technology (MEXT, 2019). In high schools, programming languages is featured in a compulsory *information* class, which is to be introduced in 2022 (Kanemune, 2019).

However, as Jung and Bajracharya (2016) pointed out, although higher education institutions in East Asia aim to increase students' technology competencies, the focus is apt to improve mainly technology competencies, such as operating digital devices or developing computer programming, which does not directly result in developing higher order skills, such as critical thinking.

Issues in Literacy Education in Japan

It is clear that attempts have been made to shift Japanese media education from a protectionist approach to a participation approach. However, previous literature from Japan reveals three crucial shortcomings.

The first shortcoming concerns the lack of integration of information literacy, media literacy, and digital literacy, even though all three are now required on the same platform of new media. Literacy education in universities is in a state of exploration during a transitional period when literacy education in elementary, junior high, and high schools has formally begun. Furthermore, while the Japan Association of National University Libraries (JANUL) collaboratively works with Association of College and Research Libraries (ACRL) and SCONUL, information literacy in Japanese higher education is not fully integrated into media literacy and digital literacy education (Nemoto, 2018).

Second, each study used a simple ad-hoc measurement tool. Most media literacy studies conducted in Japan did not necessarily present a clear media literacy theory or conceptualization as a basis for the measurement of media literacy (Goto, 2021; Kodera, 2017). Furthermore, media literacy is a necessary interdisciplinary skill in the digital environment, but students normally use it in environments outside the classroom, and educators have yet to understand its actual use (Sakamoto, 2020).

The third shortcoming is a lack of global perspectives. Morimoto (2021) and Nakamura (2008) suggest that Japanese media literacy studies tend to be local, and thus, suffer from a lack of global views in the digital era. In fact, in the 21st century, the multidisciplinary focus has been on the global standard under the 21st century skills frameworks. The role and importance of media literacy in contributing to global citizenship and digital citizenship are globally being discussed (UNESCO, 2022). Sakamoto (2020b) is concerned that digital citizenship or global citizenship education has not yet penetrated Japanese school education and that information moral education using a protectionist approach is currently used instead of these.

The purpose of this study is to develop a new scale that focuses on Japanese university students' perceptions of new media, considering the current literacy situation in Japan. The following section reviews the literature on media literacy, information literacy, and digital literacy scales.

Measurements

Scale development is essential for research in education, both to assess the effectiveness of education and to develop theories of education (Hobbs, 2017b). However, few studies directly assess new media literacy skills (Lopes et al., 2018; Kodera, 2017; Goto, 2021). In addition, a variety of approaches have been used to develop scales, and no standardized approach exists (Hobbs, 2017; Livingstone et al., 2012). Most are adapted to different research goals and situations.

In developing the NMLS-J for this study, the researcher first analyzes the literature for measures of media literacy, information literacy, and digital literacy, and next extensively examines three selected scales. The following section is described the different aspects of each media literacy, information literacy, and digital literacy, in terms of measurement.

Media Literacy Scales

Media literacy scales come from various disciplinary perspectives and academic fields, including media studies, library and information sciences, cultural studies, the visual arts, and health science (Hobbs, 2017b). Since the late 20th century, more and more scholars and educators have been concerned about how media impacts students' performance and what improvements can be realized through media literacy education (Hobbs, 2017b). As a result, various measurements have been developed or adjusted, catering to the needs of each purpose and situation.

Broadly, the measurement of media literacy is influenced by two particularly large disciplines—the humanities and the social sciences (Hobbs, 2017b). The humanities deal

with subjective aspects using analytical and critical approaches, while the social sciences are scientific, evidence-based, and objective (Tsatsou, 2018).

Most measures from a social science perspective focus on one specific aspect and its relationship with another. Protectionism and inoculation theory, which can be easier to measure objectively, have been central (Singer & Singer, 1998). Questionnaires target specific issues or specific messages or content, such as critical thinking about news media (e.g., Ashley et al., 2013; Tully and Vraga, 2018), media comprehension regarding health (e.g., Levin-Zamir et al., 2011; Pinkelton et al., 2007; Primack et al., 2009), and the relationship between mass media messages and smoking (Primack at al., 2006). These measures are often criticized for lacking a perspective or theoretical framework for society and culture as a whole (Bergsma & Carney, 2008).

On the other hand, measures from the humanities emphasize media analysis and interpretation from meaning, interpretation, politics, and economics (Hobbs, 2017). For example, Hobbs (2006) lists three main concepts as a framework: author and audience, message and meaning, and representation and reality. Buckingham (2007) also presents a theory of critical reflection based on four concepts: language, production, audience, and representation. These scales may incorporate the perspective of the theoretical framework of media literacy, in which media messages are constructed and creative, incorporating perspectives. Performance-based evaluations, or self-assessment measures, are well suited to assessing this concept (Hobbs, 2017; Ptaszek, 2019).

Performance-Based Test. Performance-based tests measure practical, realistic literacy based on real-world assignments that students perform. Literacy is assessed by assigning tasks that require students to analyze or create media content that are similar to

those they use on a daily basis (Hobbs, 2017). Evaluating practice also helps researchers test theories and frameworks (Palm, 2008). In addition, it allows for assessing the relationship between media literacy and other variables (Pereira et al., 2018). However, it requires manual scoring, which makes scoring time-consuming. In determining the scoring by a group of two or more experts, the variability of responses needs to be examined. Experts need to develop codebooks and pay careful attention to language and interpretation when making judgments (Arke & Primack, 2009; Hobbs & Frost, 2003).

Self-Evaluation Measurements. One self-assessment measure of media literacy is the use of a Likert scale to assess it. While it has the advantage of simplicity and ease of assessment with less burden on both students and evaluators, limitations have been reported (Hobbs, 2017b). An example is the gap between self-assessment and actual performance in media literacy measurement (Porat et al., 2018). Another limitation may be subjectivity. Students may not be truthful or may inaccurately estimate themselves (Tillema, 2010).

Intervention Measurements. Many media literacy scales have been developed to measure the educational effects of media literacy education interventions (Hobbs, 2017b; Kodera, 2017). Jeong et al. (2013) conducted a meta-analysis of 51 selected studies published between 1969 and 2009. The researchers reported a sample-weighted mean effect size of 0.37 ($p<.001$) for media literacy education and thus concluded that media literacy interventions generally have positive effects.

However, not all studies have reported positive results. Some studies reported no or limited effects (Banerjee & Kubey, 2012; Duran et al., 2008; Martens, 2013), whereas others found unintentional results (e.g., Byrne et al., 2009). Each study used different

measurement tools for different focuses under different educational programs, which limits the ability to compare or draw conclusions. Scholars and educators have noted various challenges in assessing media literacy education (e.g., Banerjee & Kubey, 2012; Bergsma & Carney, 2008; Livingstone & Thumin, 2003; Martens, 2013). For example, Bergsma and Carney (2008) reviewed 28 selected health-promoting media literacy intervention studies conducted in the US from 1990 to 2006. They found that some intervention programs that produced non-significant or even negative effects did not have profound theoretical or conceptual frameworks for developing the measurements. Bergsma and Carney (2008) suggest that each study should precisely articulate a framework, specifically, the pedagogical approach. Greene et al. (2015) also note the importance of applying a theoretical framework for scale development.

There are two important implications from the literature on media literacy measures. First, western media literacy scales and frameworks used in universities are distinct from university academia. The main purpose is to criticize the media themselves and evaluate the extent to which they affect health and thinking. Further, many of the scales that can be identified in the literature were developed for old mass media, such as TV commercials and news. In the 21st century, as media becomes new media, the scale needs to be considered broader (Hobbs, 2017b).

Information Literacy Scale

The measure of information literacy has undergone a major change in the 21st century. Whereas traditional information literacy demands academic accuracy, multifaceted perspectives have become central to the framework of digitization (Sparks et al., 2016). ACRL's information literacy standards framework in the US, and SCONUL in

the UK used to utilize a traditional linear framework, such as “locate, evaluate, and use effectively” (ACRL, 2000, p.1). Both SCOUNUL and ACRL now use more dynamic frameworks, which is similar to media literacy’s constructive perspectives (see Appendix C).

Digital Literacy Scale

Measures and frameworks of digital literacy have broadly come to include aspects of information literacy broadly. Digital literacy now includes not only computer functional skills, but also knowledge associated with the use of digital tools and content on digital platforms in order to gain and share information with others (Erstad, 2010; Helsper & Reisdorf, 2016; van Deursen & van Dijk, 2014).

Table 2.2 represents a basic summary of the relationships among the three literacies so far in the literature review.

Table 2.2

A Basic Summary of the Three Types of Literacy

	Information literacy	**Media literacy**	**Digital literacy**
Learning theory	Cognitivism	Constructivism	Behaviorism
Academic discipline	Library and Information science	Humanity/Social science	Computer science
Focus materials	Books / Print	Visual / Mass media	Digital device
Measurement	Academic accuracy/Positivism	Subjective views/ Specific problems	Usage of technology

As in table 2.2, each broadly developed extensively from its theory, academic disciplines, materials, and measurement methods. However, when these media are integrated into the same platform of new media, it becomes necessary to develop class

management based on a synergistic integration of formal and informal, and the inside and outside of the class and school. Ultimately, 21st century skills would be a key requirement in the new media society. The next section reviews the literature on key 21st century skills perspectives.

The 21st Century Skills Perspectives

With technological evolution, various sectors of education, business, and governments have been increasingly paying attention to 21st century skills and have thus introduced a broad range of frameworks (Joynes et al., 2019; Voogt & Robin, 2010). For example, globally recognized frameworks include the Partnership for 21st-Century Skills (P21; the American Association of Colleges of Teacher Education [AACTE] & P21, 2010), Assessment and Teaching of 21st-Century Skills (ATC21S; Binkley et al., 2012), and the 21st Century Skills and Competences for New Millennium Learners (NML) in OECD Countries (Anaiadou & Claro, 2009). Although there is no single approach to the definition of 21st century skills, all frameworks include or emphasize the significance of digital literacy and information literacy (Joynes et al., 2019; Voogt & Robin, 2010).

The following three frameworks have been particularly recognized in Japan and have influenced the Japanese 21st century skills framework development (Kimura & Tasuno, 2017).

21st Century Skills Framework

The Partnership for 21st Century Skills (P21). P21 is a globally recognized model, developed in the US by a joint government-corporate organization in 2002. The

P21 framework is shaped around the core subjects, such as language, arts, and economics, and the 21st century themes, such as global awareness and health literacy. These core subjects and the 21st-century themes are enclosed by three skills, (1) life and career skills, such as flexibility and adaptability, initiative and self-direction, and social and cross-cultural skills, (2) information, media and technology skills, and (3) learning and innovation skills, such as critical thinking and problem-solving, communication, collaboration, and creativity (Joynes et al., 2019, p. 12). This framework has served as a baseline for various subsidiary publications and conceptualizations (Dede, 2009).

Assessment and Teaching of 21st-Century Skills (ATC21S). Another well-known framework that comprises 21st-century skills is the international research project entitled ATC21S, developed by scholars from Australia, Finland, Singapore, the US, Costa Rica, the Netherlands, and Russia (Binkley et al., 2012). The ATC 21S lists ten skills categorized into four areas: (1) ways of thinking: creative and innovation, critical thinking, problem-solving, and decision-making; learning to learn and metacognition, (2) ways of working: communication and collaboration, (3) tools for working: information literacy and ICT literacy, and (4) living in the world: citizenship, life and career skills, personal and social responsibility (Binkle et al., 2010, p. 15).

21st-Century Skills and Competences for New Millennium Learners. OECD proposed 21st-century skills and competencies for new millennium learners, with the Definition and Selection of Competencies (DeSeCo). DeSeCo was designed to compare international assessments such as the Programme for International Student Assessment (PISA) (Rychen & Salganik, 2003). The DeSeCo project consists of three categories: (1) use tools interactively: language, symbols, text, knowledge, information, and technology,

(2) interact in heterogeneous groups, and (3) act autonomously (Rychen & Salganik, 2003, p.12). Referring to these global frameworks, Japan also developed its 21st-century skills framework (Shirai, 2020).

Japanese 21st Century Skills. Japan started its discussion on the implementation and practices of 21st century skills in 2013 in the context of the Japanese education system's current core concept, known as Zest for Life (Kimura & Tatsuno, 2017). Zest for Life, which initially appeared in 1998, is based on principles of the traditional holistic approach the "Chi-Toku-Tai": academic prowess, moral, physical, and mental health (Shirai, 2020, p.131), and it is continuously used for new curriculum developments (MEXT, 2021). Japan's 21st century skills framework has been revised since 2017, and was integrated into the revised official curriculum guideline in 2019 for elementary, junior high, and high schools (Horita & Sato, 2019; Shirai, 2020). This revised framework consists of three components, (1) knowledge and basic skills, (2) thinking skills, and (3) attitude and humanity (Shirai, 2020, p. 22).

At university levels in Japan, the Central Council for Education, an advisory body for MEXT proposed "gakushi ryoku" [graduate attributes] to enhance undergraduate education programs (MEXT, 2008). These refer to abilities that university graduates are expected to develop throughout undergraduate education. These abilities consist of four areas: (1) knowledge understanding (culture, society, and nature), (2) general skills (communication, quantitative skills, information literacy, logical thinking, and problem-solving), (3) attitude and intentionality (self-control, ethical behavior, citizenship, collaboration, and lifelong learning), and (4) comprehensive learning experience and

creative thinking ability. These features can commonly be found in 21st-century skills. The use of ICT as a fundamental tool to support these activities is essential (MEXT, 2021).

Comparison Between the 21st Century Skills Frameworks

Several scholars and researchers have extensively compared several 21st century skills frameworks. They highlighted similarities and differences and noted how they relate to digital literacy (e.g., Kimura & Tatsuno, 2017; Scott, 2015; Voogt & Roblin, 2012). Scott (2015) compared several well-known 21st century skills frameworks and suggested that while 21st century skills such as collaboration, communication, informal learning, productivity, and content creation are common, no single prescriptive approach can define 21st century skills. Pellegrino and Hilton (2012) also noted that the skills included in 21st century skills are basically not new, but the only new one is digital information literacy. Voogt and Roblin (2012) reviewed well-known 21st century skills frameworks and found that all the 21st century skills include, to a greater or lesser extent, digital importance, but are not uniform in their importance.

The 21st-Century Digital Skills Framework

Digital literacy is inevitable in the 21st century, but the relationship between 21st century skills and digital literacy needs to be clarified. van Laar et al. (2017) systematically reviewed selected 75 academic peer-reviewed research articles on digital literacy with 21st-century skills published from 2000 to 2016 and identified 12 digital skills of the 21st century.

As the theoretical model of this study, the 21st-Century Digital Skills Framework (21st-C DSF; van Laar et al., 2017) was adopted for three reasons. First, the 21st-C DSF was the first attempt to identify digital literacy in relation to 21st century skills. van Laar et al. (2017) constructed the framework based on reviewing published literature related to 21st century skills and digital skills. Second, the 21st-C DSF covers all global 21st century skills, targeting higher education and workplace. Third, media literacy, digital literacy, and information literacy are more or less related to the components of the 21st-C DSF, since these three types of literacy share common concepts on digital platforms.

van Laar et al. (2017) provided explanations for each of the skills, which can be summarized below.

Seven Core Skills

The seven core skills refer to abilities to use ICT to accomplish tasks required in 21st-century environments: technical, information management, communication, collaboration, creativity, critical thinking, and problem-solving skills.

Technical Skills. According to van Laar et al. (2017), technical skills are related to one's ability to utilize gadgets and applications to complete simple daily tasks and navigate in the online environment. Technical skills consist of basic skillsets to operate applications, including usage of visual graphical form in photo-visual literacy in the DL, and to stay oriented while navigating through the online environment in branching literacy skills in the DL. It also seems to be similar to functional prosumption skills in the NML, which refer to one's ability to operate media technology to create media messages.

Information Management Skills. As indicated, this skill set is the most frequently mentioned in 21st century literature (van Laar et al., 2017). These skills refer to

basic abilities to do by oneself, not with others in online environments. van Laar et al. (2017) consider this skills category to include skills to search, select, and organize information to make a decision on the most appropriate sources of information for a given task. This category shows some similarities with the MIL dimension, organization of information and media content, whose skills include synthesizing and organizing information and media content gathered. NML's real-time digital skills also need a similar ability in terms of selecting, processing, and presenting information simultaneously.

Communication Skills. van Laar et al. (2017) view communication skills as one's ability to share and express ideas effectively to others in cyberspace, emphasizing transmitting information to multiple audiences online, which is a crucial skill for 21st-century workers. This seems similar to the MIL dimension, communication of information through appropriate media and ICTs. This category can be partly related to the NML's Functional and critical prosumption skills. Further, it refers to basic skills to prosume media content in various new media spaces. The NML also regards communication as one of the important dimensions, in addition to socio-emotional digital skills. The MIL and the NML regard communication as prerequisite skills for collaboration, and include rules or language, whereas Eshet-Alkalai emphasizes emotional aspects of communication.

Collaboration Skills. van Laar et al. (2017) consider collaboration skills as abilities to develop a social network and work with others online in order to attain a common goal, by exchanging information, negotiating agreements, and making decisions with mutual respect for each other. This skillset is required for functional prosumption and critical prosumption skills in the NML, because prosuming media literacy entails both producing and consuming with other media users. Socio-emotional digital skills in the DL

also refer to the ability to collaborate in cyberspace. However, while collaboration and communication are both valued in all well-known 21st century skills frameworks (Voogt & Roblin, 2012), van Laar et al. (2017) found that previous studies hardly included collaboration skills into their assessments, because soft skills such as collaboration are difficult to measure and observe.

Creativity Skills. van Laar et al. (2017) define creativity skills as abilities to generate new ideas or organize familiar ideas in a new way and transmit or translate these novel ideas into a product, service, or process viewed as new in a specific domain. This category is similar to reproduction literacy skills in the DL. Eshet-Alkalai (2012) emphasizes combining preexisting pieces to create new work, rather than producing entirely new products. Functional presumption in the NML framework also refers to a number of technical skills in order to use various technology tools for creating digital work, or duplicating, rearranging, or combining text, audio, and video pieces into digital products.

Critical Thinking Skills. van Laar et al. (2017) define this unified skill set as abilities to do the discernment to make informed judgments regarding found information, including reflective reasoning and evaluation of evidence. van Laar et al., (2017) noted that this skill is the most frequently mentioned as an operational component in 21st century literature. The NML framework also puts a high priority on critical aspects. Koc and Barut (2016), who developed questionnaire items based on the NML framework, mentioned that almost all questionnaire items were initially related to critical and prosuming dimensions due to the nature of digital literacy, where critical judgment is inevitable. Assessment of information and media content, and media and information providers in the MIL and

information digital skills in the DL are similar to this category in terms of assessing information by sifting through bias and rhetoric.

Problem-Solving Skills. van Laar et al. (2017) regard this category as abilities to recognize and understand problems, then apply ICT skills in order to find solutions. Whereas this skill set is rarely explicitly mentioned in many digital literacy frameworks, van Laar et al. (2017) found that literature on 21st century skills saw problem-solving skills as the third most frequently mentioned, after critical thinking and information management. These problem-solving skills should be necessary when unexpected problems arise. Thus, similar skills might be the search and location of information and media content in the MIL, reproduction literacy skills in the DL, and functional consumption skills in the DL. However, the three frameworks do not provide an independent skillset for problem-solving skills.

Five Contextual Skills

The five contextual skills refer to abilities to make good use of the seven core skills mentioned above: ethical awareness, cultural awareness, flexibility, self-direction, and lifelong learning.

Ethical Awareness Skills. van Laar et al. (2017) define this set of skills as abilities to behave in a socially responsible way, including awareness of ethical and legal implications of exercising ICT skills, then doing so in a manner avoiding negative social impact. In the Reproduction digital skills in the DL, Eshet-Alkalai (2012) mentions the growing attention to plagiarism issues when producing and editing existing texts, visuals, and audio pieces. Although Chen et al. (2011) do not include ethical aspects into their framework, Koc and Barut (2016) created questionnaire items based on the NML

framework, related ethical and legal implications in critical consumption and critical prosumption. For example, in critical consumption, they made such an item as “Evaluate media in terms of legal and ethical rules (copyright, human rights, etc.)” (p. 839). The MIL framework encompasses ethical awareness skills in four dimensions: access to information, media content and media and information providers, creation of knowledge and creative expression, communication of information, media content and knowledge in an ethical and effective manner through the media and ICTs, and Participating in societal-public activities as an active citizen.

Cultural Awareness Skills. van Laar et al. (2017) view this category as skills to show cross-cultural understanding when collaborating and communicating with others when using ICT. Eshet-Alkalai (2012) considers sociological issues in socio-emotional skills. Since the MIL framework is evolved based on cultural and linguistic diversity, the following three dimensions include cultural awareness aspects: search and location of information and media content, creation of knowledge and creative expression, and Participating in societal-public activities as an active citizen. Citing Jenkins’ term, convergence culture or participatory culture, Chen et al. (2011) value sociocultural aspects, and thus their NML framework considers skills necessary for consuming and prosuming media content containing social-cultural meanings.

Flexibility Skills. van Laar et al. (2017) regard this category as abilities to adapt thinking and approaches in the face of ever-changing ICT environments. Although this set of skills is hardly included in digital literacy frameworks, these are inevitable for 21st-century skills for successful workers in the digital age. There is no skills category explicitly stating these flexibility skills in all the three frameworks for this study: the

NML, the DL, and the MIL. However, from a technological perspective, some subskills in each framework seem related to this category. Functional consumption in the NML requires the skill to flexibly access and understand media content. Real-time thinking skills in the DL need the ability to effectively in multimedia environments in order to process simultaneously large amounts of content. Access to information, media content, and media and information providers in the MIL also needs the flexibility to access required information. In addition, from a soft-skill perspective, the following two dimensions in the MIL have flexibility skills: Participating in societal-public activities as an active citizen, creation of knowledge, and creative expression. Both require flexible attitudes and behavior in a digital environment.

Self-Direction Skills. van Laar et al. (2017) define this category as skills to set goals, then leverage ICT skills to manage progress toward those goals, including decision making and status assessment. In the three frameworks, there are no skills similar to this category. However, some questionnaire items in some skill categories seem to have some similarities with this Self-direction skills category. For example, the item "construct online identity consistent with real personal characteristics" in critical presumption in the NML requires self-direction skills. Another one is "I know that new knowledge should be shared, distributed and communicated" in the communication of information, media content, and knowledge in an ethical and effective manner through the media and ICTs in MIL.

Lifelong Learning Skills. van Laar et al. (2017) view this category as comprising abilities to see and capitalize on new opportunities to integrate ICT skills, in order to constantly improve one's capabilities. This skills category shares no similarities to any skills categories in the three frameworks. However, as it can be seen in Self-direction

skills, there are also some questionnaire items related to these lifelong learning skills. One of them is “I realize that new knowledge may have various far-reaching purposes and consequences” in the creation of knowledge and creative expression in the MIL. Another one is “I assume that retrieved information and media content could be useful in future” in retrieval and holding, storage, and retention of information and media content in the MIL framework.

Literacy Scale Comparison for the Study

The literature review revealed that the three types of literacy, namely media literacy, information literacy, and digital literacy have different backgrounds; however, all these types are needed on digital platforms. Furthermore, the review of literature on 21st century skills revealed that digital skills are becoming an integral part of all 21st century skills, although they are not always explicitly stated. Therefore, the skills required on the digital platforms or new media are the 21st century skills associated with new media.

Scale Screening Criteria

Through the literature review, the following criteria were used in selecting the scales for this study: (1) the questions were free and open to the public without any copyright issues for reuse, (2) the questions were Likert-type questions, self-administered in a questionnaire, and not performance or observational measures, (3) the questions were developed within a theoretical framework, (4) they were versatile and comprehensive, and (5) they measured more than one of the three literacy. To select the 15 scales, search was carried out on the three databases: Google, ProQuest, and ScienceDirect. The 15 measures

were checked for a total of 20 criteria (see Appendix A, B, & C) and then reviewed carefully (see Appendix D).

Three Selected Frameworks and Their Survey Items

For this study, three frameworks were selected: the New Media Literacy (NML) scale (Chen, Wu, & Wang, 2011), the Digital Literacy (DL) Framework (Eshet-Alkalai, 2012), and the MIL Framework (UNESCO, 2013).

In addition to the three reasons discussed in the previous chapter, there are three further reasons that these three frameworks and their survey items were chosen for this current study. First, these frameworks are well-developed and updated through several revisions, based on the conceptual or theoretical frameworks. Second, their survey items are also well-considered, from five criteria for good survey items: "brief, relevant, unambiguous, specific, and objective" (Peterson, 2000, p. 51). Moreover, these items are also friendly and not didactic sentences, which is suitable for digital natives. Third, these are all positively worded items. Reversed items in Likert scales could potentially cause respondents to feel confused and to take more time to read and answer each item, resulting in some measurement problems, including low reliability and complex factor structures (Weijters & Baumgartner, 2012). The details of each of these frameworks and their items are summarized below.

The NML Framework

Development and Elaboration. Chen et al. (2011) developed a conceptual model to clarify the notion of new media literacy based on their analysis of technical and cultural

characteristics. This model represents the first attempt to conceptualize new media literacy (Lee et al., 2015). Theoretically, Chen et al. (2011) applied Buckingham's notion of "critical literacy" and "digital literacy" (Buckingham, 2003).

Chen et al. (2011) proposed a framework with two continuums: (1) consuming to prosuming literacy and (2) functional to critical literacy. Toffler (1981) defines the term "prosuming" as when an individual plays the roles of both a producer and a consumer. The framework's four elements are functional consumption (FC), critical consumption (CC), functional prosumption (FP), and critical prosumption (CP). For example, functional media consumers are expected to be able to access and understand media content at the textual level. Critical media consumers are expected to be able to analyze, evaluate, critique, and synthesize the media content by considering its embedded sociocultural meanings and values. The framework of Chen et al. (2011) has been shown to accommodate the notion of new media literacy better than earlier models.

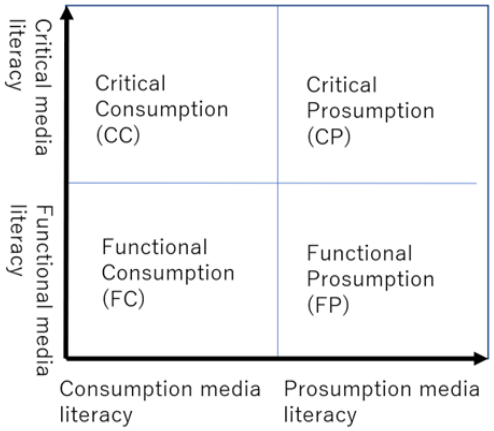
Lin et al. (2013) improved the FC, CC, FP, and CP framework (Chen et al., 2011), and the following year, Lee et al. (2015) developed a measurement tool based on the improved version of the framework (Chen et al., 2011). Firstly, Lin et al. (2013) identified two limitations of the framework (Chen et al., 2011). First, the four elements were not clearly defined, and second, the framework did not consider the Web 2.0 environment, where students can share both content and messages. According to Lin et al. (2013), the Web 2.0 environment provides a place that encourages people to make their opinion heard, embody their different identities, acquire various social norms, and participate in a critical exchange or construction of ideas. Therefore, this environment needs to be included in the

framework of digital literacy. Their refined framework added ten fine-grained factors to the four factors developed by Chen et al. (2011).

Survey Items (Koc & Barut, 2016). Koc and Barut (2016) developed the four factors (FC, CC, FP, and CP) framework of the NML (Chen et al., 2011; Lee et al., 2015; Lin et al., 2013) (see Figure 2.1). The purposes of developing the survey were summarized in two. First, it was to develop and distinguish survey items among the four factors. Second, it was to diagnose students' media literacy capacity and the effectiveness of educational practices. Koc and Barut's modified scale is composed of 35 items and has been shown to be a valid and reliable measurement of media literacy. The first dimension, functional consumption, consisting of seven items, includes technical abilities to operate hardware and software and the ability to understand media messages. The second dimension, critical consumption, has 11 items, which assess the abilities to analyze, criticize, synthesize, and evaluate. The third dimension, functional prosumption, comprises seven items, which refers to the ability to utilize technology to create media content. The fourth dimension, critical prosumption, consists of 10 items, which assess the capabilities to participate in new media platforms and create original content (see Table 2.3). In total, there are 35 items in this framework (see Appendix E).

Figure 2.1

Framework for New Media Literacy



Note. Adapted from Chen et al., 2011, p. 85.

The DL Framework

Development and Elaboration. Eshet-Alkalai (2012) developed a digital literacy framework in 2002 to investigate various complex cognitive, motor, sociological, and emotional abilities to operate a digital device. In 2002, Eshet-Alkalai (2002) began to develop his theoretical model from a study. The study involved three groups of 30 participants of three different age categories: high school students, college students, and adults (10 participants in each), all of whom were given assignments that required them to demonstrate their ability to use different kinds of digital literacy skills.

For example, to measure branching literacy, participants were asked to plan a foreign country trip, using information from the Internet. The tasks were assessed through observation and the completion of rubrics by observers. Eshet-Alkalai (2002) mentions

that due to the small sample used in this group and the qualitative methods used for analysis, it is difficult to generalize the results to a larger population. Despite these limitations, which can be addressed through further research employing this theoretical model, this study revealed five different literacies: photo-visual literacy (reading instructions from graphical interfaces), reproduction literacy (utilizing digital reproduction in learning), lateral literacy (later, they changed this term to branching literacy) (construction knowledge from on-liner navigation), information literacy (evaluating information) (Eshet-Alkalai, 2002).

This study identified five different literacies: photo-visual literacy (reading instructions from graphical interfaces), reproduction literacy (utilizing digital reproduction in learning), lateral literacy (later, they changed this term to branching literacy) (construction knowledge from on-liner navigation), and information literacy (evaluating information) (Eshet-Alkalai, 2002).

Two years later, Eshet-Alkalai and Amichai-Hamburger (2004) conducted a study similar to the initial study of Eshet-Alkalai (2002). Their study found that three groups showed differing results in the reproduction and information skills categories with the high school group scoring the lowest. Subsequently, in 2007, they conducted a longitudinal study with the same participants as in the 2002 study. All groups performed better compared with their performance in the 2002 study by Eshet-Alkalai in the photo-visual and branching categories, but high school and college groups did worse in the information skill categories. Eshet-Alkalai and Chajut (2010) analyzed that this result indicated that, over time, technology usage frequency over time negatively affects skills. They suggested

that digital literacy is related to three skills: technological skill, socio-emotional skill, and cognitive skill.

This framework's central tenet is that digital literacy is a "survival skill" (Eshet-Alkalai, 2012), embracing cognitive, motoric, sociological, and emotional skills. To various degrees, all these skills are considered to exist in every student. Finally, Eshet-Alkalai (2012) constructed the latest framework, which consists of six skills: (1) photo-visual digital skills, (2) reproduction digital skills, (3) branching digital skills, (4) information digital skills, (5) socio-emotional digital skills, and (6) real-time digital skills.

Survey Items. Porat et al. (2018) developed the survey items based on the DL framework (Eshet-Alkalai, 2012) to study the correlation between students' actual performance and perceived skills and found that students' actual social and emotional skills were lower in comparison with their self-reported skills. These skills consist of (1) photo-visual digital skills (3 items), (2) reproduction digital skills (4 items), (3) branching digital skills (3 items), (4) information digital skills (3 items), (5) socio-emotional digital skills (4 items), and (6) real-time digital skills (3 items) (see Table 2.3). In total, the survey items developed by Porat et al. (2018) had 20 items (see Appendix F).

UNESCO Media and Information Literacy Competency (MIL) Framework

Development and Elaboration. In 2005, UNESCO (United Nations Educational, Scientific and Cultural Organization) began to develop an MIL framework under the United Nations Literacy Decade (UNLD) for all member states (UNESCO, 2013). This was linked to the 1982 Grunwald Declaration of media education, in which UNESCO articulated the need for media literacy. In 2011, UNESCO suggested integrating notions of media literacy and information literacy under one umbrella term, media and information

literacy (MIL), emphasizing the development of the ability to engage meaningfully with media and information in various types of technologies and styles (Wilson et al., 2011).

In 2013, UNESCO published the UNESCO MIL assessment framework, with the aim of providing guidance for citizens to assess the current status of MIL readiness and MIL competencies in their country. The MIL was developed as an assessment for teachers or adults who are prospective teachers. The framework is premised on the assumption that teachers, who are in a position to educate children, should have the literacy that children should have. The framework also assumes that attitudes, values, knowledge, and skills vary by social-cultural context, including infrastructure (see Table 2.3).

Survey Items. The MIL has criteria integrate three cognitive elements into three components. The three cognitive elements consist of (1) attitudes (rights, principles, values, and attitudes), (2) knowledge, and (3) skills for all the components. The three components are (1) basic level: access and retrieval (4 dimensions: 36 items), (2) intermediate level: understanding and evaluation (4 dimensions: 42 items), and (3) advanced level: creativity and sharing (4 dimensions: 35 items). The MIL has 113 items in total (see Appendix G).

Comparison of the Three Frameworks

The three frameworks are compared in Table 2.2, and their dimensions in Table 2.3.

Table 2.3

Comparison of Three Framework

Authors (Year)	Chen et al. (2011)	Eshet-Alkalai (2012)	UNESCO (2013)
Term	New Media Literacy (NML)	Digital Literacy (DL)	Media and Information Literacy (MIL)
Definition	"a convergence of all literacy developed over the past centuries including classic literacy, audiovisual literacy, digital literacy, and information literacy" (p. 85)	"The proliferation of technologies during the digital era confronts individuals with situations that require the utilization of an ever-growing assortment of technical, cognitive, and sociological skills that are necessary in order to perform effectively in digital environments. These skills are termed in literature 'digital literacy'"(p. 267)	"a set of competencies that empowers citizens to access, retrieve, understand, evaluate and use, to create as well as share information and media content in all formats, using various tools, in a critical, ethical and effective way, in order to participate and engage in personal, professional and societal activities" (p. 29).
Key feature	Consumption/Prosumption	Survival skill	Empowerment of young citizens
Framework type	Continuum type	Conceptual type	Guidance type
Dimension #	4	6	12

Table 2.4

Dimensions of Three Dimensions

	Dimensions / Skills	*Description*
	The NML Framework (2011)	
1	Functional Consumption (FC)	The ability to access and understand media content at the textual level
2	Functional Prosumption (FP)	The ability to utilize technology to create media content (e.g., operate a camera or write an e-mail)
3	Critical Consumption (CC)	The ability to analyze and evaluate media content at the contextual and social level for critical understanding, The ability to critique and synthesize the media content, its embedded social meanings, and impacts, and construct one's own understanding
4	Critical Prosumption (CP)	The ability to create media content, and understand its social impact The ability to participate in media-rich environments (e.g., Second Life)
	The DL Framework (2012)	

1	Photo-visual literacy skills (PV)	The ability to intuitively and freely read and understand instructions and messages that are presented in a visual-graphical form
2	Reproduction literacy skills (RE)	The ability to create new meanings or new interpretations by combining preexisting, independent shreds of digital information as text, graphics, and sound
3	Branching literacy skills (BL)	The ability to stay oriented and avoid getting lost in the hyperspace while navigating through complex knowledge domains, despite the intricate navigation paths they may take
4	Information digital Skills (IN)	The ability to assess information effectively, by sorting out subjective, biased, or even false information
5	Socio-emotional digital Skills (SE)	The ability to collaborate in digital environments, such as knowledge communities, discussion groups, and chat rooms in order to perform effectively in the mass communication of the cyberspace
6	Real-time thinking skills (RT)	The ability to perform effectively in multimedia environments, such as simulations and games in order to process simultaneously large volumes of stimuli that "bombard" their cognition repeatedly
	The MIL Framework (2013)	
1	Definition and articulation of a need for information (DA)	The ability to determine and articulate the nature, role and scope of the information and media (content) through a variety of resources
2	Search and location of information and media content (SL)	The ability to search and locate information and media content
3	Access to information, media content and media and information providers (AI)	The ability to access needed information and media content effectively, efficiently and ethically, as well as media and information providers
4	Retrieval and holding/storage/ retention of information and media content (R)	The ability to retrieve and temporally hold information and media content using a variety of methods and tools
5	Understanding of information and media (U)	The ability to understand the necessity of media and information providers in society
6	Assessment of information and media content, and media and information providers (AS)	The ability to assess, analyze, compare, articulate and apply initial criteria for the assessment of the information retrieved and its sources, as well as evaluate media and information providers in society
7	Evaluation of information and media content, and media and information providers (EV)	The ability to evaluate and authenticate the information and media content gathered and its sources and media and information providers in society
8	Organization of information and media content (OR)	The ability to synthesize and organize the information and media content gathered
9	Creation of knowledgeand creative expression (CK)	The ability to create/produce new information, media content or knowledge for a specific purpose in an innovative, ethical and creative manner

10	Communication of information, media content and knowledge in an ethical and effective manner through the media and ICTs (CO)	The ability to communicate information, media content and knowledge in an ethical, legal and effective manner, using appropriate channels and tools
11	Participating in societal-public activities as active citizen (PA)	The ability to be engaged with media and information providers for self-expression, intercultural dialogue and democratic participation through various means in an ethical, effective and efficient manner
12	Monitoring influence of information, media content, knowledge production and use, as well as media and other information providers (MO)	The ability to monitor the impact of created and distributed information, media content and knowledge, as well as existing media and other information providers

Research Gaps in Media Literacy Concepts and Measurements

With the changing media environment in the 21st century, many frameworks and measurements have been developed. Among them, the NML framework (Chen et al., 2011; Lee et al., 2015; Lin et al., 2013), the DL framework (Eshet-Alkalai, 2012), and the MIL framework (UNESCO, 2013) are particularly well-developed and suitable for this study of undergraduates. First, these frameworks are particularly well elaborated through multiple revisions by several studies and researchers. Second, these have been used globally and adapted locally (e.g., Manca et al., 2021; Murakami, 2020). Third, these have been widely applied in evaluations as versatile tools, including in compare and contrast studies (e.g., Becerra et al., 2014). Fourth, these frameworks integrate new media literacy in updated digital environments, considering three important literacy concepts, media literacy, information literacy, and digital literacy. Fifth, these scales developed by other researchers that are based on these conceptual and/or theoretical frameworks (e.g., Eshet-Alkalai & Amichai-Hamburger, 2004; Ng, 2016). Sixth, the items in these scales can be well-

developed by following well-used criteria for identifying good survey items (e.g., Koc et al., 2016; Porat et al., 2018). Also, there are no revised items. Given digital native characteristics, positively worded items would produce good reliability.

However, these frameworks and survey items have several limitations. First, the NML and the MIL frameworks are based on a simple linear continuum, from basic technology skills (e.g., access to the Internet), to advanced skills (e.g., creativity and sharing). These frameworks lack consideration of constructs, dimensions, and dynamic relationships among individual constructs. Students have individually different prior knowledge and skills in a non-linear progression in a digital environment (Rychen, 2016).

Second, the DL focuses on the ability to use digital tools as a survival skill and is not necessarily intended primarily for educational settings. Research on how a person's ability to intuitively adapt to living in a digital environment varies with the frequency of digital device use and age factors is the primary use of this framework (e.g., Eshet-Alkalai, 2012; Eshet-Alkalai & Chajut, 2010).

Third, the MIL is a composite of 12 literacy components, including Internet literacy and television literacy, with a total of 113 items, which is time-consuming and labor-intensive to implement. In addition, some of the items, such as long and complicated sentences, are not suitable for non-native English-speaking university students. These are due to the MIL's broad coverage that allows for country-specific adjustments and a framework that can be used as a literacy standard for educators.

Finally, the DL, the NML, and MIL developed theoretical frameworks from the perspective of faculty and experts, not actual students. In other words, these may hardly be the media literacy assessments that current digital natives truly perceive and recognize. As

mentioned earlier, students use new media outside of the classroom on their own to access a variety of information, regardless of its relevance to the class content, and it is difficult for the faculty to restrict their use. Past research has found that university students prefer using digital resources not recommended by faculty (Plochocki, 2019). In order to effectively utilize new media from a student perspective, it would be beneficial to know the current student literacy and to use it in education. It would also indicate a set of items necessary for students to collaborate with each other and build collective knowledge of new media.

Finally, it is unclear to what extent these measures reflect the skills needed in the 21st century. Although the MIL encompasses 21st-century skills, it lacks the ease of assessment, as it is designed to be accessible in countries without a digital environment. It would thus be essential to conduct an exploratory study from the students' perspectives to optimally develop their abilities in the 21st century.

Research Questions

To address these research gaps discussed above, the present study seeks to answer the following research questions (RQ):

RQ 1. What is the underlying structure of new media literacy among current undergraduate students in Japan?

(1) What latent dimensions and items exist in the NMLS-J generated by the EFA and confirmed by the CFA?

(2) To what extent does the NMLS-J reflect 21st-century skills?

(3) Is the NMLS-J a different construct from the DL, the NML, and the MIL?

RQ 2. How well does the NMLS-J assess current Japanese university students' new media literacy development?

(1) Do the levels of the NMLS-J assess any difference between before and after the course?

(2) Does the NMLS-J produce different results for different class managements?

(3) Can the NMLS-J be applied by educators to measure students' performance?

RQ 3. Can the structure of the NMLS-J be applied to a performance-based test?

CHAPTER 3 METHODOLOGY

This chapter begins with a description of the research design, followed by information about the participants, data collection procedures, and data analysis. Following approval from the Ethics Review Committee of International Christian University in February 2020 (see Appendix H), the data collection was conducted with the voluntary cooperation of university students in 2020 and 2021. The data were analyzed from 2020 to 2022. Due to the COVID-19 situation, almost everything was done online.

In all, three studies were conducted in this research. The first was to develop a new media literacy scale (NMLS) for Japanese university students, labeling the NMLS-J. In the second study, two known-validity tests were conducted to examine the validity of this scale. In the third study, two performance-based tests were done to measure the validity of the constituents built on this scale.

Research Design

Adopting the survey methodology, the present study attempted to answer the research questions listed in the previous chapter by creating and validating the NMLS-J. This study involved a total of 1307 data, 18 experts, and two performance evaluators. The central objective of scale development was to identify potential constructs in the new media of digital natives and to create a valid and reliable scale to measure their new media

literacy. This study ended by proposing examples of the valid use of this scale in evaluating the NMLS-J.

In this study, the scale development and validation were conducted in three main steps, informed through the review and selective adoption of elements of the work of several scholars' and previous research methodologies (e.g., Boateng et al., 2018; Clark & Watson, 1995; DeVellis, 2017; Hinkin, 1995: Morgado et al., 2014). This work began in 2019, with the following steps: (1) item development, (2) scale development, and (3) scale evaluation, as shown in Table 3.1.

Table 3.1

Steps for Instrument Development

STUDY 1 (Main Study)			
	Activity	**Results**	**Method**
	Item Development		
	Selection of existing scales	The NML, the DL, the MIL	Literature review
	Initial item selection	113 items in the MIL to 24 20 items in the DL to 20 35 items in the NML to 35	Focus group
	Initial theoretical analysis by categorization	12 dimensions with 79 items based on the 21st-C DSF	Content analysis by experts' judgments
	Second item selection	24 items in the MIL to 15 20 items in the DL to 13 35 items in the NML to 31	Face validity by a panel of experts
	Scale Development		
	Initial NMLS-J development	5-point Likert scale with 59 items	Google Forms
	Data collection in 2020	Participants (n=295), Valid response (n=215), (Valid response rate=72.88%)	Given to the participants after class
	Data analysis and item reduction	59 items to 28	Preliminary Data Analyses (5 criteria)
	Search and description of variables (i.e., factors)	28 items to 15	EFA (split-half cross-validation approach)
	Reliability analysis of the NMLS-J	α=.73~.84	Cronbach's alpha
	Scale Evaluation		
	Confirmation of the validity of the NMLS-J model	$\chi 2$ =124.109, *df* = 87, *p* = .006 CFI = .930 RMSEA = .063 (CI=.035-.087) TLI = .915	CFA (second split-half)
STUDY 2			
	Two known groups validity tests	Overall moderate effect size (Cohen's *d* > 0.65)	*t*-test
STUDY 3			

Two Performance-Based tests among the NMLS-J factors	Person's $r > .32$	Pearson correlation coefficient

Study Context

The university where the study was conducted is located in the Kanto region of Japan, with two campuses in Tokyo and Kanagawa, and has approximately 20,000 students in total. The Tokyo campus has seven departments (Literature; Education, Psychology and Human Studies; Economics; Law; Business; International Politics, Economics, and Communication; Cultural and Creative Studies), and the Kanagawa campus has four departments (Science and Engineering; Social Informatics; Global Studies and Collaboration; Community Studies). Due to the COVID-19 preventative measures, all the courses and discussions were administrated online in 2020, and two-thirds of the course sessions continued to be operated online in 2021. Online classes during these years led to the opportunity for students to attend any course on both campuses.

Study One: Instrument Development

Participants (Study One)

A survey was conducted in the initial version of the NMLS-J during the fourth week of May 2020. Participants were selected using a convenience sampling method (Lavrakas, 2008). Online Google forms were distributed to a total of 295 students. Thirteen students did not respond, and 67 students did not complete the survey. The valid responses were 215 out of 295 students (valid response rate = 72.88%). The details of the 215 valid responses were from six classes: three academic English classes (19 students, 18 students,

and 16 students, respectively), two Japanese Composition classes (19 students and 20 students, respectively), and one Media class (123 students). All the participants in the three academic English classes and two Japanese Composition classes were first-year students. Their department requires them to obtain IELTS 5.0 or higher during the first semester of their first year in order to study abroad (Kikuchi, 2019). In the Media class, 111 students were freshmen, and 12 students were sophomores. In total, 215 valid responses were used to develop the NMLS-J. Table 3.2 shows the gender demographics.

Table 3.2

Gender Demographics of Valid Responses in Different Classes

	Total		Academic English classes		Japanese Composition classes		Media class	
	n	%	*n*	%	*n*	%	*n*	%
Male	87	40.47%	23	43.40%	17	43.59%	47	38.21%
Female	128	59.53%	30	56.60%	22	56.41%	76	61.79%
Total	215		53		39		123	

Matsunaga (2010) recommended that the sample size for a factor analysis be at least 100. This suggestion is much lower than the minimum of 300 cases that Tabachnick and Fidell recommended (2013). However, Henson and Roberts (2006) warned that such rules of thumb could be misleading and suggest that the sample size should be based on the characteristics of the obtained data. Thus, the goal of this study was to obtain as large a number of samples as possible with the same characteristics (Hair et al., 2010).

In the development of the scale, a total of 15 senior students and five teachers were asked to participate as experts. The activity and method are in Table 3.3.

Table 3.3

Experts for Scale Development

Activity	Method	No. of experts	
		Students	Teachers
Initial item selection of the MIL	Focus group discussion	6	1
Categorization	Initial content analysis		2
Initial item review	Face validity	7	2

Overall Procedure of Study One

The development of the NMLS-J was conducted following three phases: item development, scale development, and scale evaluation (see Table 3.1). The objective of the item development phase was to develop an initial version of the NMLS-J. There were three steps: generating an item pool, categorizing the items based on a theoretical, conceptual framework, and reducing the number of items. Following the recommendation of Hinkin (1995), a combination of deductive and inductive approaches was taken. Whereas a deductive approach involves item generation based on existing scales through literature review, an inductive approach considers an iterative process of refining and reducing the number of items through the feedback of experts or focus group discussion.

In the scale development phase, the initial NMLS-J was distributed to three online classes. The items were reduced through preliminary data analyses and EFA. Further, in the

scale evaluation phase, CFA was conducted to examine the structure obtained through the EFA.

The item development phase and initial scale development are described in this chapter, the Methodology chapter, and then the results of data collected with the initial scale and of scale evaluation are reported in the next chapter, the Results chapter.

Item Development

The English Language Used in the Scale

In developing the scale, the English language was used for three reasons. First, all of the students who participated in the development of the scale planned to study abroad and were therefore required to take daily classes taught by native English speakers during their first year. Therefore, the researcher of this study judged that the participants had the ability to understand basic questions in English.

The second reason for keeping English is that it will be easier to improve and revise the NMLS-J or to study in other countries and compare the results in the future, if the English language is used instead of translated. As discussed in the literature review, many researchers have suggested that scale development requires time and refinement (e.g., Hallaq, 2006).

Furthermore, the third is that many studies report shortcomings with regard to the translation of the English language used in existing scales (e.g., Behr, 2017; Griffee, 1998; Kalfoss et al., 2019; McGorry, 2000; Temple, 2005). There are two main ones. One is that back-translation originally changes the meaning, potentially missing points or raising false issues (e.g., Griffee, 1998). The other is that translation, adaptation, and validation of scales

are very time-consuming and not easy, requiring careful planning and rigorous methods (e.g., Kalfoss et al., 2019).

Therefore, it was decided that the English language was used to develop the NMLS-J. However, avoiding different understandings or misinterpretations of the survey items is a prerequisite for scale development (Dörnyei, 2009). Thus, choosing and developing English survey items that Japanese university students could understand became extremely important.

First Item Selection: Item Pool

After a close review of various frameworks and scales in the previous chapter, three instruments on well-validated and reliable frameworks were selected as the basis to create a new scale for Japanese university students. The instruments were the following three: the NML scale (Koc & Barut, 2016), the DL scale (Porat et al., 2018), and the MIL assessment framework (UNESCO, 2013). The items selected from each of the three scales are described below.

First Item Selection from the MIL framework. The UNESCO MIL has 113 items consisting of 12 elements to assess multiple latent characteristic concepts, addressing different levels of different populations. DeVellis (2017) suggests that "the larger the item pool, the better" (p. 113). However, the MIL assessment framework is based on the multiple latent trait concept and addresses various levels for different populations. In addition, the MIL was developed for teachers; thus, most of the questions are long, and the vocabulary is geared toward adults who use English as a native or second language. It was thus necessary to screen the questions for Japanese university students for whom English is

a foreign language. Appropriate survey items were selected for the NMLS-J development through a focus group discussion based on UNESCO's suggestions. The focus group provided hard-to-obtain data and insights through group interaction (Morgan, 1996).

The focus group consisted of six senior undergraduate students in a department called Cultural Studies at a university located in Tokyo, Japan. This department has a large number of students majoring in media and offers a wide range of courses related to media literacy, digital literacy, and information literacy. At the recommendation of the professor in charge of media literacy, six senior students who signed a consent form (see Appendix I) participated in the focus group. The male and female ratio was one-to-one. One male and one female each had studied abroad for one year as exchange students and were proficient in both English and Japanese. The professor who recommended these students also participated online. Thus, it was expected that all the students in this focus group would have the necessary knowledge about new media literacy and recent digital native traits.

Following the recommendation of Morgan (1996), the focus group was administered in February 2020. Due to the COVID-19 situation, the focus group was conducted online. The focus group members were asked to discuss two criteria: (1) language simplicity and understandability, including that the language is not childish or geared toward working adults, and (2) familiarity with Japanese undergraduate students. The professor who recommended the six focus group students and the researcher of this study were the moderators and facilitators for this focus group online discussion. The time was set to two hours to allow every participant to speak within the time frame in a comfortable manner in the online speaking environment. Care was also taken not to intentionally guide the participants by asking them to select specific items.

The MIL has the drawback that most of the sentences in items are long and difficult for Japanese undergraduate students to understand. For example, “Monitors and makes judgments on shared information, media content and knowledge, such as quality, impact, and integrity of practices” (UNESCO, 2013, p. 136), “If required, redirects and recasts information and media content, based on the comparison of actual results with intended results” (UNESCO, 2013, p. 136), “Internalizes, integrates, formulates and presents information and media content gathered using tools and formats into a new context – prior knowledge” (UNESCO, 2013, p. 134), and “Defines assessment criteria for information and media content retrieved and information sources: purpose, audience, authorship, credibility, significance, supplier, relevance, currency, reliability, completeness, accuracy, timelines, scope, and coverage” (UNESCO, 2013, p. 132).

Therefore, it was quite reasonable that the focus group members’ comments pointed to the length of sentences and the difficulty in understanding word expressions. The focus group members said, “Most items are too difficult for Japanese students to understand.” These included items such as “Understands the role of metadata” (UNESCO, 2013, p. 129) and “Understands the importance of indexing selected information and media content through indexation” (UNESCO, 2013, p. 133). The focus group members also mentioned that some items were too long, such as “formulates a general statement/question based on information need into a form of an active statement/question, vocalizes, writes down, types, constructs, and expresses using any technique in an explicit and efficient manner” (UNESCO, 2013, p. 129).

Through this two-hour focus group discussion, a total of 24 items were selected, two for each of all the MIL 12 dimensions. The 24 items selected were all short, easy to understand, and met the criteria (see Appendix J).

First Item Selection from the NML. All the NML 35 items were retained as an initial selection from four dimensions. All of these items, characterized by the framework (Lin et al., 2013), were developed for undergraduates, and have been used globally. Thus, these 35 items were judged to be appropriate for the current study.

First Item Selection from the DL. All the 20 items from the DL were also initially selected, since all the wordings of these items in English are easy to understand.

In total, a 79-item pool consisting of the NML scale (35 items), the DL scale (20 items), and the MIL assessment framework (24 items) were generated through the first item selected.

Initial Theoretical Analysis of the Item Pool

Theoretical Framework. These items were theoretically analyzed using the 21st-C DSF developed by van Laar et al. (2017) for the following three reasons.

First, media literacy, information literacy, and digital literacy are all essential and central skills for 21st century skills. This study aimed to develop a scale based on the integration of these three types of literacy. Historically, each of the three had different theoretical backgrounds; however, all of these literacies have come to one digital platform to utilize new media in the 21st century.

Second, the literature review in the previous chapter revealed that the components of 21st century skills were extremely diverse, and not a single unit (Joynes et al., 2019;

Voogt & Robin, 2010). 21st century skills have been developed around the world, and so many concepts and frameworks exist that it was difficult to find a common denominator. van Laar et al. (2017) conducted a meticulous literature review related to digital literacy and 21st century skills and, for the first time in the world, identified 12 aspects of digital literacy and 21st century skills in relation to each other.

Third, the 21st-C DSF was targeted at working adults and those who start to work after graduating from university, not elementary, junior high, or high school children (van Laar et al., 2020). The ability of each of the 12 aspects in the 21st-C DSF is a skill that university students should acquire.

Because of the three points mentioned above, the 21st-C DSF was determined to be an appropriate theoretical framework for the development of the NMLS-J.

Categorization. The categorization was related to an initial content analysis by experts. First, the 79 items were categorized into each of the 12 subscales (i.e., 12 dimensions) of the 21st-C DSF, to develop the initial conceptual NMLS-J framework with two experts and the researcher of this study in February and March 2020. Due to the COVID-19 situation, the categorization was divided into three sessions: the first two were in person and the last one was online. They signed a consent form (see Appendix I).

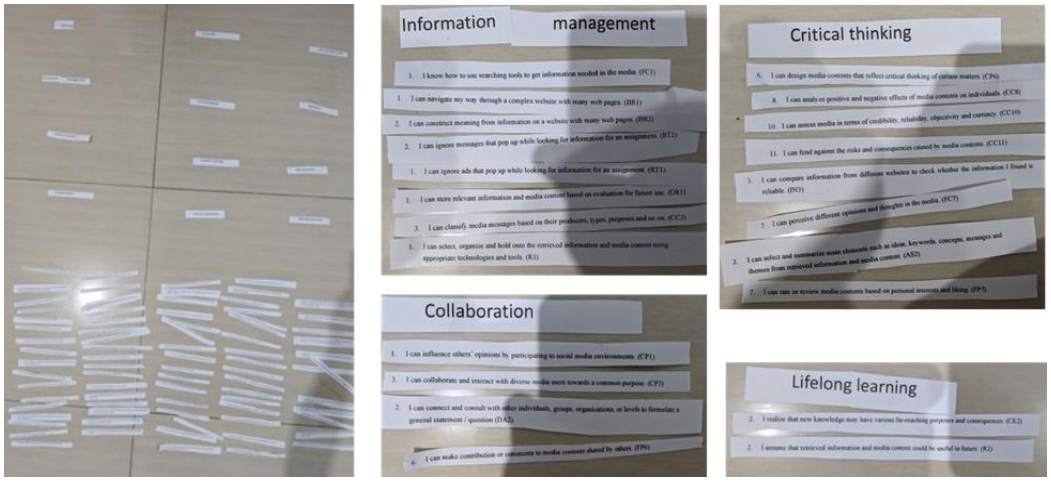
One of the experts is a Japanese teacher who has taught media literacy and media studies at a university for 31 years. He has not taught digital literacy and information literacy but uses technological devices in class. Also, he has been a member of the Japan Society of Library and Information Science for two decades. Thus, he was regarded as an expert in this scale development. The other expert was a Japanese who had worked in the media education industry for 12 years. He has been involved in developing digital media

materials for students; thus, his knowledge related to media literacy and digital literacy was judged to be appropriate for this study.

The 79 items from the three selected frameworks—the NML, the DL, and the MIL— were cut into each item, spread out on the table, and categorized into each of the 12 components of the 21st-C DSF (see Figure 3.1).

Figure 3.1

Photos Showing How Items were Generated and Categorized for the NMLS-J



Second Item Selection: Item Pool Reviewed by Experts

To confirm that the initial 79-item pool properly measured the constructs, face validity was assessed in an online panel discussion with seven laypeople (students) and two adults (teachers) in April 2020. It was conducted online due to the COVID-19 situation. The purpose of the panel discussion was twofold: to ensure that each item was placed in the appropriate category and to screen out the redundant items.

Face validity was applied at this stage as an assessment of the extent to which items reflect a content domain. Whereas content validity requires a rigorous quantitative test administered by a trained expert when assessing items, face validity refers to the informal subjective judgments made by an observer (DeVellis, 2017). However, DeVellis (2017) does not recommend face validity due to a lack of objectivity and unclear variables to be measured.

On the other hand, Gaber and Gaber (2010) presented two sides of the debate about face validity. Whereas negative aspects of face validity are vague and rough without empirically verifiable testing procedures, face validity is beneficial as it is an informal assessment based on common sense and the experiential wisdom of a community. Thus, face validity is concerned with the appropriateness of the overall study, as internal validity. In contrast, content validity is concerned with the extent to which the items identified in the study reflect the concept being measured, as external validity (Gaber & Gaber, 2010). If evaluators are internal, both experts and laypeople (students) would be able to make an overall value judgment for the scale of this study (Nevo, 1985). Since the subjects of the scales in this study were limited to a certain region and age group, it was determined that informal discussion by panel members who knew each other would be necessary to ensure validity. Therefore, at this stage, it was decided to apply face validity as part of content validity to the examination of the second item selection and second theory analysis in this study. Panel members participating in face validation were university students from the same environment as the scale development subjects.

A panel for face validity was composed of two experts and seven laypeople. One of the experts was a professor of the Science and Engineering department at a university in

the Kanto region. She has taught digital information usage and English for 11 years. Thus, it was determined that she was able to evaluate the relevant items from the perspectives of digital and information and the 21st century skills. The other expert was an instructor who had worked at a media center of a university for ten years. He specializes in educational technology and has expertise in media literacy; thus, the researcher of this study asked him to be the other expert for this project.

The seven laypeople were university undergraduate students at the university where the survey was conducted. They were all members of a research group the researcher of this study organized and taught. Five of them were fourth-year students and two of them were third-year students, all of whom had studied media at the university in the past and had extensive digital knowledge. Since the seven students were very interested in this study and willing to cooperate, the researcher of this study decided to ask them to review the item pool.

After the seven laypeople (students) and two adults (teachers) signed a consent form (see Appendix I), the researcher explained the purpose of this study and each dimension of the 21st-C DSF to the panel members through Zoom. The discussion took two hours and was recorded with the consent of the panel members so that the content could be reviewed later. All of the panel members were well-known to each other; thus, they frankly expressed their opinions during the discussion.

The panel discussion had mainly two purposes: to check the categorization and appropriateness. With regard to the categorization, the panel members agreed that two items should be moved from the dimensions in which they were initially categorized. One was # CK1 “I can use various tools for the creation and aesthetic presentation of new

knowledge in various formats," which they wanted to change from the Technical dimension to the Flexibility dimension. Since # CK1 requires the ability to think and approach the ICT environment, the panel members determined that the Flexibility dimension was more appropriate than the Technical dimension, which is related to day-to-day technical skills. The other one was # SE3 "stay aware of the possibility that a message that I wrote in an email, forum, SNS, WhatsApp, Facebook, etc., could reach other people, such as parents or teachers." This item was moved from the Flexibility dimension to the Ethical awareness dimension, because #SE3 was understood to be about personal information as a result of the panel discussion. Both items were moved with the suggestion and agreement of the panel members (students and teachers).

Secondly, through the panel discussion, 20 items were removed from the initial 79 items, and the remaining 59 selected items were confirmed. The selection and confirmation were based on three criteria. First, the comprehension and appropriateness of phrases and words were checked. Items that contained content or words unfamiliar to Japanese university students were thus deleted. Second, when there were multiple similar question items that fell within the same dimension, the panel members retained items that clearly expressed skills and were less likely to be misinterpreted. Even though some level of similarity or redundancy may be necessary to ensure the reliability of the scale as it may provide slightly different angle judgment, similar items may lead to respondent confusion (DeVellis, 2017). Thus, redundant items were deleted. Third, when opinions were divided among panel members, it was decided to respect the opinion of the students as laypeople. This was done in order to emphasize the perspectives of digital natives, which was related to the purpose of developing this scale.

The details of the decision of the panel members regarding the deletions and selection are as follows.

Second Item Selection from the NML. Thirty-one out of 35 items were selected (see Table 3.2). Four items (i.e., #CC1, #CC 11, #CC4, and #CC6) were removed for two reasons: understandability and redundancy. The panel members agreed on the deletion of #CC11, because the phrase "fend against" in #CC11 may cause difficulty for Japanese university students to understand. The panel members expressed that the phrase "different function of media" in #CC1 was ambiguous. Three students in the panel discussion mentioned that it meant media devices such as TV or radio, and other members pointed out that it might be mental functions fulfilled by the media, such as media enjoyment or encouragement.

Regarding redundancy, #CC4 "compare information across different media environments" is similar to the item in #IN3 "compare information from different websites to check whether the information I found is reliable," and also the item in #EV2 "compare information from different media and sources." The panel members decided to select #IN3 because it was the least misleading and the easiest to understand. The panel discussion also concluded that the wording, "evaluate media in terms of legal and ethical rules (copyright, human right, etc.)" in #CC9 was clearer than the similar wording, "consider media rating symbols to choose" in #CC6.

Second Item Selection from the DL scale. Thirteen out of 20 items were selected through the panel discussion (see Table 3.2). Seven items were deleted because the wording used was too easy, the expression was ambiguous, and there were other items that were similar and more appropriate in the same dimensions. Regarding the easiness, the panel

members agreed that #PV1 “understand the information presented in an illustration,” #BR3 “I am not lost on a website,” and #PV2 “understand the information presented in a map” might be too easy for university students. These items might cause a ceiling effect, and thus those items were deleted. A ceiling effect refers to a large percentage of participants who scores very high on a scale (Salkind, 2010).

The panel members pointed out the ambiguity of the two items. One was #SE3 “stay aware of the possibility that a message that I wrote in an email, forum, SNS, WhatsApp, Facebook, etc., could reach other people, such as parents or teachers.” Five students in the panel members commented that this item was similar to #SE2 “careful not to post personal information about my friends when I send a message through email, forums, Twitter, Facebook, etc.,” and the panel members decided that #SE2 was more appropriate and they agreed to remove #SE3.

Four students in the panel argued that #RT3 “response and react quickly when I’m playing a digital game or simulation” could be categorized as the Technical dimension, as it could have certain implications related to personal preferences. Thus, while these items seem to be suitable for young students, it was decided to delete #RT3.

Two items: #IN1 and #IN2, were deleted due to redundancy. The panel members agreed that # IN1 “can find the information I’m looking for” was similar to #FC1 “know how to use searching tools to get the information needed.” Since #FC1 is more specific and clearer, the panel member decided to keep #FC1 and delete #IN1. Likewise, the panel member argued that #IN2 “identify incorrect or inaccurate information in a list of internet search results” was similar to #CC10 “I can assess media in terms of credibility, reliability,

objectivity and currency." The panel member decided #CC10 was more appropriate and removed #IN2.

Second Item Selection from the MIL framework. Fifteen out of 24 items were selected through the panel discussion (see Table 3.2). Nine items were removed due to a lack of word or phrase appropriateness for Japanese university students and because of redundancy.

In terms of appropriateness, all of the seven students in the panel pointed out that the following four phrases were difficult for Japanese university students to understand: "disseminator of information" in #SL1, "create or use basic assessment instrument for evaluation of information" in #AS1, "monitor the function of lobbyists" in #MO1 and "know how to monitor media ownership and implication" in #MO2. These phrases and words were not familiar to Japanese university students; thus, the four items: #SL1, #AS1, #MO1, and #MO2 were removed.

Five students in the panel members pointed out the ambiguity of #DA1 "recognize the need for information and media content." The panel members argued that other items in the Information management dimension could cover the meaning of #DA1. Thus, it was deleted. The other four items: #EV1, #EV2, #AI1, and #U1 were removed due to redundancy. The panel members agreed that # EV1 "evaluate information and media content gathered, its sources as well as media and information providers" was deleted, and a similar and clearer item #CC10 "assess media in terms of credibility, reliability, objectivity and currency" was retained. Similarly, #EV2 "compare information from different media and information sources" was deleted, and a similar item # CC8 "analyze positive and negative effects of media" was left out due to its understandability.

In addition, the panel members decided that two items were removed due to redundancy. They suggested that two items: #AI1 “acknowledge the importance of the rules, laws, and regulations related to access to information” and # U1 “know concepts of ethics and rights related to media and information” were similar to #CC9 “I can evaluate media in terms of legal and ethical rules (copyright, human rights, etc.). All the seven students in the panel members insisted that #CC9 was more understandable than #AI1 and #U1; thus #CC9 was retained.

Table 3.4 shows the 79 items categorized in the 21st-C DSF dimensions and the 20 items that were removed after two hours of discussion by the panel consisting of seven students, two teachers, and the researcher of this study. The 20 deleted items are colored in gray. Through the panel discussion, some words were edited, such as “strategies” to “strategy,” “SMS” to “SNS,” and “button” to “buttons.”

Table 3.4

The Item Pool

Dimension (21st-C DSF)	Original Item #	Item
Technical	FP1	I can create user accounts and profiles in media environments.
	FP2	I can use hardware necessary for developing media content (text, image, video, etc.).
	FP3	I can use software necessary for developing media content (text, image, video, etc.).
	FP4	I can use basic operating tools (buttons, hyperlinks, file transfer etc) in the media.
	PV3	I can understand the meanings represented by the icons of an app.
	BR3	I am not getting lost on a website with many web pages.
	RT3	I can respond and react quickly when I’m playing a digital game or simulation.
Information Management	BR1	I can navigate my way through a complex website with many web pages.
	BR2	I can construct meaning from information on a website with many web pages.
	CC3	I can classify media information based on its producers, types, purposes, and so on.

	FC1	I know how to use searching tools to get the information needed in the media.
	OR1	I can store relevant information and media content based on the evaluation.
	R1	I can select, organize and hold onto the retrieved information and media content using appropriate technologies and tools.
	RT1	I can ignore ads that pop up while looking for information for an assignment.
	RT2	I can focus on homework while ignoring pop-up messages.
	DA1	I can recognize the need for information and media content.
	AS1	I can create or use basic assessment instrument(s)/ tool(s) for evaluation of information and media content, as well as media and other information providers.
	PV1	I can understand the information presented in an illustration.
	PV2	I can understand the information presented in a map.
	IN1	I can find the information I'm looking for on the internet.
Communication	CO2	I can choose a communication medium, format and license that best supports the communication, distribution and sharing of information, media content and knowledge, taking into account the size and type of audience.
	CP5	I can make discussions and comments to inform or direct people in the media.
	FP5	I can share digital media content and messages on the Internet.
	SE4	I respectfully relate to the opinions of others when responding through email, forums, Twitter, Facebook, etc.
Collaboration	CP1	I can influence others' opinions by participating in social media environments.
	CP3	I can collaborate and interact with diverse media users towards a common purpose.
	DA2	I can connect and consult with other individuals, groups, organizations, or levels to formulate a general statement/question.
	FP6	I can make contributions or comments to media content shared by others.
Creativity	CC5	I can combine media messages with my own original opinions.
	CP10	I can develop original visual and textual media content (video clips, web pages, etc.)
	CP7	I can produce opposite or alternative media content.
	CP9	I can create media contents that comply with legal and ethical rules.
	OR2	I can transform information and media content and from one format to another.
	RE2	I can connect with a number of different online sources when writing a new text of my own.
	RE3	I can use others' illustrations to create a new illustration/collage of my own.
	RE4	I can use others' videos to create a new video of my own.
Critical thinking	AS2	I can select and assess main elements such as ideas, keywords, concepts, messages and themes from retrieved information and media content.
	CC10	I can assess media in terms of credibility, reliability, objectivity and currency.
	CC7	I can make a decision about the accuracy of media messages.
	CC8	I can analyze the positive and negative effects of media content on individuals.
	CP6	I can design media content that reflects critical thinking of certain matters.
	FC7	I can perceive different opinions and thoughts in the media.
	FP7	I can rate or review media content based on personal and others' interests and likings.
	EV2	I can compare information from different media and information sources.

	EV1	I can evaluate information and media content gathered, its sources as well as media and information providers.
	CC11	I can fend against the risks and consequences caused by media content.
	IN2	I can identify incorrect or inaccurate information in a list of internet search results.
	SL1	I can seek to identify an author, producer, organizer, disseminator of information and media content.
	CC1	I can distinguish the different functions of media.
	CC4	I can compare information across different media environments.
	IN3	I can compare information from different websites to check whether the information I found is reliable.
Problem-solving	FC3	I can make use of various media environments to reach information.
	LS2	I can refine search strategy, if required.
	RE1	I can address things that other people wrote online, when writing a new text of my own.
Ethical awareness	CC9	I can evaluate media in terms of legal and ethical rules (copyright, human rights, etc.).
	CP8	I can produce media content respectful to people's different ideas and private lives.
	FC6	I understand the political, economic, and social dimensions of media content.
	PA1	I am aware of the consequences and risks of participating in societal-public activities, including in virtual worlds.
	SE1	I am careful not to post personal information about myself when I send a message through email, forums, Twitter, Facebook, etc.
	SE2	I am careful not to post personal information about my friends when I send a message through email, forums, Twitter, Facebook, etc.
	CC6	I can consider media rating symbols to choose which media content to use.
	U1	I know concepts of ethics and rights related to media and information and international and professional standards.
	SE3	I can stay aware of the possibility that a message that I wrote in an email, forum, SNS, WhatsApp, Facebook, etc., could reach other people, such as parents or teachers.
	AI1	I can acknowledge the importance of the rules, laws, and regulations related to access to information.
Cultural awareness	CC2	I can determine whether or not media content has commercial messages.
	CP2	I can make contributions to media by reviewing current matters from different perspectives (social, economic, ideological etc.).
	FC4	I can realize explicit and implicit media messages.
	FC5	I can notice media content containing mobbing and violence.
	U2	I understand the importance of advertisement in media and information providers.
	MO1	I can monitor the functions of public relations services and lobbyists.
	MO2	I know how to monitor media ownership and its implications.
Flexibility	AI2	I can access selected information and media content through a variety of media and other information providers
	CK1	I can use various tools for the creation and aesthetic presentation of new knowledge in various formats.
	FC2	I can catch up with the changes in the media.
	PA2	I can engage and participate in societal-public activities through various means and tools.
Self-direction	CO1	I know that new knowledge should be shared, distributed and communicated.

	CP4	I can construct an online identity consistent with real personal characteristics.
Lifelong learning	CK2	I realize that new knowledge may have various far-reaching purposes and consequences.
	R2	I assume that retrieved information and media content could be useful in future.

Scale Development

Data Collection

Determination of the Format and Item Order. Utilizing 59 items consisting of 12 subscales, an initial version of the NMLS-J was created with a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). Some scholars recommend taking forced choice versions (i.e., even numbered point scales), because a 5-point scale which has neutral options that are neither "agree" nor "disagree" and produces inaccurate results (e.g., Bartram, 2007), while some scholars (e.g., Armstrong, 1987) argue that the presence or absence of a neutral option does not significantly affect the results (e.g., Krosnick & Presser, 2010). Even others suggest that the presence of a neutral option leads to more appropriate results (e.g., Krosnick & Presser, 2010). Thus, the NMLS-J followed the NML and the DL in adopting a 5-point Likert scale.

Minor modifications were made to make items easier to understand, including changing grammar particles such as "the" and "a," and changing "media contents" to "media content." In addition, in order to avoid the response order effect, the 59 items were randomly ordered.

The survey form of the initial NMLS-J (see Appendix L) used by Google Forms included an informed consent section, which explained the purposes of this study (see Appendix K). It also stated that the participation was voluntary and anonymous, and that

the survey results would not be used for any purpose other than the study. The participants were also instructed that they could stop at any time in the middle of the survey without any consequences. Before starting the survey, the participants checked the box for an informed consent section (see Appendix M).

Data Analysis and Item Reduction

Preliminary Data Analyses. Following the suggestion of Field (2017), five criteria were used to screen the items, (1) the absence of outliers, (2) normality within the data, (3) internal consistency, (4) inter-item score correlation, and (5) sampling adequacy for individual items.

Exploratory Factor Analysis (EFA). After the preliminary data analyses, the researcher used the split-half cross-validation approach for the scale development context. Following the two-step approach for structural equation modeling (Anderson & Gerbing, 1988), the data of the 215 responses were split into two random halves, with similar gender and class (see Table 3.5).

The first half of the sample was used to conduct EFA to explore the main variables to create a theoretical model of the NMLS-J. The principal axis factoring (PAF) was conducted with 107 samples as the extraction method, while Varimax was used for the rotation. For this EFA, IBM SPSS version 27 was utilized.

Scale Evaluation

Confirmatory Factor Analysis

In order to confirm the NMLS-J model, the second sample set with 108 responses (Table 3.5) was applied for CFA via structural equation models (SEM). AMOS version 27 was used to run the CFA. Following the suggestions of Schreiber et al. (2006), a number of statistics were applied to investigate the goodness of fit of the exploratory model, including Chi-square (χ^2), root mean square error of approximation (RMSEA), Tucker-Lewis index (TLI), and comparative fit index (CFI).

Reliability

Following the CFA, a reliability analysis using Cronbach's alpha coefficients was conducted on this data set. The purpose of the analysis was to determine whether the generated scale showed good internal consistency.

Table 3.5

Gender and Class for Participants to Use the Two-Step Approach

Total (First-half)			Academic English classes		Japanese Composition classes		Media class	
	n	%	*n*	%	*n*	%	*n*	%
Male	44	41.12%	12	44.44%	8	42.11%	24	39.34%
Female	63	58.88%	15	55.56%	11	57.89%	37	60.66%
Total	107		27		19		61	
Total (Second-half)								
Male	43	39.81%	11	42.31%	9	45.00%	23	37.10%
Female	65	60.19%	15	57.69%	11	55.00%	39	62.90%
Total	108		26		20		62	

Study Two: Two Known-Group Validity Tests

To examine the validity of the NMLS-J, two known-group validation studies were carried out using two classes taught by the researcher of this study in 2020 and 2021. Both classes were held once a week for one semester (three months) for a total of 15 class sessions (90 minutes each). The known-groups method is a method to examine the validity by discriminating among groups that are theoretically expected to differ on the traits measured by the scale (Cronbach & Meehl, 1955). This current study was conducted under the assumption that the participants' NMLS-J scores would differ before and after the course started. Unforeseen circumstances during the COVID-19 resulted in changes to several classes.

Participants (Study Two)

The first validity test was conducted in the second semester of 2020, in the Introduction to Linguistics class. Due to the COVID-19 situation, all the classes were conducted online. A total of 174 students participated: 26 freshmen, 148 sophomores, five juniors, and eight seniors. However, 13 juniors and seniors were removed from the total number of participants. There were 153 valid responses to the pre-survey and 133 valid responses to the post-survey. The gender balance was 44.6% male and 55.4% female.

The second validation study was implemented in the first semester of 2021 in the Media class. A total of 241 students participated, of which 174 were freshmen and 67 were sophomores, and the male-to-female ratio was 42.2% male and 57.8% female. There were

228 valid responses to the pre-survey and 223 valid responses to the post-survey. The participants of the two known-group validity studies are summarized in Table 3.6.

Table 3.6

Participants of the Two Known-Group Validity

Date	First validation study 2020 (September and December)		Second validation study 2021 (April and June)	
	n	Valid responses (Valid response rate)	*n*	Valid responses (Valid response rate)
Pre-test	174	153 (87.93%)	241	228 (94.61%)
Post-test	152	133 (87.50%)	232	223 (96.12%)

Procedure (Study Two)

Both the pre-and post- known-group surveys were conducted with a consent form signed online at the end of the class (see Appendix M). Throughout both of the classes, the students were given some assignments without specific information or websites directed by the researcher of this study, but they were recommended to create some group community sites themselves for the assignments.

Both of the surveys were implemented in such a way as to attempt to avoid response biases. Response bias refers to situations that arise in the process of responding to a survey and influence how one responds to it (Paulhus, 1991). People generally tend to be overly optimistic and overestimate when evaluating themselves and may exaggerate their responses. On the other hand, it has been reported that Japanese students tend to underestimate themselves (Cabinet Office of Japan, 2018). To avoid this, the participants

were told that they could complete the survey anonymously, which had nothing to do with their class evaluation.

The data were analyzed using SPSS version 27.

Instrument

The instrument, the NMLS-J, which was developed in the study one, consisted of 15 positive items measured on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*). The 15 items are in Appendix N. A positive item refers to a positively worded statement that does not contain negative adverbs, such as "not." Many scale developers select negatively worded items to avoid "acquiescence, affirmation, or agreement bias" (Devillis, 2017, p. 117). However, Devillis (2017) notes that item reversals can confuse respondents and may cause lower response rates. Considering the state of the student participants, who would be tired after class, the researcher decided to administer all the items as positively worded items.

In addition to the purpose of the survey, the online form of the NMLS-J stated that the participation was voluntary, and that responses were anonymous and would not be reflected in any grades. It also stated that results would be provided upon request. The items were randomly ordered using a Google form. The participants who agreed to participate checked the informed consent box on the form online and began the survey.

First Known Group Validation Study

The first validation study was conducted in the Introduction to Linguistics class in 2020. The course content was not directly related to new media, which could be considered to confirm the validity of the NMLS-J as a versatile scale. The course consisted of 15 class

sessions, 12 of which were lecture-based with about five to 10 new technical terms and related content, using the textbook, *The study of language* (Yule, 2020). The class included the relationship between society and language, especially the relationship between a particular country and its language. Post-class assignments were given for each of the 12 class sessions on a topic related to what was learned in class. For about 20 minutes after the start of each class, the students were asked to discuss with other students each assignment they had completed at home before class. The discussion was conducted through Zoom breakout sessions.

Intervention for the First Known Group. The researcher of this study consciously encouraged the students to do two things as interventions: online research and networking among students. In addition, as a final project, the students were assigned a task to foster creativity in their groups. Specifically, the intervention was conducted through the following three points.

Firstly, the researcher gave the students assignments so that they could research information on languages and the use of the language of a particular country, by using online libraries and online information each time. Since many of the students had never used or made great use of the online library before, the researcher began by teaching them how to use the database. The students were allowed to check with their classmates during class to see what online information they could get from the Internet and how to obtain the information.

Secondly, the researcher provided the students with as many opportunities to communicate with each other online and make networking as much as possible. The COVID-19 situation inevitably encouraged students to use new media. For example, the

students were asked to search for information on the official languages, mother tongues, and multilingual status, as well as the background to the use of these languages and which languages were actually used in what situation at present. In addition, the researcher asked the students to investigate how the country's citizens obtain information about the COVID-19 situation. For example, the students were asked to discuss in groups whether information on COVID-19 was conveyed differently in different languages within the same country, such as in Canada. In order to search what differences existed and what disadvantages were caused by COVID-19, the students were asked to use social media to understand the local situation and to contact local people, or related agencies, by using the English language.

Finally, the final project was an opportunity for review and reflection. It was on the linguistic impact on a particular region of each group and its future, and the students needed to use at least five of the technical terms learned in class. The students discussed the project in groups of about five, and gave group presentations in the 14th and 15th classes. After all the classes were over, they were required to submit their individual reports on what they had done and learned through this course.

Second Known Group Validation Study

The second validation study was conducted in the Media class in 2021. The theme of this media class was the relationship between empathy and media. The textbook, *Empathy* (Maibom, 2020) was used for this class. In the first five of the 15 class sessions, the students received lectures from the researcher about some basic concepts related to empathy, such as emotional empathy, cognitive empath, and sympathy. In the second half,

the students were asked to examine and discuss how these basic concepts of empathy are reflected in some films and commercials in class. The students were also assigned three projects in the second half of the course. The first one was to create individual memes that are sympathetic to social satires. In the second project, the students were asked to use storytelling to examine how individual students felt about the news they cared about and whether group members could relate to it. In the third project, the group selected one of the 17 goals of the SDGs and created a 30-second commercial aimed at gaining empathy from a global perspective. After the completion of the last project, the students were asked to submit an individual report detailing the project and reflection.

Intervention for the Second Known Group. As in the first known group intervention, the researcher of this study consciously encouraged the students to do two things as interventions: online research and networking among students. However, due to the nature of the class content, this class focused on using search engines such as Google rather than using the online library to gather information. The main of this class was media production, including memes, storytelling, and video. Since few students had any experience with these three media productions, the researcher of this study attempted to make each activity function as an intervention.

The first activity was a meme production. The students were asked to search about memes online and discussed the origin of the meme while finding sample memes on the Internet. Memes can be represented by pictures and short text, which is expected to allow students to share multifaceted judgments with other students, including political and cultural aspects metaphorically. It also enables students to learn that something could

possibly unintentionally and ethically hurt someone. The class used Meme Generator, a free online meme generator, to create the memes.

Second, the researcher had the students produce storytelling. The students were asked to discuss how listeners' understanding, trust, and empathy differ depending on the speaker's voice, tone, rhythm, etc. Then, the students listened to a sample interview in which the speaker talked about events at COVID-19 and they discussed as a group the differences in understanding when there was a visual video and when there was only audio. The students were then asked to use software such as Audacity to create a story that was five minutes or less story about how they were empowered by hearing someone else tell the story of their life experience, such as how they overcame a challenge, and to share their story with the online group.

Finally, the students were asked to create a video with five to six group members. First, the researcher had the group discuss the impact of the widespread use of smartphones on video production. The researcher asked the students to examine how information differs from entertainment, whether there was any propaganda in entertainment, the difference between professionals and amateurs, and basic video grammar, such as montage. The researcher also informed the group that it was useful to keep the necessary clips online, including audio and photos, so that they can share them with the group. Further, the students were told that, whenever necessary, it would be necessary to ask various experts for their opinions and to check the accuracy of the information. This time, the group created a 30-second to one-minute commercial video to publicize SDG activities. After the completion of this video project, the students were asked to submit an individual reflection paper of approximately 3000 words.

Study Three: Performance-Based Assessments

To check the applicability of the NMLS-J to actual performance evaluation, following the suggestion of Salkind (2010), two performance-based assessments were conducted with three evaluators: two educators and the researcher of this study. This study aims to confirm the construct validity of the NMLS-J, and also to assess the relationship between self-evaluation and performance-based assessments.

Participants (Study Three)

Both of the assessments were conducted using the assignment final reports submitted by a known group of students in Study two. The evaluation was conducted with all the papers submitted by the two known group students. In total, 132 students' papers in the first known group, and 223 students' papers in the second known group were used.

Two researchers were asked to participate in this evaluation. They have lectured at various educational institutions including universities; and thus, they were deemed suitable for this peer review. One had worked for a video creation company for about seventeen years. The other one was an instructor who had worked for various educational institutions for sixteen years. After signing a consent form (see Appendix O), the two raters received the initial training provided by the researcher of this study, on the basis of the criteria (see Appendix O). The evaluators used a 5-point scale (0 = *non-existing* to 5 = *excellent*). The inter-rater reliability was Cohen's k = .83– .86 across factors. Cohen's kappa coefficient is a

statistic used to assess inter or intra -rater reliability of qualitative items: the closer it is to 1, the closer the inter-rater ratings (McHugh, 2012).

CHAPTER 4 RESULTS

This chapter presents the results of the study. It begins with the preliminary data analysis result, followed by a presentation of the results of the exploratory factor analysis (EFA) and the confirmatory factor analysis (CFA), and presents the NMLS-J, which the main objective of this study. Subsequently, it reports the results of two validation studies (two *t*-tests and two performance-based tests) of the NMLS-J, using two known group populations.

Instrument Development

Preliminary Data Analysis: Item Screening Process

Before the EFA was conducted, a set of 59 items was screened to determine whether they fulfilled the conditions required to conduct an EFA. The following five criteria were used to screen the items: (1) the absence of outliers, (2) normality within the data, (3) internal consistency using corrected item-total correlation and Cronbach's alpha, (4) inter-item score correlation, and (5) sampling adequacy for individual items (Field, 2018).

Outliers. Boxplots were assessed for criterion (1) the absence of outliers. The presence of many outliers indicates that the item is unsuitable for the scale (Field, 2018). In this study, all of the 59 items were tested with box whiskers to confirm that there were no outlier items. (see Appendix P).

Normality. To check the criterion (2) the normality of the data, a quantile-quantile plot (Q-Q plot) was used. The Q-Q plot is a graphical method used to test for univariate normality to evaluate the cumulative probability of a variable against the probability of a normal theoretical distribution (Field, 2018; Oppong & Yao, 2016). The visual inspection of the Q-Q plot indicated that all the items were normally distributed (see Appendix Q).

Internal Consistency. For criterion (3) internal consistency, each subscale of the theoretical model was assessed using corrected item-total correlation and Cronbach's alpha (Field, 2018). The two subscales, "self-direction" and "lifelong learning," were not tested due to the fact that each had only two items. As a result, 11 items were identified for deletion (see Appendix R).

Inter-Item Score Correlation. The 59 items were also assessed by the Pearson correlation coefficient, in order to check the criterion (4) inter-item score correlation (see Appendix T). Variables with many low correlations ($r < .3$) or many high correlations ($r > .9$) are not appropriate for the item pool (Field, 2018). The correlation matrix indicates 31 items with very few correlations above .3. The remaining 28 items produced correlations greater than .3 and less than .9 with p-value < .01. The number of variables with low correlations is in Appendix S.

Sampling Adequacy for Individual Items. For criterion (5) sampling adequacy for individual items, the 59-item dataset was assessed by Kaiser-Meyer-Olkin (KMO) values for individual variables. The KMO values for individual items using the anti-image correlation matrix were tested for partial correlation (see Appendix T). Variables with a measure of sampling adequacy (MSA) of less than .5 may need to be excluded from the factor analysis (Field, 2018). All the MSA values of the 59-item dataset were above .5.

Bartlett's test examines whether the variance-covariance matrix is proportional to

an identity matrix. The initial KMO score of sampling adequacy score was .854, and Bartlett's test of sphericity was statistically significant ($p < .001$).

Through the five criteria, (1) the absence of outliers, (2) normality within the data, (3) internal consistency using corrected item-total correlation and Cronbach's alpha, (4) inter-item score correlation, and (5) sampling adequacy for individual items, in total, 31 items from 59 were removed from the model, leaving 28 items for the EFA. Table 4.1 shows all the 59 items and the 31 deleted items are shown in gray.

Table 4.1

List of Removed Items

	Item		Reason for Removal
Technical	FP1	I can create user accounts and profiles in media environments.	Hurt internal consistency
	FP2	I can use hardware necessary for developing media contents (text, image, video, etc.).	Too many low r
	PV3	I can understand meanings represented by the icons of an app.	Hurt internal consistency
Information management	BR1	I can navigate my way through a complex website with many web pages.	Too many low r
	BR2	I can construct meaning from information on a website with many web pages.	Too many low r
	RT1	I can ignore ads that pop up while looking for information for an assignment.	Too many low r
	RT2	I can ignore messages that pop up while looking for information for an assignment.	Too many low r
	OR1	I can store relevant information and media content based on evaluation for future use	Hurt internal consistency
Communication	CO2	I can choose a communication medium, format and license that best supports the communication, distribution and sharing of information, media content and knowledge, taking into account the size and type of audience	Too many low r
	CP5	I can make discussions and comments to inform or direct people in the media.	Too many low r
	SE4	I respectfully relate to the opinions of others when responding through email, forum, Twitter, Facebook, etc.	Hurt internal consistency
Creativity	RE2	I can connect with a number of different online sources when writing a new text of my own.	Hurt internal consistency
	RE3	I can use others' illustrations to create a new illustration/collage of my own.	Hurt internal consistency
	RE4	I can use others' videos to create a new video of my own.	Hurt internal consistency
	CC5	I can combine media messages with own opinions.	Too many low r

	OR2	I can transform information and media content from one format to another.	Too many low r
	CP9	I can create media content that complies with legal and ethical rules.	Hurt internal consistency
Critical thinking	CC8	I can analyze positive and negative effects of media content on individuals.	Too many low r
	IN3	I can compare information from different websites to check whether the information I found is reliable.	Too many low r
	AS2	I can select and assess main elements such as ideas, keywords, concepts, messages and themes from retrieved information and media content.	Too many low r
	CC7	I can make a decision about the accuracy of media messages.	Too many low r
Problem-solving	RE1	I can address things that other people wrote online, when writing a new text of my own.	Hurt internal consistency
Ethical awareness	SE1	I am careful not to post personal information about myself when I send a message through email, forum, Twitter, Facebook, etc.	Hurt internal consistency
	SE2	I am careful not to post personal information about my friends when I send a message through email, forum, Twitter, Facebook, etc.	Hurt internal consistency
	PA1	I am aware of the consequences and risks of participating in societal-public activities, including in virtual worlds.	Too many low r
Cultural awareness	U2	I understand the importance of advertisement in media and information providers	Too many low r
Flexibility	CK1	I can use various tools for the creation and aesthetic presentation of new knowledge in various formats	Too many low r
Self-direction	CP4	I can construct an online identity consistent with personal characteristics.	Hurt internal consistency, Too many low r
	CO1	I know that new knowledge should be shared, distributed and communicated.	Hurt internal consistency, Too many low r
Lifelong learning	CK2	I realize that new knowledge may have various far-reaching purposes and consequences.	Hurt internal consistency, Too many low r
	R2	I assume that retrieved information and media content could be useful in the future.	Hurt internal consistency, Too many low r

Exploratory Factor Analysis

An EFA was applied to reduce data to a smaller set of summary variables and to explore the underlying theoretical structure of the phenomena (Gatignon, 2010). To answer RQ1, the EFA was conducted on the data of the remaining 28 items using the principal axis factor analysis (PAF) extraction method (see Table 4.2). The PAF seeks the least number of factors that can explain the common variance of a set of variables, while removing as much common variance in the factors as possible (Mabel & Olayemi, 2020).

The KMO MSA was .842. The KMO values for the items ranged from .772 to .912, which was above the acceptable limit. Bartlett's test of sphericity was also statistically significant ($p < .001$), indicating that the data were likely to be factorizable.

Table 4.2

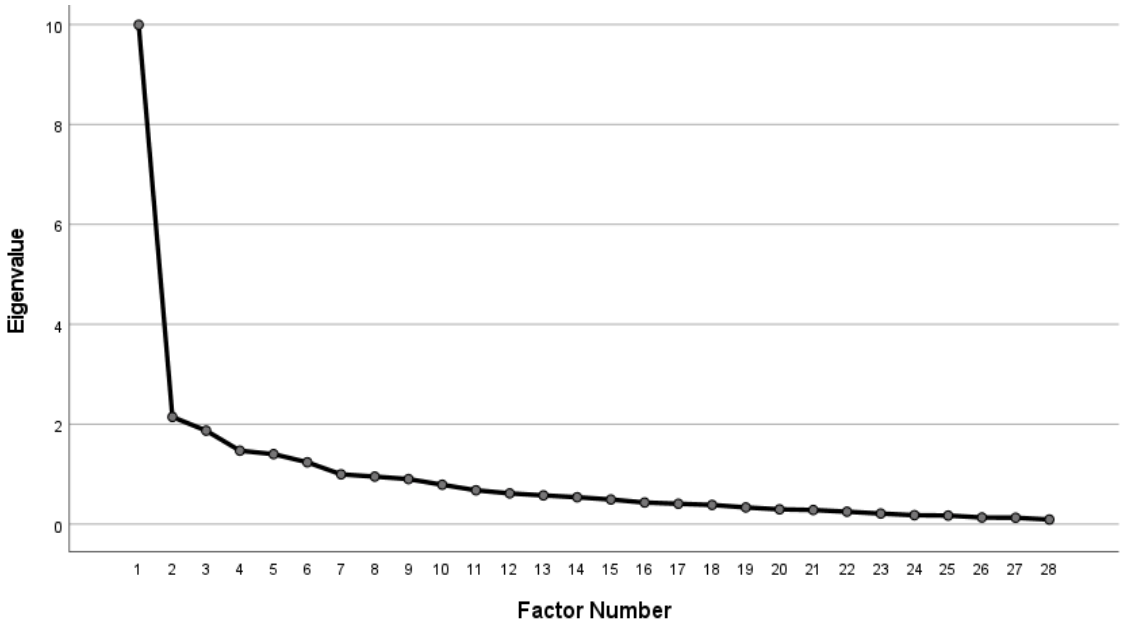
The Remaining 28 Items for EFA

Component	Item	
Technical	FP3	I can use the software that are necessary for developing media content (e.g., texts, images, videos, etc.).
	FP4	I can use basic operating tools (e.g., buttons, hyperlinks, file transfers, etc.) in the media.
Information management	FC1	I know how to use searching tools to get the information needed in the media.
	CC3	I can classify media messages based on their producers, types, purposes and so on.
	R1	I can select, organize and hold onto the retrieved information and media content using appropriate technologies and tools
Communication	FP5	I can share digital media content and messages on the Internet.
Collaboration	CP1	I can influence others' opinions by participating in social media environments.
	CP3	I can collaborate and interact with diverse media users towards a common purpose.
	DA2	I can connect and consult with other individuals, groups, organizations, or levels to formulate a general statement/question
	FP6	I can make contributions or comments to media content shared by others.
Creativity	CP7	I can produce opposite or alternative media content.
	CP10	I can develop original visual and textual media content (video clips, web page, etc.)
Critical thinking	CP6	I can design media content that reflects critical thinking of certain matters.
	CC10	I can assess media in terms of credibility, reliability, objectivity and currency.
	FC7	I can perceive different opinions and thoughts in the media.
	FP7	I can rate or review media content based on personal and others' interests and likings.
Problem-solving	LS2	I can refine the search strategy, if required
	FC3	I can make use of various media environments to reach information.
Ethical awareness	CC9	I can evaluate media in terms of legal and ethical rules (copyright, human rights, etc.)
	FC6	I understand the political, economic and social dimensions of media content.
	CP8	I can produce media content respectful to people's different ideas and private lives.
Cultural awareness	CP2	I can make contributions to media by reviewing current matters from different perspectives (e.g., social, economic, ideological etc.).

	FC4	I can realize explicit and implicit media messages.
	FC5	I can notice media content containing mobbing and violence.
	CC2	I can determine whether or not media content has commercial messages.
Flexibility	FC2	I can catch up with the changes in the media.
	AI2	I can access selected information and media content through a variety of media and other information providers.
	PA2	I can engage and participate in societal-public activities through different means and tools

Figure 4.1

Scree Plot for the NMLS-J (N = *107*)



The EFA revealed six factors with eigenvalues exceeding Kaiser's criterion of 1, and this model explained 64.75% of the variance. However, the scree plot displayed inflection locations that would justify retaining either three or six factors (see Figure 4.1). In such a situation, Costello and Osborne (2005) recommended running the data several times, setting the number of factors to three, four, five, and six, and comparing the item loading tables. The study retained three factors because it produced the "cleanest" factor structure, with items loading above .30, and it had the fewest cross-loading items (items

that loaded at .3 or higher on two or more factors).

The three factors explained 56.77% of the variance (see Table 4.3). The rotated factor matrix of the three factors was inspected for cross-loading items that differed by less than 0.15 between the highest and the second-highest factor loading. These items were removed following the recommendation of Tabachnick and Fidell (2013). Table 4.4 presents the final rotated factor matrix.

Table 4.3

*Three-Factor Structure for the NMLS-J (*N*=107)*

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Factor	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	5.455	36.365	36.365	4.968	33.118	33.118	2.972	19.814	19.814
2	1.689	11.262	47.627	1.170	7.799	40.917	2.142	14.279	34.093
3	1.372	9.145	56.772	.919	6.125	47.043	1.942	12.950	47.043
4	1.002	6.681	63.454						
5	.848	5.656	69.110						
6	.784	5.225	74.334						
7	.668	4.452	78.787						
8	.581	3.875	82.662						
9	.529	3.528	86.190						
10	.453	3.022	89.212						
11	.432	2.877	92.089						
12	.388	2.588	94.677						
13	.307	2.044	96.721						
14	.290	1.932	98.653						
15	.202	1.347	100.000						

Note. Extraction Method: Principal Axis Factoring.

Table 4.4

*Rotated Factor Matrix for the NMLS-J (*N = *107)*

		Factor		
		1	2	3
FC3	I can make use of various media environments to reach information.	**.687**	.192	.330
FC2	I can catch up with the changes in the media.	**.679**	.128	.304
FC4	I can realize explicit and implicit media messages.	**.637**	.204	.219
CC3	I can classify media messages based on their producers, types, purposes and so on.	**.634**	.166	.135
CC10	I can assess media in terms of credibility, reliability, objectivity and currency.	**.619**	.161	.030
CC2	I can determine whether or not media contents have commercial messages.	**.616**	.177	.055
CC9	I can evaluate media in terms of legal and ethical rules (copyright, human rights, etc.)	**.421**	.130	.059
AI2	I can access selected information and media content through a variety of media and other information providers	.202	**.793**	.087
R1	I can select, organize and hold onto the retrieved information and media content using appropriate technologies and tools	.272	**.631**	.290
SL2	I can refine the search strategy, if required	.229	**.622**	.302
DA2	I can connect and consult with other individuals, groups, organizations, or levels to formulate a general statement/question	.116	**.550**	.066
PA2	I can engage and participate in societal-public activities through various means and tools	.128	**.331**	.143
FP4	I can use basic operating tools (button, hyperlinks, file transfer, etc) in the media.	.157	.209	**.757**
FP3	I can use software necessary for developing media content (text, image, video, etc.).	.234	.142	**.724**
FP5	I can share digital media content and messages on the Internet.	.120	.236	**.604**

Note. Extraction Method: Principal Axis Factoring
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in five iterations

Table 4.5 indicates the factor correlations done with varimax rotation. If an orthogonal rotation was performed, this table would not appear in the output because the

correlation between the factors was set to 0. The factors were moderately correlated with each other.

Table 4.5

Correlations Between Three Factors

Factor	1	2	3
1	–		
2	.589	–	
3	.466	.532	–

Note. Extraction Method: Principal Axis Factoring
Rotation Method: Varimax with Kaiser Normalization

The remaining 15 items were categorized and named into three factors. Each factor was labeled to reflect the common structure of items loading on the same factor. Factor 1 was named *Critical and Ethical Thinking skills,* factor 2 *Media Content and Tool Management skills*, and factor 3 *Technical and Communication skills*. The detailed reasons for these factor names are explained in the discussion chapter.

Table 4.6 shows the reliability of the exploratory model for each factor and its internal consistency. Cronbach's alpha was utilized. This assesses how well the items on the scale measure the latent constructs. Higher values indicate that the items in the scale can measure the same underlying structure and thus form a reliable measure. All of the scales gained acceptable values of Cronbach's alpha.

The reliability analysis of the overall NMLS-J showed good internal consistency (Cronbach's alpha = .83; Field, 2017). The three scales within the NMLS-J are Critical and Ethical Thinking skills (α = .84), Media Content and Tool Management skills (α = .73), and Technical and Communication skills (α = .79). Overall, Cronbach's alphas for the NMLS-J (α=.73–.84) also showed high scores (Field, 2018; see Table 4.6).

Table 4.6

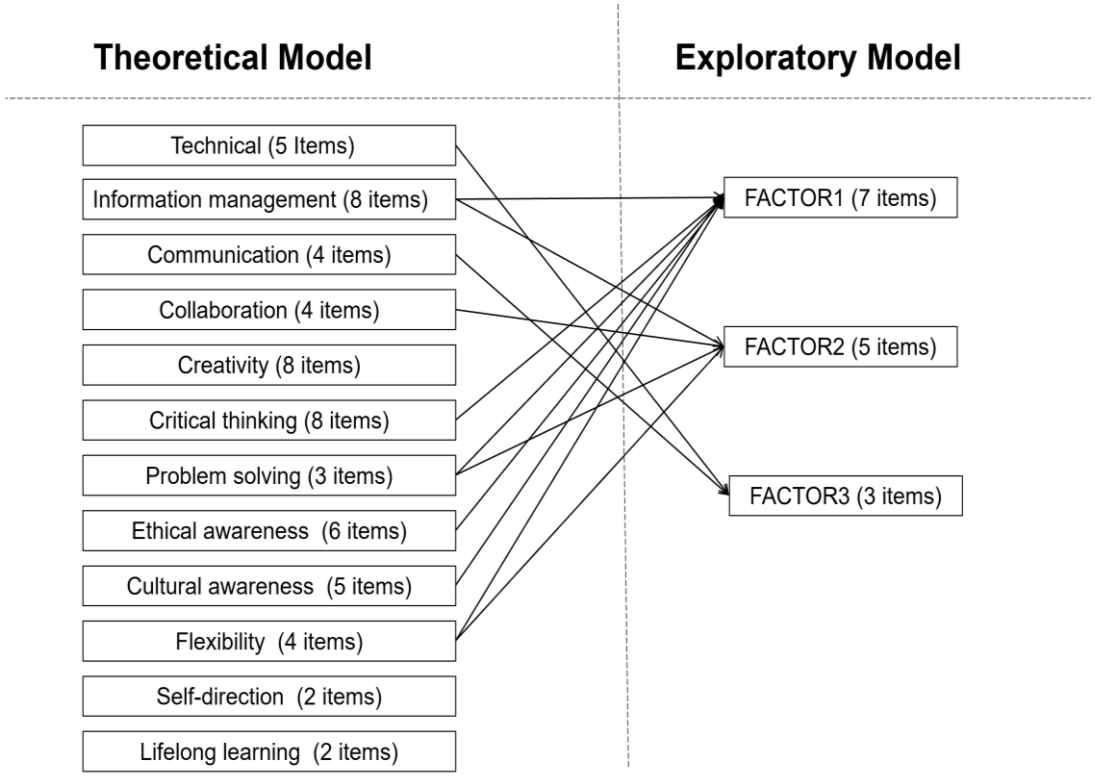
Factor Loadings for Three Factors Measuring New Media Literacy

		Item	α if item deleted	I-T correlation
Critical and Ethical Thinking skills	(α=.842)	FC3	.804	.685
		FC2	.808	.663
		FC4	.815	.617
		CC3	.815	.618
		CC10	.821	.580
		CC2	.821	.575
		CC9	.844	.432
Media Content and Tool Management skills	(α=.731)	AI2	.677	.666
		R1	.688	.638
		SL2	.695	.633
		DA2	.747	.569
		PA2	.792	.348
Technical and Communication skills	(α=.792)	FP4	.697	.697
		FP3	.669	.699
		FP5	.694	.774

The EFA generated a model different from the revised theoretical NMLS-J model. Along with the initial theoretical model, the 59 items were spread into 12 subscales (see Figure 4.2). However, the model generated by the EFA, called the exploratory model, was composed of only 15 items categorized into three factors (see Table 4.9). These items were grouped very differently from the theoretical model, creating a new theoretical NMLS-J framework. The relationship between the two models is presented in Figure 4.2. Nine of the 12 dimensions of the theoretical model (the 21st-C DSF) comprised the three subscales of the exploratory model. Three dimensions: creativity, self-direction, and lifelong learning, did not show in the exploratory model.

Figure 4.2

Overview of the Relationship Between the Theoretical and Exploratory NMLS-J Models



Scale Evaluation

Confirmatory Factor Analysis

A CFA through structural equation modelling (SEM) was conducted with the other half of the data to verify the overall fit of the measurement model and obtain the final estimates of the measurement model parameters (Gatignon, 2010). The CFA was conducted using SPSS AMOS 27 (see Figure 4.3).

Following the suggestion (Schreiber et al., 2006), the researcher assessed several indices to determine the fitness of the three-factor exploratory model: Chi-square (χ^2), root mean square error of approximation (RMSEA), Tucker-Lewis index (TLI), and

comparative fit index (CFI), which are summarized in Table 4.7.

Table 4.7

*Model Fit Statistics for the Exploratory NMLS-J Model (*N*=108)*

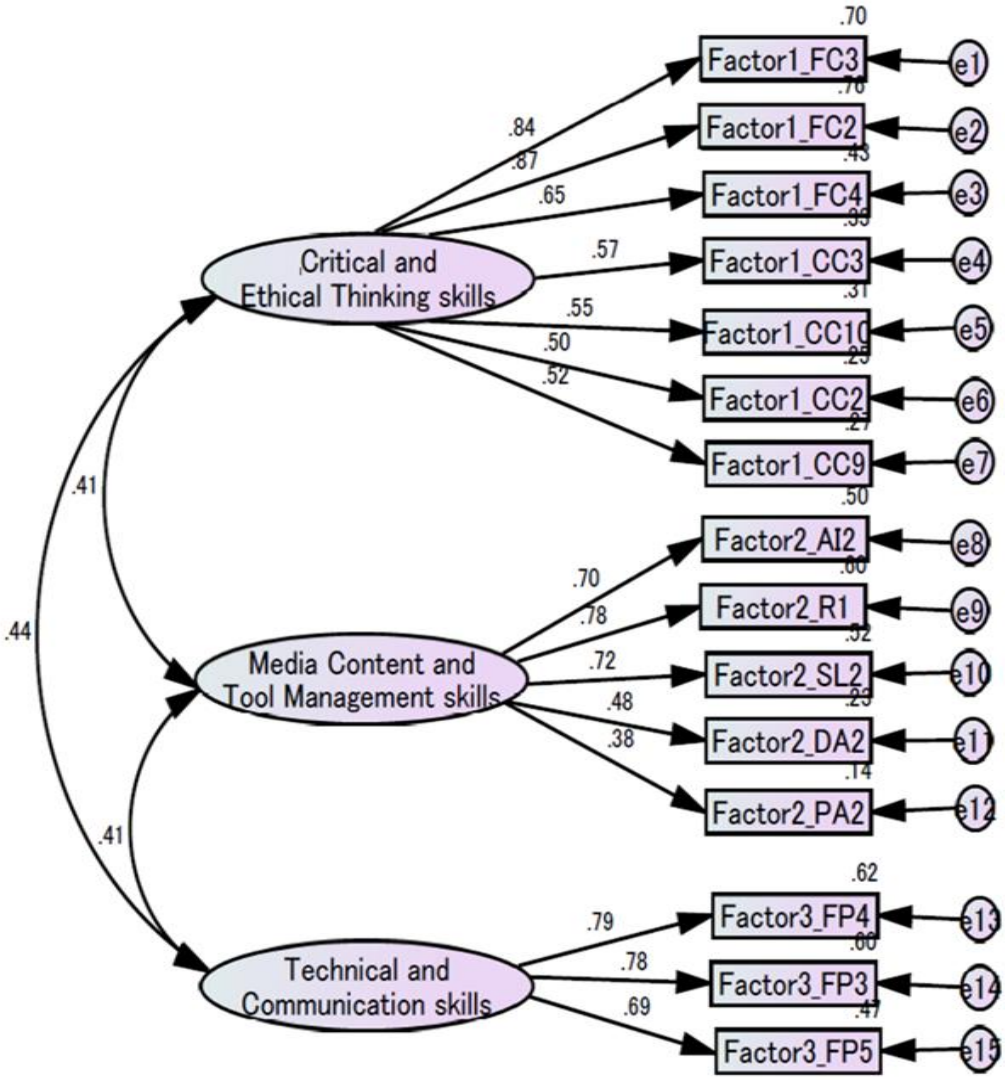
Statistics	Exploratory Model
χ^2	124.109, *df* = 87, *p* = .006
CFI	.930
RMSEA	.063 (CI=.035-.087)
TLI	.915

The chi-square (χ^2) is a good indicator of model fit. However, since it is very sensitive to sample size, the results should be interpreted carefully in light of other fit indices. (Hu & Bentler, 1999; Perry et al., 2015). The χ^2 for the exploratory model was 124.109 and χ^2/df = 1.426. Although no cut-off value for χ^2 has been established, the lower the value, the better the model's fitness (Gatignon, 2010). The recommended cut-off for χ^2/df is < 3. , which indicates that the model is a good fit. The CFI and TLI were > .90, which met Hu and Bentler's cut-off criteria (1999) for an acceptable model. Values close to 1 for the CFI and TLI indicate a very good fit between the data and the model. However, the RMSEA was slightly higher than the recommended < .06 cut-off. The RMSEA assesses how far a model is from a perfect mode. Research suggests that an RMSEA value of < .05 indicates a close fit, and that < .08 is a reasonable model (Brown, 2015).

The CFA model of the three-factor structure is shown in Figure 4.3. The standardized sub-factor loadings were between .38 (#12 "I can engage and participate in societal-public activities through various means and tools") and .87 (#2 "I can catch up with the changes in the media"). Brown (2015) suggests that a cut-off value of .34 is acceptable.

Figure 4.3

Factor Structure of the NMLS-J



Discriminant Validity. The discriminant validity of the model was further tested. The model was assessed using the Fornell-Larcker criterion (Hamid et al., 2017). Table 4.8 shows the comparison of the square root of average variance extracted (AVE) and the correlation of other latent constructs. To be considered a good model, the value of the

square root of AVE should be larger than the correlation strength with the other latent construct. Table 4.8 shows the comparison of the square root of AVE and the correlations with other constructs. The table shows that the exploratory NMLS-J model meets the requirement for establishing a good discriminant validity. Table 4.9 shows the final 15 items of the NMLS-J.

Table 4.8

Discriminant Validity of the NMLS-J Model

	Factor 1	Factor 2	Factor 3
Critical and Ethical Thinking skills (F1)	**.66**		
Media Content and Tool Management skills (F2)	.41	**.63**	
Technical and Communication skills (F3)	.44	.44	**.75**

Table 4.9

The NMLS-J Items

Component		Item
Critical and Ethical Thinking skills	#1	I can make use of various media environments to reach information.
	#2	I can catch up with the changes in the media.
	#3	I can realize explicit and implicit media messages.
	#4	I can classify media messages based on their producers, types, purposes and so on.
	#5	I can assess media in terms of credibility, reliability, objectivity and currency.
	#6	I can determine whether or not media content has commercial messages.
	#7	I can evaluate media in terms of legal and ethical rules (copyright, human rights, etc.)
Media Content and Tool Management skills	#8	I can access selected information and media content through a variety of media and other information providers.
	#9	I can select, organize and hold onto the retrieved information and media content using appropriate technologies and tools.
	#10	I can refine the search strategy, if required.
	#11	I can connect and consult with other individuals, groups, organizations, or levels to formulate a general statement/question.
	#12	I can engage and participate in societal-public activities through various means and tools.
	#13	I can use basic operating tools (buttons, hyperlinks, file transfer, etc) in the media.

Technical and Communication skills	#14	I can use the software necessary for developing media content (text, image, video, etc.).
	#15	I can share digital media content and messages on the Internet.

Study Two: Known Group Validity of the NMLS-J

In order to confirm the validity of the NMLS-J model, the researcher conducted two independent sample *t*-tests and reliability analyses in 2020 and 2021, respectively.

First Validation Study

The data were collected at the beginning and end of the Introduction to Linguistics class in 2020 and a *t*-test with an independent sample was conducted. The students' post-test scores on the NML-J were overall higher (M = 3.75, SD = 0.63, n = 133) than their pre-test scores (M = 3.48, SD = 0.59, n = 153; t[284] = 3.72, $p < .001$) with a medium effect size (Cohen's d= 0.61; see Table 4.10). In particular, the students showed improvement in the subscale of the Technical and Communication skills (t [284] = 3.91, $p < .001$) with a large effect size (Cohen's d = 0.86). However, a large confidence interval was obtained in this subscale. The students also showed improvements in the Media Content and Tool Management skills, but Leven's test of this subscale indicated that the assumption of homogeneity of variance was violated.

Table 4.10

The t-test Results Using the NMLS-J in 2020 (Pre: N=*153, Post:* N=*133)*

	Pre		Post					95%CI		
	M	*SD*	*M*	*SD*	*t*	*df*	*p*	*LL*	*UL*	*d*
NMLS-J[a]	3.48	0.59	3.75	0.63	3.72	271.38	<.001	-0.41	-0.12	0.61
Critical and Ethical Thinking skills	3.38	0.62	3.58	0.61	2.44	284	.014	-0.35	-0.03	0.66
Media Content and Tool Management skills[a]	3.50	0.63	3.80	0.69	3.85	270.55	<.001	-0.45	-0.14	0.66
Technical and Communication skills	3.70	0.91	4.11	0.78	3.91	284	<.001	-0.60	-0.19	0.86

Note. CI = confidence interval; LL = lower limit; UL = upper limit.
[a]Welch test is reported because Levene's test indicated that the homogeneity of variances assumption was not met for this variable.

Second Validation Study

The data were collected at the beginning and end of the Media class in 2021 and a *t*-test with independent samples was conducted as in the first validation study. The students' post-test scores on the NMLS-J were overall higher (M = 3.69, SD = 0.62, n = 223) than their pre-test scores (M = 3.75, SD = 0.62, n = 241; t[447.82] = 5.78, $p < .001$] with medium effect size (Cohen's d = 0.64). As seen in the first validation study, the students showed improvement in the subscale of the Technical and Communication skills (t[445.30] = 4.56, $p < .001$) with a large effect size (Cohen's d = 0.83; see Table 4.11). Also, there was a large confidence interval in this subscale.

There were unequal variances in all the *t*-tests in the second study, and thus, Welch's *t*-test was used. According to Delacre et al. (2017), such unequal variances often arise due to some floor or ceiling effect.

Table 4.11

The t-test Results Using the NMLS-J in 2021 (Pre: N = *241, Post:* N = *223)*

	Pre		Post					95%CI		
	M	*SD*	*M*	*SD*	*t*	*df*	*p*	*LL*	*UL*	*d*
NMLS-J[a]	3.39	0.67	3.75	0.62	5.78	447.82	<.001	-0.47	-0.23	0.64
Critical and Ethical Thinking skills[a]	3.21	0.70	3.56	0.66	5.44	448.13	<.001	-0.47	-0.22	0.68
Media Content and Tool management skills	3.35	0.75	3.69	0.69	5.10	447.15	<.001	-0.48	-0.21	0.72
Technical and Communication skills[a]	3.63	0.87	3.99	0.78	4.56	445.30	<.001	-0.51	-0.02	0.83

Note. CI = confidence interval; LL = lower limit; UL = upper limit.
[a]Welch test is reported because Levene's test indicated that the homogeneity of variances assumption was not met for this variable.

Study 3: Performance-Based Assessment

The actual new media literacy levels of students were evaluated, using the NMLS-J. Three educators assessed the face validity of each of the works and papers August 2022. These works and papers were assignments submitted by the known-group students in the study two. All the subscales in the NMLS-J were scored according to the criteria presented in the methodology chapter.

Table 4.12 provides descriptive statistics related to the performance of the Introduction to Linguistics class conducted in the fall of 2020. The Technical and

Communication skills produced a high mean score. However, the skewness was negative, which suggested the data were spread to the left of the mean, and also had one or more large outliers (Field, 2018). Furthermore, the kurtosis was high, which means the data may have had a heavy tail or outliers (Field, 2018). Kurtosis describes the shape of the distribution's tails in relation to the overall shape.

Table 4.12

Descriptive Statistics of Performance-Based Test (N = *132*)

	M	*SD*	Skewness	Kurtosis
Critical and Ethical Thinking skills	3.44	0.93	-1.02	0.68
Media Content and Tool Management skills	3.77	0.71	-0.62	0.35
Technical and Communication skills	4.12	0.77	-1.11	1.24

Table 4.13 shows Pearson's correlation coefficients among each subscale of the NMLS-J, by using actual performance data. High correlations between them were observed. In particular, the Critical and Ethical Thinking skills had a significantly high correlation with the Media Content and Tool Management skills ($r = .812$, $p < .001$).

Table 4.13

Pearson's Correlations Among Performance

	Critical and Ethical Thinking skills	Media Content and Tool Management skills	Technical and Communication skills
Critical and Ethical Thinking skills	_		
Media Content and Tool Management skills	.812**	_	
Technical and Communication skills	.531**	.612**	_

**p<.001

Table 4.14 shows Pearson's correlation coefficients between self-evaluation and actual performance. All the values indicate a weak positive linear relationship. In particular, the correction in the Technical and Communication skills had less than .3 (r = .236, p < .001).

Table 4.14

Correlations Between Self-Evaluation and Actual Performance (N = *133/132*)

	Critical and Ethical Thinking skills	Media Content and Tool Management skills	Technical and Communication skills
r	.321**	.373**	.236**

**p < .001

Table 4.15 provides descriptive statistics on the performance of the Media class in the spring of 2021. Similar to the Introduction to Linguistics class 2020, the Technical and Communication skills also indicated a high kurtosis value. And so did the Media Content and Tool Management skills sub-scale. This suggests that the data may have had a heavy tail or outliers (Field, 2018).

Table 4.15

Descriptive Statistics of Performance-Based Test (N = *223*)

	M	*SD*	Skewness	Kurtosis
Critical and Ethical Thinking skills	3.38	1.03	-1.18	0.89
Media Content and Tool Management skills	3.67	0.76	-0.92	1.71
Technical and Communication skills	4.12	0.76	-0.85	1.44

Table 4.16 shows Pearson's correlation coefficients among each subscale of the NMLS-J, by using actual performance data. There were high correlations between them. In particular, the Critical and Ethical Thinking skills had a significantly high correlation with the Media content and Tool management skills (r =.723, p <.001), as seen in the 2020 class.

Table 4.16

Pearson's Correlations Among Performance

	Critical and Ethical Thinking skills	Media Content and Tool Management skills	Technical and Communication skills
Critical and Ethical Thinking skills	_		
Media Content and Tool Management skills	.732**	_	
Technical and Communication skills	.477**	.613**	_

**p < .001

Table 4.17 shows the correlations between self-evaluation and actual performance. All the values indicate a weak positive linear relationship. However, the correction in the Technical and Communication skills had higher than in the 2020 class (r = .477, p < .001).

Table 4.17

Correlations Between Self-Evaluation and Performance (N = *223*)

	Critical and Ethical Thinking skills	Media Content and Tool Management skills	Technical and Communication skills
r	.347**	.339**	.477**

**p<.001

CHAPTER 5 DISCUSSION

This study aimed to identify latent dimensions of new media literacy that allow faculty to understand the current university students' perspectives in Japan and to examine the validity and reliability of a new media literacy scale (NMLS-J) developed through the identified dimensions. The NMLS-J was not a conceptual model consisting of items deemed necessary by the faculty regarding the use of new media, but rather a model that was more in line with the reality of the current student population and perception. The NMLS-J may consist of items all relevant to the use of new media by current university students in Japan.

This chapter begins with discussing the study findings in comparison to previous research in the literature review, which answers three research questions: (1) what is the underlying structure of new media literacy among current undergraduate students in Japan? (2) does the NMLS-J assess Japanese university students' new media literacy development?; and (3) can the dimension of the NMLS-J be applied to a performance-based test?

The NMLS-J was developed by analyzing the three existing scales selected for this study and their items with 12 dimensions of the 21st century skills (the 21st-C DSF model). The initial item pool created from the three scales consisted of 79 items, and 20 items were removed by three methods by a total of 18 experts. The remaining 59 items formed the initial NMLS-J, which was distributed to six classes and collected 215 data. Of

the 59 items in the initial NMLS-J, 31 items were deleted in the item screening process. EFA was conducted with the remaining 28 items, which were consequently reduced to 15 items. The CFA using SEM confirmed that this three-factor 15-item NMLS-J model is a good fit for the data from the Japanese undergraduate students' perspective.

The deleted items, the items that compose the NMLS-J, and the names of the three factors are discussed below, as well as the implications from the results of the two known-group validation studies (two t-tests and two performance-based tests).

Removed Components

Through the item screening processes and the EFA, three components of the initial theoretical model: creativity, self-direction, and lifelong learning, were deleted. Possible reasons are discussed below.

Creativity

All eight creativity subscale items of the theoretical model disappeared through the item screening phase and the EFA. Even though the DL, the NML, and the MIL all have their creativity-related items, and the creativity subscale in the theoretical model had one of the largest numbers of the items, this study found that these items were not related to any other components' items.

The deletion of the creativity component may be carefully considered from five aspects. First, four out of the eight creativity items removed prior to the EFA were related not to creating completely original content, but rather to adding each student's own unique twist to existing content to make it new. The participants in this study were Japanese students from an era in which they received "jyoho moraru" [information moral] education

on topics such as copyrights and intellectual property from an early age. In such education, the students were cautioned not to alter or modify existing media content without formal permission (Sato et al., 2021). In this sense, it could be interpreted that the participants of this study were aware that productions that "transform" in item# OR2 or "combine" item# CC5 existing content, such as the deleted items, should be avoided.

Second, three creativity items (item# RE2, RE3, and ER4) with low internal consistency included the word "new," which might have led the students to assume that advanced technical skills were necessary for creation. This result may suggest a variation in the participants' technological skills, particularly when creating new content. This may support previous research findings that there is a range of technical skills among digital natives, as seen in the previous chapters (e.g., Livingstone et al., 2008; Kimura & Kondo, 2018). New digital tools and editing software for creating artwork are constantly being updated, and knowledge and proficiency with such software may keep updated as well. Whereas some of these tools may offer new opportunities to engage in original and new media production, these updated tools may also widen the digital skills gaps between students.

Third, however, there is a discrepancy in the MNLS-J in that the remaining item # 14 "developing media content," is about creativity, and the "creativity" aspect has been completely removed. This matter may be interpreted in a different way. That is, although university students may appear to be creating new content for social media, especially using their smartphones, they may not actually view it as a creative activity. According to the latest report about the purpose of Internet use (MIC, 2020), only around 10 % of users answered that it was to create original new content. Livingstone et al. (2005) also pointed

out that not all people are eager to use advanced technology and create online products in daily life. In fact, many of the students in the known-group validity tests commented that the class taught by the researcher was the first time they had worked with memes, videos, and other media production. Japanese students are accustomed to taking classes possible and actively, which could also be related to removing the creativity items. They are not willing to produce a new product.

Fourth, current university students may be more consumers than producers. They may place more value on exchanging and sharing information than creating activities outside the classroom. Alagaran (2012) is concerned that recent media literacy education at universities may be overly focused on making students good media content producers, ignoring the fact that students are also media consumers. In this sense, students may need more critical thinking skills than high creative skills. This may be related to the interpretation of the factor items that remained for the NMLS-J, which will be discussed later.

Finally, however, this study still indicates that creativity is important. Although the NMLS-J does not list creativity as a measure of new media literacy, it does not mean that creativity is not necessary. Both the known-group classes taught by the researcher for this study provided creative activities, and the students showed improvements in the post-test of the NMLS-J. Further, the performance-based assessment's results indicate that three components in the NMLS-J had high correlations between themselves. In addition, as in the previous research results (e.g., Hobbs, 2017; Porat et al., 2018), this study revealed that the students overestimated the self-assessment compared to the performance-based scores.

This suggests that it may be possible to assess the level of the NMLS-J as a performance-based assessment instrument tool more accurately than as a self-measurement tool.

The study by Livingstone et al. (2020) found that the creative skills of students have not improved globally. They conducted the international comparison study using the MIL, and reported that what was common internationally, regardless of income, was that children's digital operational skills were higher than their creative skills. This result supports the findings of this current study, including the same scale, the MIL. Livingstone et al. (2020) suggest that the students may need guidance in creative self-expression because these creativity skills are unlikely to grow on their own.

In addition, given the nature of the Japanese people, it may be difficult to actively create and present things online. While there is a movement to promote further making the classical, passive traditional Japanese classroom into an active environment (MEXT, 2017), it may still be difficult, and it will be necessary to devise a way to do so.

The result of this study suggests that it would be possible to use the NMLS-J in ways other than self-assessment scales, in particular for creative activities. The NMLS-J might be used as an evaluation for a performance-based assessment. The high correlation between the components of the Critical and Ethical Thinking skills and of the Media Content and Tool Management skills indicates that both may be developed through creative activities.

Self-Direction and Lifelong Learning

All the items in self-direction, and lifelong learning were deleted before EFA, because these subscales had only two items. Three out of four items in these subscales are

from the MIL. This result indicates the scales selected for this study barely consider these two categories. There are three possible explanations. First, as van Laar et al. (2017) suggested, self-direction and lifelong learning might be considered approaches for the future, rather than part of skills. These are necessary elements of the 21st century (Voogt & Roblin, 2012), as the MIL also includes them (UNESCO, 2013), but might not be directly related to skills for new media literacy.

Second, this study found the items categorized as self-direction and lifelong learning components had low inter-item correlations ($r < .3$). With regard to lifelong learning, the participants were mostly first-year students, which may mean that they did not seek content related to their future in the media. Similarly, this study, in terms of the self-direction items, found that freshmen may not prefer to identify themselves online, as in the items deleted. In other words, for the students of this study, new media may have value primarily for providing information exchange, communication, and entertainment, rather than determining students' future or online identity. This finding supports studies on the online behavior of current digital natives. They spend large amounts of time focused on entertainment, shopping, or talking with friends (Mizukoshi, 2019; Katz et al., 2021).

Third, it should be considered with caution that all items containing the word, "knowledge" have been removed. While there are items that asked about skills in sharing media content and messages (i.e., information), items that asked about skills in sharing "knowledge" disappeared and were not included in the NMLS-J. It may indicate that the students understand knowledge and information separately.

Buckland (1991) analyzes information into three categories, information-as-process, information-as-knowledge, and information-as-thing. Information-as-process is

information as the act of obtaining or giving information exchange, which varies depending on the situation. Information as knowledge refers to information as knowledge gained through the process. Information-as-thing is information that represents a physical entity. In other words, “knowledge, belief, and opinion are personal, subjective, and conceptual” and “intangible” (Buckland, 1991, p. 351). Students may implicitly feel that information-as-process or information-as-thing is more valuable to share on the Internet than information as knowledge. At the same time, however, students may construct their knowledge using the obtained information, and use it for developing media content, as seen in #14.

The NMLS-J did not have three out of the 12 components of the initial theoretical model: creativity, self-direction, and lifelong learning. The participants in this study considered these three components irrelevant in measuring new media literacy. This result may be applicable to the characteristics of current digital natives. However, from the perspective of empowerment, self-direction and lifelong learning skills should be considered, although these may not be regarded as part of skills or abilities (ven Laar et al., 2017). Future research may be needed to identify possibilities for how to integrate these skills. The next section discusses the constructs of the NMLS-J.

The NMLS-J Components

Split Loadings

Information Management, Problem-Solving, and Flexibility. The three components in the theoretical model: information management, problem-solving, and flexibility skills, were split into two factors, factor 1 and 2 in the NMLS-J model. Yong

and Pearce (2013) suggest that in order to accurately reflect and name variables within a factor, it is necessary to be considered that the variables of split loadings may have little underlying meaning for the factor. In this study, the interpreting and naming of the factors in the NMLS-J carefully reflected the common construct of survey items that loaded solely on the same dimensions. At the same time, however, it cannot be deniable that the categorization into 12 items was ambiguous. Thus, these items in the split loading items might be categorized into other dimensions. Considering this point, the details regarding each factor in the NMLS-J are discussed below.

Three Factors of the NMLS-J

Factor 1: Critical and Ethical Thinking Skills

Factor 1, consisting of seven items, was named *Critical and Ethical Thinking* skills. It was derived from the non-overlapped components of the initial theoretical model: critical thinking and ethical awareness components. This finding indicates that students recognize that critical thinking and ethical awareness skills are related to measuring new media literacy. That is, a high level of critical thinking also requires a high level of ethical awareness in a new media environment from the students' perspective.

In factor 1, there may be several noteworthy points. First, Factor 1 accounted for the largest percentage of the variance (36.4%) to the total variance. That is, the participants placed the most value on this factor. Many scholars have suggested that in the 21st century the center of media literacy is critical thinking, as seen in the literature review chapter (e.g., Buckingham, 2003; Hobbs, 2010; van Laar et al., 2017; Livingstone et al., 2005;

Sakamoto, 2020a). Dale (1969) described literacy as “critical reading, critical listening, and critical observing” (p.135).

However, the previous research did not emphasize the combination of critical thinking and ethical thinking. In a systematic literature review by van Laar et al. (2017), ethical awareness was not addressed in most studies, and not a single study found that critical thinking and ethical awareness are the same dimensions. Neither the DL, the NML, nor the MIL has a dimension combining critical thinking skills and ethical skills, either.

On the other hand, the literature review chapter of this study found that the MIC and the MEXT have not explicitly included critical thinking skills within the framework of media literacy (MEXT, 2019; MIC, 2019). It was also noted that media literacy education in Japanese junior high and high schools is being addressed within the framework of information moral education, but the protectionist approach of enumerating and teaching the dangerous aspects of the Internet is alive and well (Sakamoto, 2020b).

Nonetheless, this study revealed that no protectionist items were found to remain in factor 1. Items related to a warning, such as not posting personal information (item #SE1) and being aware of media risks (item #AP1), were not correlated with other items in this study. Current university students live in a digital environment and are surrounded by diverse online information, and they may already be well aware of a variety of issues and risks that exist around them. This result suggests that accessing and interpreting diverse messages may promote both critical thinking skills and ethical thinking skills.

Rachels and Rachels (2014) state that ethics is generally considered to be in relativism, which means that ethical judgments and values are not absolute but relative, existing in diverse societies and cultures. Information on the Internet is shared under

norms that support democracy. When faced with ethical issues, students need to think critically, considering that there may not be a commonality between ethical concepts and principles. Paul and Elder (2009) also suggest that critical thinking without ethics leads to selfish sophistry. This study may indicate that the students may be aware that there are diverse opinions and cultures, and that autonomous ethical and critical thinking skills are essential.

Furthermore, this study found that all the items in factor 1 were related to individual student behaviors, activities, judgments, and decisions that are not mediated by or subject to connections with others. This finding may support the previous research finding that current digital natives are individualistic before collaborative (e.g., Isaacs et al., 2020) and self-reliant (Kutlák, 2021). The phenomenon of Japanese people who have been regarded as collectivists becoming independents may support the globalization of digital natives, as seen in the literature review section (Takahashi, 2014). In a rapidly changing digital society where digital ethics and norms are also changing, students may first feel the need to use new media responsibly and individually.

While correlating with the other two factors discussed next, factor 1 can be summarized that current university students may value and recognize the relationship between critical thinking skills and ethical awareness. The students may also indicate that making autonomous decisions in a highly diverse online society is more important than protectionist approaches.

Factor 2: Media Content and Tool Management Skills

Factor 2 consisted of seven items and one unique component of the initial theoretical model: collaboration. Whereas the item in the collaboration component produced no significant factor loading in the EFA (.55) and CFA (.48), all the items in factor 2 may be related to collaborative judgments and behaviors mediated by media content connected through digital tools. Thus, this factor was named *Media Content and Tool Management* skills.

In addition, collaboration on the initial theoretical model was the only component for which all the items were passed in the screening process. This means that all the items of collaboration were related to the other items and had some meanings. This result may support the previous study findings that digital natives feel that collaboration and social skills, based on a sense of individual responsibility, are the most valuable skills needed in the 21st century (Ahonen & Kinnunen, 2015; Kats et al., 2021). Kellner and Share (2007) argued that media literacy education aims to have students aware that media content is constructed in a participatory and collaborative manner of meaning within economic, political, or social contexts in a democracy. The students of this study also appear to recognize that new media literacy necessarily involves collaboration skills.

However, the collaboration skills in factor 2 should be carefully considered in three aspects. The items in the collaboration component that were deleted in EFA were different from the item in the collaboration component that remained. The deleted items ask about skills in actively expressing (item #CP3) and contributing opinions online (item #CP1), including influencing the opinions of others and the media communities (item #FP6). On the other hand, the one remaining item #11, using the word “consult with,” does

not directly influence others, but seeks advice or information. This may support the previous research. Current digital natives do not speak out online to create conflicting or opposing opinions (Sriprom et al., 2019). Rather, they use several social media accounts for different purposes and focus on maintaining agreeable relationships (Kats et al., 2021; Tsuzuki et al., 2019). Current digital natives are wary of hierarchical authority and value recognizing each other's diversity in a comfortable community, but do not hesitate to seek advice from those with specific expertise when necessary (Kats et al., 2021). From the students' perspective, this study found that the skills of connecting and consulting with various people may be more important in assessing new media literacy than the skills of actively influencing or discussing others online.

The second notable aspect of factor 2 is that the inclusion of items may imply online networks. This may mean a connection with not only human beings, organizations, or providers (item #8, #11) but also resources by using tools. For example, media content managed by digital tools can be shared and stored with others. The 21st century seems to mean that digital collaboration is enabled by media content and tool management skills on new media. These items may indicate that the students are individually aware of the need for improved search strategies (#10) and proper storage of media content (#9). In other words, not only did the students individually use the information to construct networks to work with, but they also valued the distributed information and media content they obtained by working with digital devices. They may recognize that there may be more information and different perspectives online than they already know (Siemens, 2005).

The third point of interest in factor 2 is with respect to item #12, which evaluates the extent to which students consciously and actively engage in social and public activities.

The item #12 is not an item that assesses the perceived awareness of the risks of such activities, as the deleted similar item claims (item #PA1, “I am aware of the consequences and risks of participating in societal-public activities”). As seen in the literature review, the idea of empowerment, not protection, is the major theme of media literacy (e.g., Buckingham, 1998; Kellner & Share, 2007; Hobbs, 2011). Instead of a protective education that avoids the risks posed by the media, students need to be and value actively exposed to the media and be able to think autonomously. This is an indication that the students also emphasizing the importance of actively interacting with networks and acquiring the ability to think autonomously, rather than protective education that avoids the risks.

In addition, item #12 is meaningful and supports the aims of media literacy, although the factor loading was .33. Silverstone (2004) argues that it is not enough for the purpose of media literacy education to be understood in relation to individual students and their skills, but it should include the skills that make students citizens who contribute to public life. UNESCO (2021) suggests that recent students are highly concerned about social instability, climate change, and racial equity, and feel the need to participate in activities relating to these issues. They feel a responsibility to make the world a better place (Kats et al., 2021). From the students’ perspective as well, new media literacy appears to value empowerment rather than protection, especially with regard to social activities.

Regarding factor 2, the findings of this study can be summarized as follows: in the new media environment, students’ coexistence and collaboration with others, including technology tools and media content as well as various content providers, may be related to

the other items. The students may have assumed that information is open online, and it is important to know where to find it and how to manipulate it, such as through categorization and storage with technology. The students may also have recognized the importance of participating in social activities by autonomously and actively using new media. Factor 2 revealed that the students value assessment with empowerment in relation to the other two factors 1 and 3.

Factor 3: Technical and Communication skills

Factor 3 consists of three items that come from two unique components of the initial theoretical model, Technical and Communication dimensions, and was thus named *Technical and Communication* skills. In total, six out of nine items in technical and communication skills were deleted at the preliminary data analysis stage. There may be some differences between the deleted nine items and the remaining three items.

First, three out of five items in the technical component were deleted through the item screening process. This could be because these deleted items included words such as hardware and icons, which the students may have considered technically advanced. This result supports previous studies that have shown that the technical skills of digital natives are diverse and that digital natives are not necessarily tech-savvy (e.g., Cote & Milliner, 2017; Rodríguez-Moreno et al., 2021; Tatsumi et al., 2012). The remaining two items were related to basic and simple skills that students may consider essential for working on new media platforms.

Second, similarly, three out of the four communication items were removed during the item screening stage. All of the deleted items appeared to be clearly identified

and aware of the people to whom they are sent, such as item #CP5 “make discussions and comments to inform or direct people” or item #SE4, “respectfully relate to the opinions of others when responding.” On the other hand, the remaining item can be interpreted as only sending comments or messages and not being aware of the recipients (item #15).

The results may imply that the students may see value in sharing images and photos online, through multiple social media accounts (Alhabash & Ma, 2017; Samutachak et al., 2020). In other words, university students may place value on distributing information to an unspecified number of people, avoiding serious discussions and anxiety. This may be related to the fact that research has shown that many recent college students are psychologically distressed (Dingli & Seychell, 2015). Basically, Dale (1969) defined communication as “the sharing of ideas and feelings in a mood of mutuality” (p. 10). When information is shared, they may be an expectation that it will be understood.

The Underlying Structure of the NMLS-J

The findings from CFA support the utility of the NMLS-J as a scale of new media literacy for current undergraduate students in Japan. The three factors of the NMLS-J established a good discriminant validity and accomplished the aim by evaluating the crucial skills, Critical and Ethical Thinking skills, Media Content and Tool Management skills, and Technical and Communication skills.

The NMLS-J constructed three distinct components of new media literacy with 15 items (see Table 5.1). First, in assessing new media literacy in a diverse online information environment, the students viewed ethics as important, along with critical thinking skills, as it relates to sharing information (factor 1 and 3). Second, a distinction was made between

skills performed based on individual responsibility (factor 1) and skills that involve collaborating with humans and technology (factor 2). The third is that the creativity component was not in the NMLS-J model. Whereas some university students may actively engage themselves in creative activities for media content, such activities were not directly correlated with other skills in the NMLS-J. Rather, they viewed new media literacy as consisting primarily of skills to search for and share information for their own purpose and public activities.

Based on these results, the initial definition of new media literacy for university students in Japan was revised to *the ability to critically and ethically judge diverse new media content, manage it using digital tools, and connect and share it with networks*. It suggests the ability of university students to make effective use of new media and information while autonomously and organically relating to each skill. Each factor can be defined as follows, and the model of the NMLS-J is represented in Figure 5.1. Factor 1: *Critical and Ethical Thinking* skills refers to the ability to independently find relevant information in a variety of situations, and critically evaluate that information based on reflective reasoning and ethical consideration. Factor 2: *Media Content and Tool Management* skills refers to the ability to collaboratively leverage make media content and online connectivity as needed through the appropriate use of digital tools. Factor 3: *Technical and Communication* skills refers to the ability to recognize online networks and utilize appropriate software to represent and share information and media content.

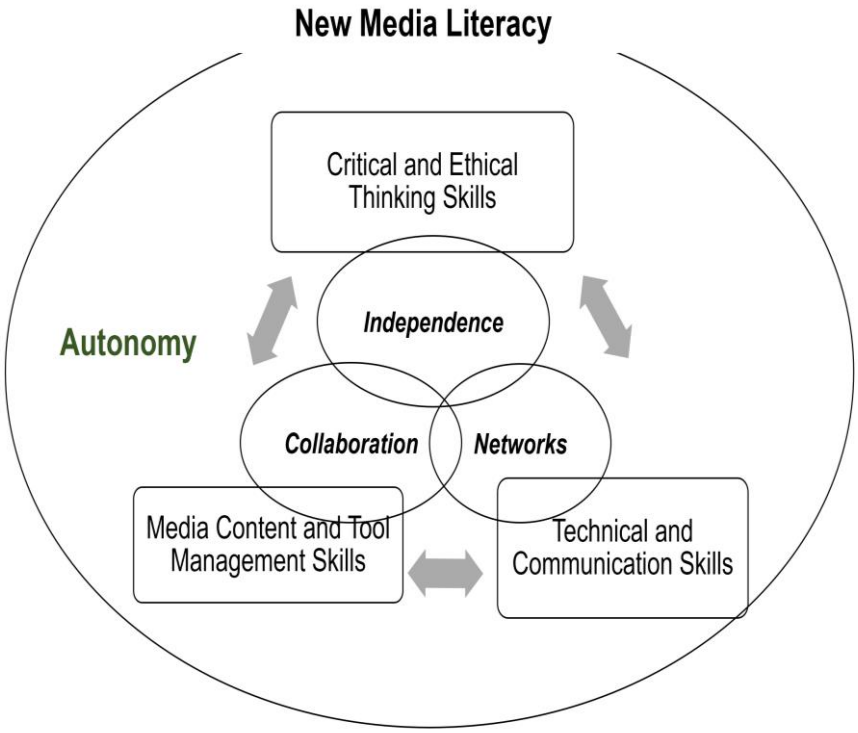
Table 5.1

Items of the NMLS-J

Component		Item
Critical and Ethical Thinking skills	#1	I can make use of various media environments to reach information.
	#2	I can catch up with the changes in the media.
	#3	I can realize explicit and implicit media messages.
	#4	I can classify media messages based on their producers, types, purposes and so on.
	#5	I can assess media in terms of credibility, reliability, objectivity and currency.
	#6	I can determine whether or not media content have commercial messages.
	#7	I can evaluate media in terms of legal and ethical rules (copyright, human rights, etc.)
Media Content and Tool Management skills	#8	I can access selected information and media content through a variety of media and other information providers
	#9	I can select, organize and hold onto the retrieved information and media content using appropriate technologies and tools
	#10	I can refine the search strategy, if required
	#11	I can connect and consult with other individuals, groups, organizations, or levels to formulate a general statement / question
	#12	I can engage and participate in societal-public activities through various means and tools
Technical and Communication skills	#13	I can use basic operating tools (button, hyperlinks, file transfer etc) in the media.
	#14	I can use software necessary for developing media content (text, image, video, etc.).
	#15	I can share digital media content and messages on the Internet.

Figure 5.1

Model of the NMLS-J



Construct Validation of the NMLS-J

Two known-group validity tests were conducted in 2020 and 2021 to test the validity of the NMLS-J constructs, assuming that the variables of the post-classes were higher than those of the pre-classes. Overall, both courses produced a positive *t*-test value with a medium effect size (Cohen's *d*). These results may support that the NMLS-J could

be used to assess the effectiveness of new media literacy in an interdisciplinary context, targeting undergraduates in Japan.

Both courses in this study have increased the students' NMLS-J scores. The results support the researchers' assertion that a laissez-faire approach does not increase media literacy (e.g., Buckingham, 2003; Jenkins, 2006; Livingstone et al., 2020). Furthermore, this current study showed the importance of networks and collaboration. The students in this study were given assignments throughout the semester to increase the frequency of their use of new media outside the classroom, individually and with group members.

Both the courses themed different topics and tasks, and were managed differently, but emerged the improvement in both of them. This result may support the previous research that creativity can stretch critical thinking skills, as seen in the literature review chapter (e.g., Burn, 2015; Hobbs, 2017; Yanagida, 2014).

The overall results of the mean scores at the pre- and post- survey in the Media course were slightly lower than those of the Introduction of Linguistics course. This difference might be related to the students' familiarity with new media. The Introduction of Linguistics course in 2020 was conducted online due to the COVID-19 pandemic situation, and most of the course sessions in 2021 went back to the normal face-to-face class. While staying at home, the students might have connected with other students and used new media more often than in face-to-face settings. The students in the Introduction of Linguistics course in 2020 may have more opportunities to use new media during the semester.

On the other hand, the second validation t-test produced unequal variances in all the components. The results of the *t*-tests applied Welch's test. Some researchers suggest the use of Welch's test, regardless of the result of Levene's test (e.g., Delacre et al., 2017). The descriptive statistics of the performance-based assessment showed high Skewness and Kurtosis scores in the second validation class. This means, the data did not provide the normal distribution. Delacre et al. (2017) suggest that this is usually attributed to some floor or ceiling effects. This case needs future study in the future.

The results of known-group validity tests have provided useful suggestions as to what classroom management approaches may facilitate the growth of students' new media literacy. It seems apparent that traditional classes in which teachers convey knowledge inside the classroom cannot develop students' usage and skills of new media. How the use of new media outside the classroom could be taught and utilized is discussed below.

Learning Theory

The NMLS-J may not be able to explain existing learning theories well, including behaviorism, cognitivism, and constructivism, with mainly three reasons. First, no protectionist items were left in the NMLS-J. This may indicate a rejection of behaviorism. Second, information is selected, organized, stored, and retrieved not only by the schema of the mind, but by technology. This may indicate a rejection of cognitivism. Furthermore, learning content in autonomous networked activities is not planned in a linear fashion, but distributed online. This may indicate a rejection of constructivism. Then, a new learning theory, connectivism developed by Siemens (2005) and Downes (2005), might be applicable and appropriate for the NMLS-J framework. Connectivism is a new learning

theory in the digital age. The key features are “autonomy, diversity, openness, and interactivity or connectedness.” Siemens (2005) describes connectivism as “the integration of principles explored by chaos, network, and complexity and self-organization theories” (Siemens, 2005, p. 5).

Whereas connectivism is a learning theory in a digital age, connectivism does not suggest that technology determines human behavior or culture. Or rather, it emphasizes the importance of connections and networks in learning. Technology is regarded as a tool that can enhance the ability to make connections and navigate networks, but it is not the sole determinant of how individuals learn or interact with each other as in technological determinism.

This theory also argues that learning in a digital age occurs not just by acquiring information, but also making connections between pieces of information and recognizing patterns. On new media platforms where information is abundant and constantly changing, connectivism suggests that the ability to navigate and make sense of these networks is essential for effective learning.

“Autonomy” in the connectivism must not be related to an autonomous driver, but autonomous learner and human behavior. Ultimately, whether technology helps or hinders human collaboration or autonomy must depend on how humans use technology.

However, a gap between connectivism and the NMLS-J may be seen. That is related to knowledge. Siemens (2005) describes it as “Personal knowledge is comprised of a network” (p. 8). Downes (2012) also notes that “knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks” (p. 9). In this study, all items containing the word “knowledge”

were removed; thus, there are no items in the NMLS-J with “knowledge,” as mentioned earlier in this chapter. Whereas collective intelligence, convergence culture, and participatory culture (Jenkins, 2009) should be key in new media environments, current university students might not fully use new media networks to construct knowledge. Future research might be expected in this regard.

Practical Use of the NMLS-J

Through developing the NMLS-J, constituents of the NMLS-J might be able to be applicable for the development or management of class content and assessment of students’ performance or products. It might be possible to gain more precise results and find problems. However, more elaboration should be necessary in order to assess accurately and effectively. For example, students may need to know what final product is expected. Furthermore, some of the questions asked in class may not be directly linked to the content of the class. Therefore, it will be necessary to include more practical, classroom-oriented items in each survey item.

Implication: Practical Use of the NMLS-J

Since the new media environment is outside the classroom, knowing what students consider valuable for media literacy can be instructive to educators and institutions wishing to improve students’ new media literacy. Thus, the following sections will discuss what can be done with the NMLS-J from the perspectives of three user groups: students, educators, and institutions.

Student Use

The premise of the NMLS-J is that it is built on skills that university students, born in the 21st century and raised in a new media environment, view as important. Each skill of the NMLS-J is generic and can be applied to individual situations. University students utilize new media for most courses and assignments, the majority of which are outside of the classroom. Applying the NMLS-J may make it easier for each student to understand each new media literacy level and find ways to improve them.

What students can do with the NMLS-J: 1) Reflect on one's new media use, 2) Share one's knowledge obtained from the NMLS-J with other students; and 3) Regularly diagnose and continually improve one's media literacy. Each of the above examples is explained in more detail below.

Reflect on your New Media Use. New media environments are diverse, and the information out there is vast. The three essential factors of the NMLS-J allow students to reflect on their current literacy levels. For example, if the information is obtained from only one source, the reliability, credibility and currency of the information may be lost (factor 1), and one may miss necessary information, by not effectively using technology to organize media, store information, and connect others (factor 2), and unless one is using the basic operation of new media, the foundation of new media literacy may be undermined (factor 3).

Construct your Knowledge Obtained from the NMLS-J with other Students. By sharing and discussing what is being asked in each item and factor of the NMLS-J with classmates, students may find similarities and differences. Through these activities, new

perspectives and new networks may emerge. For example, students may discuss what media messages are explicit and implicit and what media messages are commercial (factor 1). Information sharing allows one to know what information is available in the media and from information providers, and what public activities are available (factor 2). It is important for students to know what tools are appropriate for information sharing and how they can be used (factor 3).

Regularly Diagnose and Continually Improve your Media Literacy. New media are constantly changing. Skills that students may once have considered sufficient may no longer be applicable, due to changes in media. It may be beneficial to periodically review one's new media literacy, such as at the beginning and end of each semester. For example, students may diagnose whether the information obtained is up-to-date and accurate, along with identifying criteria they can leverage to ascertain whether it is new and reliable or it is not (factor 1), students may need to check whether previously accessed and retrieved information, media content and groups that can still be available (factor 2), and one may check whether needed technology is usable for up-to-date information one wants to obtain (factor 3).

Educator Use

Assuming that students are using new media in any course, educators from various disciplines may be able to take advantage of the NMLS-J. Educators may tend to assume that university students born and raised in a digital environment are media literate (Jenkins, 2006). Alternatively, it is assumed that some educators are aware of students' lack of literacy but may be uncertain about what skills are necessary. The following are

some suggestions for what educators can do with the NMLS-J. These are: 1) know what skills students need and plan accordingly, 2) plan when and how to provide help to learners; and 3)create opportunities for students to enhance media literacy among themselves

Know What Skills Students Need and Plan Accordingly. An educator can identify and address students' media literacy levels through the NMLS-J. Since the NMLS-J is composed of dimensions in which each related skill and factor is deemed important by current university students in Japan, it may be helpful for teachers to know what these are. While individual students are likely to have different new media literacy levels, students are nonetheless uniformly encouraged to use all of the items in the NMLS-J when interfacing autonomously with new media.

Plan When and How to Provide Help to Learners. With a variety of information now open and easily accessible, students are likely to be exposed to a mixture of good and bad media content on a daily basis. Students may be utilizing online information and networks that teachers have never accessed. The NMLS-J may be able to provide a topic for discussion in class with students about what it takes to scrutinize media sources according to their distinct new media literacy levels. It may also be useful to have teachers introduce classes to networks in which students and teachers have participated, or to networks featuring a diversity of information related to the class content.

Create Opportunities for Students to Enhance Media Literacy Among Themselves. Teachers may suggest that students apply the NMLS-J to informal media use outside the classroom. New knowledge and ideas may often come from personal networks and informal Communication in a variety of fields. Teachers may want to suggest that

students check the NMLS-J in a non-coercive manner while encouraging them to actively use new media. It is recommended that students improve their media literacy at home by checking the NMLS-J regularly themselves.

Institutional Use

The NMLS-J can be applied in libraries, information media centers, IT centers, writing centers, and other educational institutions. Professionals at these institutions in university often use a traditional protectionist approach without the opportunity to understand the full picture of students' new media literacy (e.g., Ichikawa et al., 2015; Tatsuta, 2015). Given that professionals at these institutions may not have the opportunity to understand the new media literacy of students and may be unaware of it, they may be uncertain about how to inform their practice to students. The following are some suggestions for what institutions can do with the NMLS-J. 1) Provide opportunities for students to prepare themselves to become new media literate; 2) Evaluate and ensure the students' new media environment is appropriate; and 3) Prepare educators to be resourceful in resolving student issues

Provide Opportunities for Students to Prepare Themselves to Become New Media Literate. Each institution may indicate what it can offer in advance, and conduct orientation programs, if necessary. In particular, freshmen may be confused by the differences in the way they used media up to high school. For example, librarians may inform students about how to find primary and secondary sources of information from

Wikipedia and determine its accuracy (factor 1), how to find ways to contact experts found in books or newspapers (factor 2), and how to share academic information (factor 3).

Evaluate and Ensure the Students' New Media Environment is Appropriate. The changing digital environment requires a more technical understanding of algorithmic and other mechanisms. It would be useful to suggest to students from a professional standpoint how to effectively utilize these technologies and develop the ability to empower themselves autonomously. For example, an information and media center may provide students with ways to evaluate the accuracy and reliability of information from a technical perspective, such as how algorithms work (factor 1), how to properly organize and store the obtained information (factor 2), and how to use the latest software (factor 3).

Prepare Educators to Be Resourceful in Resolving Student Issues. The NMLS-J may provide opportunities for faculty development so that educators can serve students. Teachers may tend to use media in their own areas of expertise and then may not be able to respond to issues encountered by digital native students. If teachers had an opportunity to be prepared in advance, by their institutions on the current state of new media literacy and how to process it, teachers could be more flexible. Educational institutions would do well to provide faculty with up-to-date information so that they, along with their students, can take advantage of the evolving digital environment.

There may be several ways to utilize the NMLS-J from the three stakeholders, students, educators, and institutions. These approaches may need to be modified to best suit individual situations. The vital key may be collaboration among these three stakeholders, which is likely to provide opportunities to appropriately support and develop

students' levels of new media literacy. Such cooperation is significantly achievable in a digital environment, where the NMLS-J could be used and adapted as a checklist.

CHAPTER 6 CONCLUSION

This study developed the NMLS-J from the perspectives of students born and raised in the 21st century. The NMLS-J may help faculty understand how the current students at the university use new media literacy and may be useful in the development of course content and materials in advance. The students themselves may also be able to see if they are up to a standard level of literacy in their use of new media.

The NMLS-J, consisting of three factors, was tested with two known groups of students, which confirmed the validity and reliability of the NMLS-J construction. Based on the results, this chapter offers some implications for new media literacy in the 21st century, and it also discusses some limitations and suggests further future studies.

Implications of the Study

- First, this study found that the NMLS-J may reflect some unique characteristics of the recent digital natives born around 2000. The items of the NMLS-J and their relationship, as well as the removed items, may be consistent with global research findings on current digital natives. Recent digital natives are self-reliant (e.g., Kutlák, 2021) and independent (e.g., Isaacs et al., 2020), as well as collaborative and active in contributing to society (e.g., Ahonen & Kinnunen, 2015). Recent digital natives are actively connected to various new media; however, they do not necessarily engage in

online discussions or explicitly argue and debate their opinions online. Recent digital natives are resistant to authoritarianism but comfortably consult with experts on an equal footing on the Internet (Kats et al., 2021). All these research findings may be consistent with the results of this NMLS-J development study.

This result may lead to the fact that Japanese university students are becoming globalized and sharing some similar characteristics of current global digital natives (e.g., Takahashi, 2014).

- This study confirms that a protectionist approach to new media literacy education for university students may not be beneficial. There was not a single protectionist item left in the NMLS-J to guard against risky content, through the item screening phase and EFA. In other words, self-protective items, such as being careful not to disclose personal information and avoiding inappropriate content, did not correlate with any proactive decision-making skills, such as thinking critically and accessing diverse media. Instead, the students may feel that the more they access and actively use diverse content in new media, the more they develop critical and ethical thinking skills autonomously.

- This study proposes that a creativity dimension may be unnecessary in measuring new media literacy for this study population. Although there was a background of increased education requiring students to create media works in order to encourage active participation in class and critical thinking skills in Japan (e.g., Tsuchiya, 2021), the

NMLS lacked support for this. Rather, the correlation showed that the critical analysis regarding risk content increased proportionally as media access increased. This result suggests that creativity in new media, which involves technical skills, unlike the reading and writing skills of traditional literacy, has a wider range of educational objectives, which may be a concern that leads to technological determinism (Banaji et al.2010). Advanced technical skills for producing creative works digitally do not correlate with developing the various skills included in new media literacy. In other words, this result implies that the development of creativity in new media may require an intervention and guide, with solid educational objectives and current students' ability to use technology. From the student's perspective, this study indicates that the exchange and consumption of information may be more comfortable and valuable in the new media environment, and that students also correlatively perceive the importance of critically and ethically scrutinizing information.

- This study implies that autonomous skills may be essential for new media literacy. Factor 1 suggests that in order to take advantage of individual autonomous critical thinking skills, it is necessary to have ethics based on relative standards that look at the network society as a whole. Critical thinking in Japan is likely to be considered only to confirm the intentions of the sender of media messages or content and the authenticity of information (Sakamoto, 2020a). Messages exchanged within the framework of new media need to be understood not solely in terms of the sender's intentions, but also in light of the fact that various messages are received by multiple people in diverse social contexts, including social power and justice.

Factor 2 indicates that individual autonomous tool management skills may be essential to maximizing the use of technology and media content generated by diverse people online. Furthermore, factor 3 suggests that effective personal technical skills may be a necessity for expanding the network through communication. The students may realize the importance of understanding the wealth, convenience, complexity, and diversity of information they drive from new media. The best way to develop students' skills to see the entire network and autonomous skills may be to encourage students to use new media and to engage in open discussion.

- This study proposes that managing media content may be an important dimension in measuring new media literacy. New media literacy may require students to learn how to search, select, and further store a piece of media information in a new media environment where diverse media information is now available. Traditional media literacy involves viewers analyzing the media text itself from various angles, including languages and the producer's point of view. On the other hand, the NMLS-J suggests that a dimension of tool management to effectively use and connect a piece of media information and content distributed on the Internet as needed may be important to new media literacy from the students' perspective.

- This study proposes that the key theoretical elements of the NMLS-J may be the relationships between independence, collaboration, and networks. Technological skills may be needed to achieve these connections. Factor 1 and 2 indicate that the students may use new media individually, but also prefer to use and make sense of information

collaboratively. It may be extremely student-centered and network-driven. In other words, the students may be learning outside the classroom, apart from the well-planned learning in the classroom. Given that university courses may be expected to connect with society and solve fluid and complex social problems, it will be imperative that the courses provide opportunities to generate knowledge using information from the Internet and its diverse networks.

- This study proposes that the NMLS-J can be applied by students, educators, and institutions individually. New media have removed the distinction between the classroom and outside of the classroom, as well as the link to various course subjects. Each factor and item in the NMLS-J are related and may be used as a self-check. In addition, students may be able to use the NMLS-J to understand how to apply what they have learned to societal and public activities through media tools. Educators may be able to improve their course content and materials, as well as provide opportunities in class for students to review their results with each other and with groups of students and discuss ways to improve their new media literacy. Institutions may also be able to use the NMLS-J to understand what educational elements students expect or lack.

Limitations of the Study

While this study may have made useful suggestions to stakeholders regarding new media literacy and new media literacy education, it has some limitations.

First, due to the COVID-19 pandemic, data collection was severely limited. The sample selected was a convenient sample of mostly first year students from one university.

This was fewer than the originally planned number of samples. The data of this study barely fulfilled the requirements; thus, this sample may represent only a narrow scope of the population of Japanese undergraduate students.

Second, the data used for this study were collected with great care, taking time after each class to allow the students to respond honestly, but response bias may exist. In addition, this study continued using English, which may have caused some misinterpretations or discrepancies in students' responses. Concerns must remain about relevance and generalization. Further, the expert students who participated in the panel review were students recommended by media faculty, but the experts are not necessarily representative of expert university students.

In addition, it should be noted that some of the items from the NML, the DL, and the MIL had some equivocality and ambiguity. These items might have varying interpretations of the meaning of the words, and importantly, some not necessarily be identical to each component. For example, through the panel discussion, the item "make use of various media environments to reach information" was categorized into the Problem-solving component of the 21st-C DSF. Still, one member insisted that it should be in the Information management component. Likewise, the item "understand the political, economic, and social dimensions of media content" was categorized into the ethical awareness component of the 21st-C DSF, although it might also have the meaning of the Cultural awareness component. This equivocality partially explains the complexity of the components of the 21st-C DSF in the NMLS-J model. These limitations inevitably call for future research.

Recommendations for Future Research

This study may be able to provide some valuable suggestions and implications for media literacy education and university students in Japan. However, further research will be necessary to confirm these suggestions and improve the NMLS-J.

- It will be needed to increase the sample size and reconfirm the validity and reliability of the NMLS-J. A larger sample size could yield estimates of population loadings that are more stable and precise.

- Future research should include pre-post *t*-tests in various classes to investigate the validity and reliability of the NMLS-J. In doing so, a mixed-methods approach, including qualitative research and performance-based assessments, would be useful. Response biases, such as overestimating or underestimating, are inevitable in questionnaire tests (e.g., Paulhus, 1991). In addition, the results of the NMLS-J may be expected to vary, depending on the presence or absence of new media literacy educational interventions and the class content (Hobbs, 2017). The details and correlations with qualitative data should be investigated for future use of the NMLS-J and for improving new media literacy assessments and education.

- Future research should include comparative studies on the validity of the NMLS-J in universities in other areas and countries. The literature and this current study have found that digital natives are a global phenomenon. The survey items used in this study are from the DL, the NML, and the MIL, which are used worldwide. It would be

worthwhile to consider whether the NMLS-J would be adaptable in other areas in Japan as well as other countries. The NMLS-J might need to develop an NMLS-Universal version (NMLS-U).

- A proposed Japanese version of the NMLS-J is in Appendix V. It should be noted that it is still under development, as back-translation still needs to be done. Some Japanese translations may have different meanings and interpretations.

- Future research should examine and validate different grades and longitudinal studies. Since the NMLS-J was designed primarily for first-year university students, some of the 15 survey items in the higher grades may cause ceiling effects that render the variance of the independent variable unmeasurable (Salkind, 2010). Correlations on similar scales should be considered to determine convergent validity.

- Future research should investigate the relationship between the NMLS-J scores and academic performance in the classroom, in particular, in terms of knowledge generation and collective intelligence. The NMLS-J is intended to be a versatile instrument tool that could be used in a variety of classes, but depending on the content of the class, the same students may have different results. A detailed survey, specifically quantitative and qualitative, will help to determine the actual state of new media literacy and the revision of the NMLS-J.

- Future research would be useful to investigate the relationship between each factor of the NMLS-J and a related independent variable in a cross-sectional study. For example, examining correlations with what students spend most of their time online, playing games globally, shopping abroad, and using e-books, would help find the impact of new media literacy in daily use.

- Future research will be needed to further the suggestions and implications made in Chapter 5 on what the three user groups (students, educators, and institutions) can do with the NMLS-J. New media are constantly evolving; thus, there is a need to understand the digital environment where current digital natives live outside of class. Improving new media literacy will not be a stand-alone effort within the classrooms in charge of media literacy, but will require in-depth studies that involve various institutions, communities, and society.

- The NMLS-J removes three of the twelve elements of the original theoretical model. They are creativity, self-direction, and lifelong learning. Participants in this study believed that these three components were irrelevant to the measurement of new media literacy. This result may be true for the characteristics of today's digital natives. However, these are essential parts of the 21st century as global citizenship (UNESCO, 2022). Future research may be needed to explore the possibility of integrating these skills.

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Appendix A

Criteria for Scale Selection

1. Information literacy
2. Media literacy
3. Digital literacy
4. The survey is based on a behaviorist perspective.
5. The survey is based on a cognitivist perspective.
6. The survey is based on a constructivist perspective.
7. The survey has a protectionist item.
8. The survey has an empowerment item.
9. It can be used globally and adapted locally.
10. It is widely applied as a versatile tool.
11. It was examined for validity and reliability.
12. In developing the scale or framework, it has been revised and refined well several times by several researchers and investigators.
13. The conceptual and theoretical framework applied to the scale has been well developed.
14. The questions do not require knowledge of a specific culture or country.
15. The components are dynamic, not linear, leading from foundation to application.
16. The English in question is understandable by Japanese university students.
17. All questions are publicly available.
18. The survey considers 21st century skills perspectives.
19. It has items related to activities that take place outside of the classroom.
20. It has items about skills available in the school's course content.

Appendix B: Scale Selection

Author(s) (Year)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	***Total x***
Maksl et al (2017)	x		x		x		x	x			x	x	x		x		x		x		*11*
Koc and Barut (2016)	x	x	x	x		x	x	x	x	x	x		x	x		x	x		x	x	*16*
Hallaq (2016)	x	x	x			x		x			x			x	x	x	x		x	x	*12*
Literat (2014)		x	x			x		x			x		x	x	x	x	x		x		*11*
Young (2017)		x	x			x		x			x		x	x	x	x	x		x		*11*
Eristi & Erdem (2017)		x	x	x			x			x	x			x		x	x		x	x	*11*
Inan & Temur (2012)		x	x			x	x	x			x				x	x	x		x		*10*
Ashley et al. (2013)		x	x			x		x			x	x	x	x	x	x	x		x		*12*
Duran et al. (2008)		x	x			x	x	x			x				x		x		x		*9*
Kurbanoglu et al. (2006)	x		x	x	x					x	x		x	x		x			x	x	*11*
Clark & Catts (2007)	x				x				x	x	x	x	x	x		x	x		x	x	*12*
Pinto (2011)	x		x		x				x		x	x	x	x	x	x	x		x	x	*13*
Porat et al. (2018)	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	*17*
UNESCO (2013)	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	*18*
van Deursen et al. (2016)	x		x		x				x	x	x	x			x	x	x		x	x	*12*

Appendix C

Theoretical Frameworks (Media literacy, Information literacy, Digital literacy)

Aufderheide (1993)

- Media are constructed and construct reality
- Media have commercial implications
- Media have ideological and political implications
- Form and content are related in each medium, each of which has a unique aesthetic, codes, and conventions
- Receivers negotiate meaning in media

Bazalgette (1992)

- Agencies (who produces this text?)
- Categories (What kind of text is it?)
- Technologies (How is it produced?)
- Languages (How do we know what it means?)
- Audiences (To whom is it addressed, and how do we know?)
- Representations (How does it present its subject?)

Hobbs (2010)

- Authors and Audiences (AA)

AA1: Authors create media messages for profit and/or influence

AA2: Authors target specific audiences

- Messages and Meanings (MM)

MM1: Messages contain values and specific points of view

MM2: Different people interpret messages differently

MM3: Messages affect attitudes and behaviors

MM4: Multiple production techniques are used

- Representations and Reality (RR)

RR1: Messages filter reality

RR2: Messages omit information

Buckingham (2003)

Representation, Language, Production, and Audience

Hallaq (2016)

Ethical Awareness, Media Access, Media Awareness, Media Evaluation, Media Production

Jenkins (2006)

Play: The capacity to experiment with one's surroundings as a form of problem-solving

Performance: The ability to adopt alternative identities for the purpose of improvisation and discovery

Simulation: The ability to interpret and construct dynamic models of real-world processes

Appropriation: The ability to meaningfully sample and remix media content

Multitasking: The ability to scan one's environment and shift focus as needed to salient details

Distributed Cognition: The ability to interact meaningfully with tools that expand mental capacities

Collective Intelligence: The ability to pool knowledge and compare notes with others toward a common goal

Judgment: The ability to evaluate the reliability and credibility of different information sources

Transmedia Navigation: The ability to follow the flow of stories and information across multiple modalities

Networking: The ability to search for, synthesize, and disseminate information

Negotiation: The ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms

(Visualization: The ability to create and understand visual representations of information)

Bordac (2009)

Formal application, Theoretical analysis, Contextual analysis, Communication

Ontario Association for Media Literacy (1987, as cited in Pungente & O'Malley, 1999)

- All media are constructions
- The media construct reality
- Audiences negotiate meaning in media
- Media messages have commercial implications
- Media messages contain ideological and value messages
- Media messages contain social and political implications
- Form and content are closely related in media messages
- Each medium has a unique aesthetic form

ARLC (2015)

- Authority Is Constructed and Contextual
- Information Creation as a Process
- Information Has Value
- Research as Inquiry
- Scholarship as Conversation
- Searching as Strategic Exploration

ARLC (2000)

- The information literate student determines the nature and extent of the information needed.
- The information literate student accesses needed information effectively and efficiently.
- The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.
- The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.
- The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

SCONUL (2011)

- Identify: Able to identify a personal need for information
- Scope: Can assess current knowledge and identify gaps
- Plan can construct strategies for locating information and data
- Gather: Can locate and access the information and data they need
- Evaluate: Can review the research process and compare and evaluate information and data
- Manage: Can organise information professionally and ethically
- Present: Can apply the knowledge gained: presenting the results of their research, synthesising new and old information and data to create new knowledge and disseminating it in a variety of ways

CAUL Australian and New Zealand Information Literacy Framework (Bundy, 2004)

Standard One: The information literate person recognises the need for information and determines the nature and extent of the information needed

Standard Two: The information literate person finds needed information effectively and efficiently

Standard Three: The information literate person critically evaluates information and the information seeking process 16

Standard Four: The information literate person manages information collected or generated

Standard Five: The information literate person applies prior and new information to construct new concepts or create new understandings

Standard Six: The information literate person uses information with understanding and acknowledges cultural, ethical, economic, legal, and social issues surrounding the use of information

van Deursen and van Dijk (2010)

Operational skills or 'button knowledge': The operational manipulation of computer and Internet software and hardware

Formal skills: The ability to understand and use formal characteristics of computers and the Internet, such as hyperlinks or moving between Internet pages

*Information skill*s: The skills required to search, select, handle and critically evaluate Internet and digital media contents

Strategic skills: The capacity to use the Internet to one's personal advantage.

Communication skills: The skills needed to participate in online networks

*Content creation skill*s: The practical skills needed to create and distribute content on the Internet

DigComp (Ferrari, 2013)

Information: identify, locate, retrieve, store, organise and analyse digital information, judging its relevance and purpose.

Communication: communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness.

Content-creation: Create and edit new content (from word processing to images and video); integrate and re-elaborate previous knowledge and content; produce creative expressions, media outputs and programming; deal with and apply intellectual property rights and licences.

Safety: personal protection, data protection, digital identity protection, security measures, safe and sustainable use.

Problem-solving: identify digital needs and resources, make informed decisions as to which are the most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, update one's own and others' competences.

DigComp 2.2 (Vuorikari et al., 2022)

Information and data literacy, Communication and collaboration, Digital content creation, Safety, Problem solving

Appendix D: Comparison Scales

Author(s) (Year)	Author(s) of the theoretical framework	Key features	Limitations	Dimensions
Maksl et al (2017)	Hobbs (2006)	-Knowledge about news reporters and news companies. -The relationship between thinking and knowledge of news understanding.	-Focused on mass media content, and consumer aspects. -The survey questions were designed for Americans.	Automatic vs. Mindful Thought Processing, Media locus of control, News media knowledge structures
Koc and Barut (2016)	Chen et al (2011), Buckingham (2003)	-Evaluates the use of information available on the Internet from multiple perspectives.	The distinction between functional question items and critical question items is unclear.	Functional consumption, Critical consumption, Functional presumption, Critical prosumption
Hallaq (2016)	Hallaq (2016), Bordac (2009)	Focuses on the Internet as used in daily life.	Most of the items are biased toward everyday online use (e.g., online banking, online shopping).	Media awareness, Media access, Ethical awareness, Media evaluation, Media production
Literat (2014)	Jenkins (2006)	Digital participation (Facebook, Twitter, YouTube, Blogging, creating media projects)	-Focuses on adult participants who already have a certain degree of media literacy. -The content of the survey was not necessarily appropriated for university students.	Play, Performance, Simulation, Appropriation, Multitasking, Distributed Cognition, Collective Intelligence, Judgment, Transmedia Navigation, Networking, Negotiation, Visualization

Young (2017)	Jenkins (2006)	How people in the nonprofit human service organization use social media	The content of the survey was not necessarily appropriated for university students	Play, Performance, Simulation, Appropriation, Multitasking, Distributed Cognition, Collective Intelligence, Judgment, Transmedia Navigation, Networking, Negotiation, Visualization
Eristi & Erdem (2017)	Aufderheide (1993), Bazalgette (2007), Jolls (2008)	Survey items grouped under four basic media literacy skills; access, analyze, evaluate and communicate	Lack of items that participate in the media such as production, collaboration, problem solving, etc.	Access, Analyze, Evaluate, Communicate
Inan & Temur (2012)	Aufderheide (1993)	Evaluates the extent to which college students participating in a program to train future teachers to teach media literacy to children are media literate	Focuses on mass media such as TV, newspapers, and magazines	13 survey items related to mass media
Ashley et al. (2013)	Hobbs (2006)	Focuses on college students, by evaluating baseline levels of news media literacy including access, evaluate, analyze and create news media products.	Many of the questions are specific to US news content.	Authors and audiences, Messages and meanings, Representation and reality

Duran et al. (2008)	5 Ws and 1 H	Four open-ended units on media literacy knowledge, media structures, and influences	Questions about media knowledge, specifically mass media	Media knowledge, Media influence, Content analysis
Kurbanoglu et al. (2006)	Bandura (1977)	The relationship between self-efficacy and information literacy	Lack of informal aspects.	Intermediate information literacy skills, Advanced information literacy skills
Clark & Catts (2007)	Council of Australian University Librarians (CAUL) Australian and New Zealand Information Literacy Framework	Developed with a focus on the ability of medical students to obtain and use information correctly.	Lacks informal aspects; web description but lacks digital aspects Lacks collaborative aspects	Discipline, Generic skills, Information skill, Values and Beliefs, Topic
Pinto (2011)	IL-HUMASS (Information Literacy Humanities Social Sciences) (2010)（KSA、Declaretive knowledge procedural)	The relationship between information search, evaluation and dissemination of information, motivation, self-efficacy, and favorite sources of learning	-Lacks an informal aspect Lacks a collaborative aspect -Lacks a digital aspect - Lacks a collaborative aspect	Information Retrieval, Evaluation, Processing, Communication/Dissemination. Three Self-Report Dimensions: Motivation, Self-Efficacy, Favorite Sources of Learning
Porat et al. (2018)	Eshet-Alkalai (2012)	A conceptual framework of the literacy and digital literacy-related skills people need to function in the digital age	Lacks collaboration, with many aspects of personal use	Photo-Visual Literacy, Branching Literacy, Reproduction Literacy, Information Literacy, Socio-Emotional Literacy, Real-Time Literacy

UNESCO (2013)	UNESCO (2013)	Created with the goal of developing media literacy, information literacy, and digital literacy among all citizens. Basically for teachers	-Many information literacy items. Many items in the overall questionnaire. - Most sentences are long and have difficult words.	Accesses and retrieves information and media content Understands, assesses and evaluates information and media Creates, utilizes, and monitors information and media content
van Deursen et al. (2016)	the Internet Skills Scale (ISS)	Focus on what an individual needs to use the Internet	Focus is on personal use of the Internet, not on its connection to society.	Operational, Information navigation, Social, Creative, Mobile

Appendix E Question items of the NML framework

Functional consumption

1. I know how to use searching tools to get information needed in the media.
2. I can catch up with the changes in the media.
3. I can make use of various media environments to reach information.
4. I can realize explicit and implicit media messages.
5. I can notice media contents containing mobbing and violence.
6. I understand political, economical and social dimensions of media contents.
7. I can perceive different opinions and thoughts in the media.

Critical consumption

8. I can distinguish different functions of media (communication, entertainment, etc.).
9. I can determine whether or not media contents have commercial messages.
10. I can classify media messages based on their producers, types, purposes and so on.
11. I can compare news and information across different media environments.
12. I can combine media messages with own opinions.
13. I can consider media rating symbols to choose which media contents to use.
14. I can make decision about the accuracy of media messages.
15. I can analyze positive and negative effects of media contents on individuals.
16. I can evaluate media in terms of legal and ethical rules (copyright, human rights, etc.)
17. I can assess media in terms of credibility, reliability, objectivity and currency.
18. I can fend against the risks and consequences caused by media contents.

Functional prosumption

19. I can create user accounts and profiles in media environments.
20. I can use hardware necessary for developing media contents (text, image, video, etc.).
21. I can use software necessary for developing media contents (text, image, video, etc.).
22. I can use basic operating tools (button, hyperlinks, file transfer etc) in the media.
23. I can share digital media contents and messages on the Internet.

24. I can make contribution or comments to media contents shared by others.
25. I can rate or review media contents based on personal interests and liking.

Critical prosumption

26. I can influence others' opinions by participating to social media environments.
27. I can make contribution to media by reviewing current matters from different perspectives (social, economical, ideological etc.).
28. I can collaborate and interact with diverse media users towards a common purpose.
29. I can construct online identity consistent with real personal characteristics.
30. I can make discussions and comments to inform or direct people in the media.
31. I can design media contents that reflect critical thinking of certain matters.
32. I can produce opposite or alternative media contents.
33. I can produce media contents respectful to people's different ideas and private lives.
34. I can create media contents that comply with legal and ethical rules.
35. I can develop original visual and textual media contents (video clips, web page, etc.)

Appendix F Question items of the DL framework

Photo-visual literacy (PV)

1. I can understand information presented in an illustration.
2. I can understand information presented in a map.
3. I can understand meanings represented by the icons of an app.

Reproduction literacy (RE)

1. I can address things that other people wrote online, when writing a new text of my own.
2. I can connect with a number of different online sources when writing a new text of my own.
3. I can use others' illustrations to create a new illustration/collage of my own.
4. I can use others' videos to create a new video of my own.

Branching literacy (BR)

1. I can navigate my way through a complex website with many web pages.
2. I can construct meaning from information on a website with many web pages.
3. I am not getting lost on a website with many web pages.

Information literacy (IN)

1. I can find the information I'm looking for on the internet.
2. I can identify incorrect to inaccurate information in a list of internet search results.
3. I can compare information from different websites to check whether the information I found is reliable.

Social-Emotional literacy (SE)

1. I am careful not to post personal information about myself when I send a message through email, forums, Twitter, Facebook, etc.
2. I am careful not to post personal information about my friends when I send a message through email, forums, Twitter, Facebook, etc.
3. I can stay aware of the possibility that a message that I wrote in an email, forum, SNS, WhatsApp, Facebook, etc., could reach other people, such as parents or teachers.
4. I respectfully relate to the opinions of others when responding through email, forum, Twitter, Facebook, etc.

Real-Time thinking literacy (RT)

1. I can ignore ads that pop up while looking for information for an assignment.
2. I can ignore messages that pop up while looking for information for an assignment.
3. I respond and react quickly when I'm playing a digital game or simulation.

Appendix G Question items of the MIL framework

Dimension: Definition and articulation of a need for information

Competency: Media and information literate person is able to determine and articulate the nature, role and scope of the information and media (content) through a variety of resources

1. Recognizes the need for information and media content
2. Defines the need for information and media content
3. Recognizes the need and importance of media and information providers
4. Determines and specifies information needs linking with key and relevant concepts, disciplines and subjects in order to transform a need into a form for an action
5. Knows that different types of information needs / problems require different sources of information (other people, groups, organizations or objects) and/or places from which something comes, arises, was created or obtained (such as library, archive, media, Internet)
6. Assumes that different types of information needs / problems may not be solved without others' help, such as people, groups or organizations
7. Connects and consults with other individuals, groups, organizations, or levels to formulate a general statement / question
8. Formulates a general statement / question based on information need into a form of an active statement / question, vocalizes, writes down, types, constructs, expresses using any technique in an explicit and efficient manner

Dimension: Search and location of information and media content

Competence: Media and Information literate person is able to search and locate information and media content

9. Develops search strategy (-ies) to find appropriate information, media content, information providers, means and tools
10. Knows roles and functions of information producers and media institutions in society where information and media content could be found and located
11. Explores, determines and situates the place / site where information and media content could be located by any instrument/tool and place, such as any physical and/or virtual place
12. Seeks to identify an author, producer, organizer, disseminator of information and media content
13. Understands the role of metadata
14. Identifies, differentiates and prioritizes potential information sources by type of information source, date, topic, author, sender, receiver, keywords, tags and terms, etc.
15. Appreciates diversity of information and media content provided by information providers and media, as well as appreciates diverse formats
16. Distinguishes formats of information and media resources
17. Decides what types of information and media resources are required
18. Knows importance and relevance of tools for locating information and media content
19. Recognizes limitations, challenges and possibilities of locating information and media content due to technical, legal, economic, social-cultural, political and other reasons
20. Refines search strategy, if required
21. Locates those information sources, using appropriate tools

Dimension: Access to information, media content and media and information providers

Competency: Media and information literate person is able to access needed information and media content effectively, efficiently and ethically, as well as media and information providers

22. Determines the method(s) and strategy(-ies) for accessing information and media content
23. Determines the availability, costs, time, benefits and applicability of acquiring the needed information and media content, applying the method(s) and strategy(-ies) formulated above
24. Follows basic laws, regulations, policies, rights and principles related to ethical access to: information, documentary heritage, media content, ICTs, other media and information providers
25. Acknowledges the importance of the rules, laws and regulations related to access to information
26. Knows that access to information and media content could be restricted
27. Uses diverse tools to access information and media content
28. Accesses selected information and media content through a variety of media and other information providers
29. Accesses media and other information providers, including those on the Internet, for self-expression, creativity, social and political participation

Dimension: Retrieval and holding / storage/ retention of information and media content

Competency: Media and information literate person is able to retrieve and temporally hold information and media content using a variety of methods and tools.

30. Uses various systems and tools to retrieve most suitable information and media content in a variety of formats
31. Uses other forms of inquiry in order to retrieve information

32. Retrieves different types of information
33. Selects, organizes and holds onto the retrieved information and media content using appropriate technologies and tools
34. Knows requirements, rules and practices of holding information and media content
35. Assumes that retrieved information and media content could be useful in future
36. Applies basic requirements of holding information and media content

Dimension: Understanding of information and media

Competency: Media and information literate person understands necessity of media and information providers in society

1. Understands principles and conditions necessary for media and information providers to fulfil their functions
2. Understands role and functions of media and information providers in society to inform, teach, influence and entertain
3. Recognizes that media and information providers have implications for society
4. Knows that the work of media and information providers and their impact can and should be monitored
5. Knows concepts of ethics and rights related to media and information and international and professional standards
6. Recognizes the impact of information and media content on oneself
7. Identifies how information and media content can be represented differently and in different formats
8. Identifies and differentiates who owns and creates information and media content
9. Understands authorship and rights of authors

10. Appreciates the importance of acknowledging others' work in terms of authorship and rights
11. Knows about editorial independence and censorship of information and media content, as well as media and information institutions
12. Recognizes that audiences/users interpret information and media content in different ways
13. Knows that there are various viewpoints in any information and media content
14. Appreciates information and media content applying aesthetic criteria and formats
15. Understands the codes and genres of different media and information platforms
16. Understands the importance of advertisement in media and information providers

Dimension: Assessment of information and media content, and media and information providers

Competency: Media and information literate person is able to assess, analyse, compare, articulate and apply initial criteria for assessment of the information retrieved and its sources, as well as evaluate media and information providers in society

17. Defines assessment criteria for information and media content retrieved and information sources: purpose, audience, authorship, credibility, significance, supplier, relevance, currency, reliability, completeness, accuracy, timelines, scope, and coverage.
18. Creates or uses basic assessment instrument(s)
/ tool(s) for evaluation of information and media content, as well as media and other information providers
19. Selects and summarizes main elements such as ideas, keywords, concepts, messages and themes from retrieved information and media content
20. Understands the purpose and importance / significance of information and media content and its context on sustainable development

21. Interprets, makes connections on the retrieved information and media content, and restates in own words
22. Distinguishes editorial independence and recognizes censorship of information and media content and media content, and media and other information providers
23. Describes the intended audiences of the retrieved information and media content
24. Identifies, analyses and differentiates diverse advertising messages, processes, techniques, standards, and codes of practice
25. Identifies and verifies additional information sources, methods and search strategies using diverse tools

Dimension: Evaluation of information and media content, and media and information providers

Competency: Media and information literate is able to evaluate and authenticate information and media content gathered and its sources and media and information providers in society

26. Defines evaluation criteria and appropriate tools
27. Aware about limitations and subjectivity of evaluation
28. Identifies and unionizes related needs / topics / issues and asks additional questions
29. Examines information and media content gathered, and its sources as well as media and information providers
30. Evaluates information and media content gathered, its sources as well as media and information providers
31. Compares information from different media and information sources
32. Understands the importance of life cycle of information and media content for evaluation
33. Draws conclusions from information and media content gathered using various technique and makes a judgement

34. Provides arguments for the drawn conclusions

Dimension: Organization of information and media content

Competency: Media and information person is able to synthesize and organize information and media content gathered

35. Takes and records own notes and summarizes
36. Revises, refines, frames and narrows his/her initial need / problem / issue / question
37. Groups and organizes information and media content
38. Understands the importance of indexing selected information and media content through indexation
39. Uses tools and format for organization of information and media content
40. Stores relevant information and media content based on evaluation for future use
41. Translates information and media content and from one format to another
42. Synthesizes information and media content from several formats such as print, audio, video

Dimension: Creation of knowledge and creative expression

Competency: Media and information literate person is able to create/produce new information, media content or knowledge for a specific purpose in an innovative, ethical and creative manner

1. Recognizes that existing information and media content could be combined with original thought, experimentation, and/or analysis to produce new information and knowledge
2. Organizes the information gathered and media content in a manner that supports the purposes and format of new information, media content or knowledge as well as solves the problem

3. Considers the importance of socio-cultural aspects of the target audience, such as gender, race, age, ability etc.
4. Internalizes, integrates, formulates and presents information and media content gathered using tools and formats into a new context – prior knowledge
5. Reflects and, if needed, revises the creation process
6. Applies international standards, requirements, recommendations for new knowledge creation in an ethical manner
7. Is aware of the importance of information accessibility standards and recommendations for reaching out to a specific target audience
8. Customizes information and media content, applying information accessibility standards and recommendations
9. Uses various tools for the creation and aesthetic presentation of new knowledge in various formats
10. Realizes that new knowledge may have various far-reaching purposes and consequences

Dimension: Communication of information, media content and knowledge in an ethical and effective

Competency: Media and information literate person communicates information, media content and knowledge in an ethical, legal and effective manner, using appropriate channels and tools manner through the media and ICTs

11. Knows that new knowledge should be shared, distributed and communicated
12. Chooses a communication medium, format and license that best supports the communication, distribution and sharing of information, media content and knowledge, taking into account the size and type of audience

13. Uses a range of information and communication technologies and applications for the purpose of communicating, distributing and sharing information, media content and knowledge
14. Identifies, copies, communicates, distributes, shares information, media content and knowledge in contextually-relevant settings to the target audience
15. Communicates information and media content in an ethical way
16. Communicates information and media content in a legal way
17. Knows how to protect own work, personal data, civil liberties, privacy and intellectual rights
18. Aware of the consequences and risks of communicating, distributing and sharing knowledge in virtual worlds
19. Understands the interdependencies between users and victims/ perpetrator/ bystanders / witnesses of ICTs and media platforms
20. Shares information, media content and knowledge through a range of media and tools

Dimension: Participating in societal-public activities as active citizen

Competency: Media and information literate person is able to be engaged with media and information providers for self-expression, intercultural dialogue and democratic participation through various means in ethical, effective and efficient manner

21. Recognizes the importance of being engaged and involved in societal-public activities, through various media and information providers
22. Aware of the consequences and risks of participating in societal-public activities, including in virtual worlds
23. Shares and interacts with other creators, producers, users, information providers and targeted audience, physically or virtually, and via a range of tools

24. Engages and participates in societal-public activities through various means and tools

Dimension: Monitoring influence of information, media content, knowledge production and use, as well as media and other information providers

Competency: Media and information person is able to monitor the impact of created and distributed information, media content and knowledge, as well as existing media and other information providers

25. Knows about the need/importance of monitoring shared information, media content and knowledge
26. Uses or establishes monitoring means/ mechanisms and policies/instruments for periodical assessment of the effectiveness of intended impacts
27. Monitors and makes judgements on shared information, media content and knowledge, such as quality, impact, and integrity of practices
28. Identifies and analyses how target audience responded to information, media content and knowledge and its impact
29. Knows and uses available information and media monitoring services and tools
30. Knows how results of monitoring could be used for improvement or creation of new information, media content and knowledge
31. Knows how to monitor media ownership and its implications
32. Understands the functions and role of institutions providing public relations services and how these influence the audience and decision making;
33. Monitors the functions of public relations services and lobbyists
34. If required, redirects and recasts information and media content, based on the comparison of actual results with intended results

35. Knows how and where to communicate appreciation or complaints

Appendix H

Notification of Investigation Results

Date: 2/12/2020

To (Applicant): Prof. Insung Jung
From: President, International Christian University

Document No.: 2019-48
Name of Research Project: Comparison of Digital Media Literacy Scales from the Perspective of Social Empathy: Implications for Social Media Literacy for Japanese University Students
Individual Responsible for Research: Hisayo Kikuchi

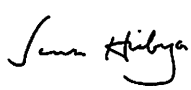
I herewith notify you of the following results of the Research Ethics Committee's investigation of the above named research project.

1. Decision:
   - ■ Approved
   - ☐ Conditional approval
   - ☐ Changes recommended
   - ☐ Rejected
   - ☐ Not applicable

2. Reason:
   N/A

3. Remarks:
   N/A

※ If changes are recommended, investigation request must be resubmitted.

Signature: 

Appendix I

調査協力の同意書

この研究は、「デジタル・メディア・リテラシー」に関しての研究です。ご協力をお願いいたします。

１．研究の目的

最終的な研究の目的は、海外で良く利用されているデジタル・メディア・リテラシー尺度の比較を通して、新しいリテラシー尺度（ソーシャル・メディア・リテラシー尺度）を作成することです。

２．今回の調査依頼内容

デジタル・メディア・リテラシー尺度の質問数を、この座談会を通して減らすことが目的です。

３．調査時間

座談会時間は約２時間（説明時間を含む）を予定しています。

４．調査依頼に関して

この研究に協力することによって不利益なことは一切生じません。協力に謝礼金はありませんが希望があれば、今回の研究終了後、本研究の成果を知らせます。下記の e-mail に連絡をください。

５．プライバシー

座談会はすべて本人の任意で、途中で参加をやめることができます。所属学部、年齢以外、この座談会であなたのプライベートなことを尋ねることはありません。また本研究で得られた調査情報は、全てこの研究のみに使用し、第三者にデータが漏洩することはありません。

６．同意書

この同意書、２部にサインをしてください。１部は研究者である私（菊池）が回収します。もう１部は、あなたが保管をしてください。

以上

２０２０年　　月　　日

菊池尚代　　サイン

連絡先メールアドレス：hisayod@gmail.com　菊池尚代

以上の内容に同意します。

氏名：　　サイン：

Appendix J UNESCO

1. Definition and Articulation (DA)

1. I can recognize the need for information and media content
2. I can connect and consult with other individuals, groups, organizations, or levels to formulate a general statement/question

2. Search and Location (SL)

1. I seek to identify an author, producer, organizer, disseminator of information and media content
2. I can refine search strategy, if required

3. Access to Information (AI)

1. I can acknowledge the importance of the rules, laws and regulations related to access to information
2. I can access selected information and media content through a variety of media and other information providers

4. Retrieval and holding (R)

1. I can select, organize and hold onto the retrieved information and media content using appropriate technologies and tools
2. I assume that retrieved information and media content could be useful in future

5. Understanding Information (U)

1. I know concepts of ethics and rights related to media and information and international and professional standards
2. I understand the importance of advertisement in media and information providers

6. Assessment of Information (AS)

1. I can create or use basic assessment instrument(s)/ tool(s) for evaluation of information and media content, as well as media and other information providers
2. I can select and summarize main elements such as ideas, keywords, concepts, messages and themes from retrieved information and media content

7. Evaluation of Information (EV)

1. I can evaluate information and media content gathered, its sources as well as media

and information providers
2. I can compare information from different media and information sources

8. Organization (OR)

1. I can store relevant information and media content based on evaluation for future use
2. I can translate information and media content and from one format to another

9. Creation of Knowledge (CK)

1. I can use various tools for the creation and aesthetic presentation of new knowledge in various formats
2. I realize that new knowledge may have various far-reaching purposes and consequences

10. Communication of Information (CO)

1. I know that new knowledge should be shared, distributed and communicated
2. I can choose a communication medium, format and license that best supports the communication, distribution and sharing of information, media content and knowledge, taking into account the size and type of audience

11. Participating in Societal Public Activities (PA)

1. I am aware of the consequences and risks of participating in societal-public activities, including in virtual worlds
2. I can engage and participate in societal-public activities through various means and tools

12. Monitoring Influence of Information (MO)

1. I can monitor the functions of public relations services and lobbyists
2. I know how to monitor media ownership and its implications

Source: UNESCO's Global Media and Information Literacy Assessment Framework (2013)

Appendix L

The researcher will verbally explain directions in Japanese before the surveys starts, after the researcher's classes are over. The surveys will be conducted online after the following a consent form and direction.

::

ONLINE (Google Forms)

学部： [ ]
性別： □男性 □女性
年齢： □１８ □１９ □２０ □２１ □２２ □２３
この研究に関しての同意書 オンライン にクリックをしました：
□はい いいえ□

::

Directions: There are four different scales. Each scale has a different scale type. The term "media" used here refers to the following, unless otherwise specified: current digital technology platforms including but not limited to web sites, online forums, social networks, video sharing sites and virtual worlds in which anyone can share any digital content.

- SCALE

1) Strongly disagree ⇔ 5) Strongly agree (１． とても反対 ⇔ ５． とても賛成)

オンライン用

1	I can create user accounts and profiles in media environments.
2	I can ignore messages that pop up while looking for information for an assignment.
3	I can understand meanings represented by the icons of an app.
4	I can store relevant information and media content based on evaluation for future use

5	I can navigate my way through a complex website with many web pages.
6	I respectfully relate to the opinions of others when responding through email, forum, Twitter, Facebook, etc.
7	I can transform information and media content from one format to another.
8	I can use others' illustrations to create a new illustration/collage of my own.
9	I can compare information from different websites to check whether the information I found is reliable.
10	I can create media contents that comply with legal and ethical rules.
11	I can analyze positive and negative effects of media contents on individuals.
12	I can select and assess main elements such as ideas, keywords, concepts, messages and themes from retrieved information and media content.
13	I am careful not to post personal information about my friends when I send a message through email, forum, Twitter, Facebook, etc.
14	I am aware of the consequences and risks of participating in societal-public activities, including in virtual worlds.
15	I am careful not to post personal information about myself when I send a message through email, forum, Twitter, Facebook, etc.
16	I understand the importance of advertisement in media and information providers
17	I can use various tools for the creation and aesthetic presentation of new knowledge in various formats
18	I can use software that are necessary for developing media content (e.g., texts, images, videos, etc.).
19	I can classify media messages based on their producers, types, purposes and so on.
20	I can share digital media content and messages on the Internet.
21	I can select, organize and hold onto the retrieved information and media content using appropriate technologies and tools
22	I can influence others' opinions by participating in social media environments.
23	I can make contributions or comments to media content shared by others.
24	I can design media content that reflects critical thinking of certain matters.

25	I can produce opposite or alternative media content.
26	I can develop original visual and textual media content (video clips, web page, etc.)
27	I can rate or review media content based on personal and others' interests and likings.
28	I can assess media in terms of credibility, reliability, objectivity and currency.
29	I can perceive different opinions and thoughts in the media.
30	I can refine search strategies, if required
31	I can evaluate media in terms of legal and ethical rules (copyright, human rights, etc.)
32	I can make contributions to media by reviewing current matters from different perspectives (e.g., social, economic, ideological etc.).
33	I understand the political, economic and social dimensions of media content.
34	I can produce media content respectful to people's different ideas and private lives.
35	I can catch up with the changes in the media.
36	I can access selected information and media content through a variety of media and other information providers.
37	I can engage and participate in societal-public activities through different means and tools
38	I can use hardware necessary for developing media contents (text, image, video, etc.).
39	I can construct meaning from information on a website with many web pages.
40	I can ignore ads that pop up while looking for information for an assignment.
41	I can choose a communication medium, format and license that best supports the Communication, distribution and sharing of information, media content and knowledge, taking into account the size and type of audience
42	I can make discussions and comments to inform or direct people in the media.
43	I can connect between a number of different online sources when writing a new text of my own.

44	I can combine media messages with own opinions.
45	I can use others' videos to create a new video of my own.
46	I can address things that other people wrote online, when writing a new text of my own.
47	I can make a decision about the accuracy of media messages.
48	I can construct online identity consistent with personal characteristics.
48	I realize that new knowledge may have various far-reaching purposes and consequences.
50	I assume that retrieved information and media content could be useful in future.
51	I can use basic operating tools (e.g., buttons, hyperlinks, file transfers, etc.) in the media.
52	I know how to use searching tools to get the information needed in the media.
53	I can collaborate and interact with diverse media users towards a common purpose.
54	I can connect and consult with other individuals, groups, organizations, or levels to formulate a general statement/question
55	I can realize explicit and implicit media messages.
56	I can determine whether or not media content has commercial messages.
57	I can notice media content containing mobbing and violence.
58	I can make use of various media environments to reach information.
59	I know that new knowledge should be shared, distributed and communicated.

調査協力の同意書

この研究は、「デジタル・メディア・リテラシー」に関しての研究です。ご協力をお願いいたします。

１．研究の目的

最終的な研究の目的は、海外で良く利用されているデジタル・メディア・リテラシー尺度を利用して、新しいリテラシー尺度（ソーシャル・メディア・リテラシー尺度）を作成することです。

２．今回の調査依頼内容

５９問の質問に答えていただきます。回答はすべてオンライン上で行ってください

３．調査時間

回答時間は約２０～３０分（説明時間を含む）を予定しています。

４．調査依頼に関して

この研究に協力することによって学生のみなさんに不利益なことは一切生じません。成績にも一切、反映されません。協力学生に謝礼金はありませんが希望があれば、今回の研究終了後、本研究の成果を知らせます。下記の e-mail にその旨を連絡してください。

５．プライバシー

回答はすべて本人の任意で、途中で回答をやめることができます。回答はオンライン上で行われ、年齢、学部以外、個人を特定できる質問はありません。本研究で得られた調査情報は、全てこの研究のみに使用し、第三者にデータが漏洩することはありません。途中で、わからないことがあれば、質問をしてください。

６．同意書

この調査の同意は、オンラインで回答を開始する前にオンライン上で行ってください。い。

以上

年　　月　　日

菊池尚代

連絡先メールアドレス：hisayod@gmail.com　菊池尚代

Appendix M

調査協力の同意書

この研究は、「デジタル・メディア・リテラシー」に関しての研究です。ご協力をお願いいたします。

１．研究の目的

最終的な研究の目的は、海外で良く利用されているデジタル・メディア・リテラシー尺度を利用して、新しいリテラシー尺度（ソーシャル・メディア・リテラシー尺度）を作成することです。

２．今回の調査依頼内容

15 問の質問に答えていただきます。回答はすべてオンライン上で行ってください

３．調査時間

回答時間は約 10 分（説明時間を含む）を予定しています。

４．調査依頼に関して

この研究に協力することによって学生のみなさんに不利益なことは一切生じません。成績にも一切、反映されません。協力学生に謝礼金はありませんが希望があれば、今回の研究終了後、本研究の成果を知らせます。下記の e-mail にその旨を連絡してください。

５．プライバシー

回答はすべて本人の任意で、途中で回答をやめることができます。回答はオンライン上で行われ、年齢、学部以外、個人を特定できる質問はありません。本研究で得られた調査情報は、全てこの研究のみに使用し、第三者にデータが漏洩することはありません。途中で、わからないことがあれば、質問をしてください。

６．同意書

この調査の同意は、オンラインで回答を開始する前にオンライン上で行ってください。い。

以上

年　　月　　日

菊池尚代

連絡先メールアドレス：hisayod@gmail.com　菊池尚代

1	I can make use of various media environments to reach information.
2	I can determine whether or not media contents have commercial messages.
3	I can realize explicit and implicit media messages.
4	I can catch up with the changes in the media.
5	I can assess media in terms of credibility, reliability, objectivity and currency.
6	I can refine search strategy, if required
7	I can access selected information and media content through a variety of media and other information providers
8	I can evaluate media in terms of legal and ethical rules (copyright, human rights, etc.)
9	I can engage and participate in societal-public activities through various means and tools
10	I can connect and consult with other individuals, groups, organizations, or levels to formulate a general statement / question
11	I can select, organize and hold onto the retrieved information and media content using appropriate technologies and tools
12	I can share digital media contents and messages on the Internet.
13	I can use software necessary for developing media contents (text, image, video, etc.).
14	I can use basic operating tools (button, hyperlinks, file transfer etc) in the media.
15	I can classify media messages based on their producers, types, purposes and so on.

Appendix O

Criteria for Critical and Ethical Thinking skills.

- Did the work utilize a variety of media resources, including databases, Wikipedia, social media, news websites, and news curation, and critically analyze them?
- Did the student use accurate primary sources?
- Did the work include references and consider legal and ethical aspects?

Criteria for Media Content and Tool Management skills.

- Did the student openly try to obtain information by sending questions to others who might know the answer online and thorough various media outlets?
- Did the student make use of technology to store and organize the individual media information they obtained?
- Was the student positive about participating in various online networks?

Criteria for Technical and Communication skills.

- Did the student use basic software and finish the media content?
- Did the students establish open communication?

調査協力の同意書

この研究は、「デジタル・メディア・リテラシー」に関しての研究です。お忙しいところ、誠に恐縮ですが、どうかご協力をお願いいたします。

１．研究の目的

最終的な研究の目的は、海外で良く利用されているデジタル・メディア・リテラシー尺度の比較を通して、新しいリテラシー尺度（ソーシャル・メディア・リテラシー尺度）を開発することです。

２．今回の調査依頼内容

開発した尺度を利用して、学生の作品を評価していただきます。

３．調査時間

回答時間は約１２０分（説明時間を含む）を予定しています。

４．調査依頼に関して

この研究に協力することによる不利益は一切生じないよう十分に配慮いたします。この研究終了後、本研究の成果を知らせます。お手数ですが、下記の e-mail に連絡をください。

５．プライバシー

回答はすべてご本人の任意で、途中で回答をおやめいただくこともできます。ご本人を特定できるご質問はなく、プライベートは守られます。本研究で得られた調査情報は、全てこの研究のみに使用し、第三者にデータが漏洩することはありません。

以上

以上

２０２２年　８月　　１日

菊池尚代　　サイン

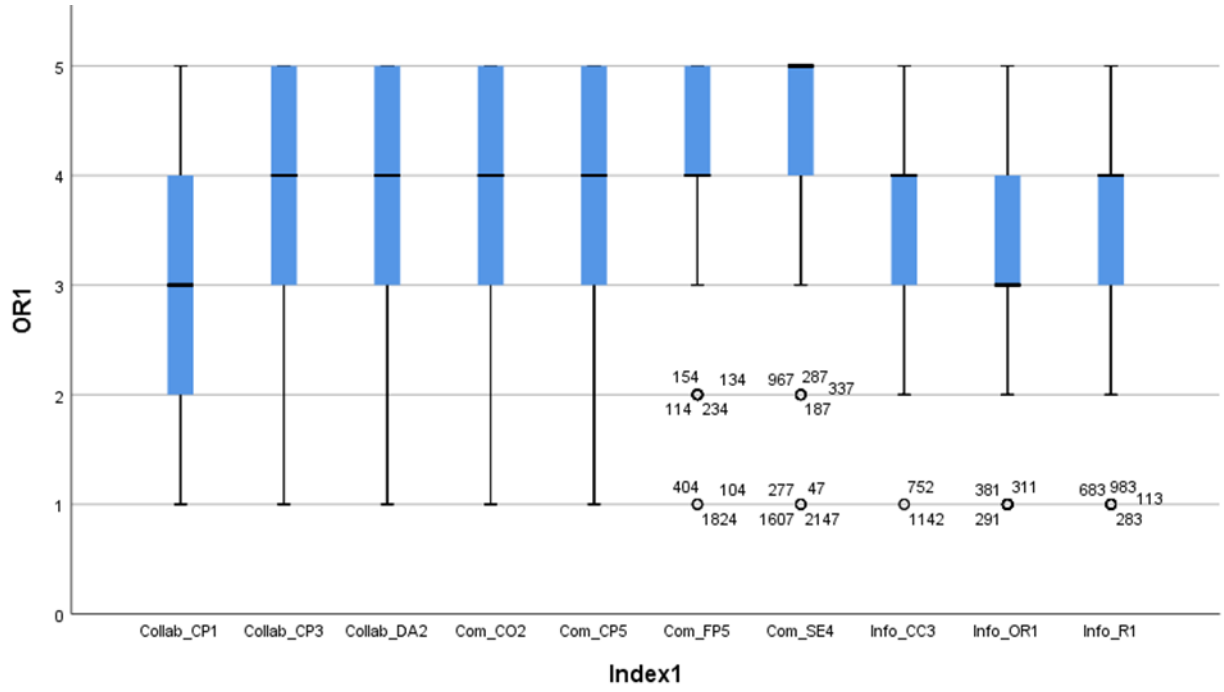
連絡先メールアドレス：hisayod@gmail.com　菊池尚代

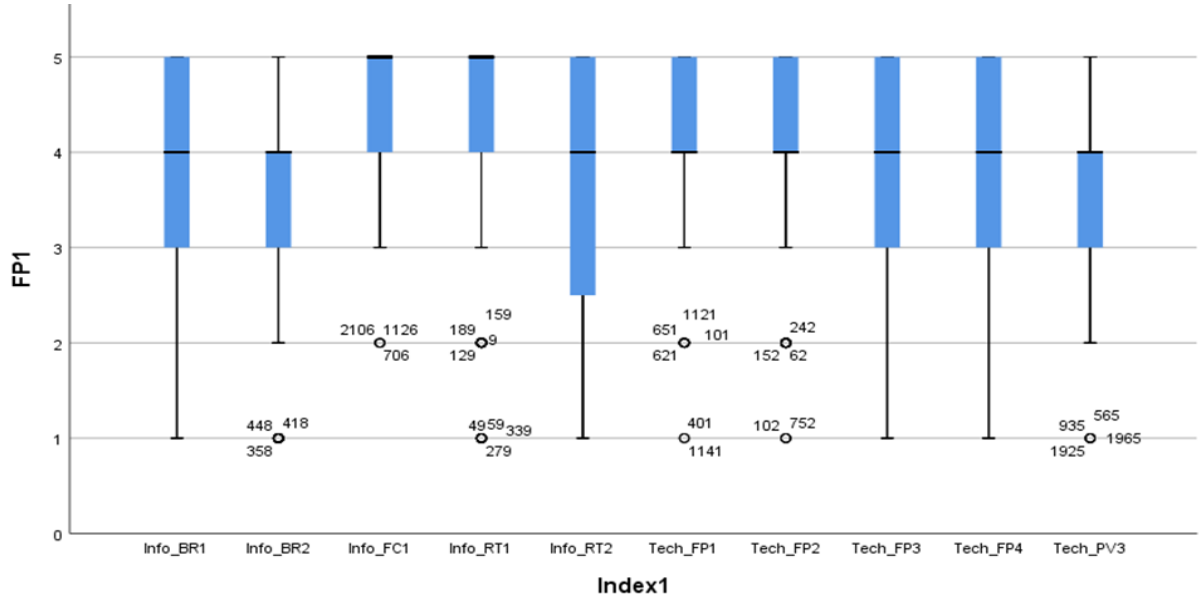
＿＿＿＿＿＿＿＿＿＿＿＿

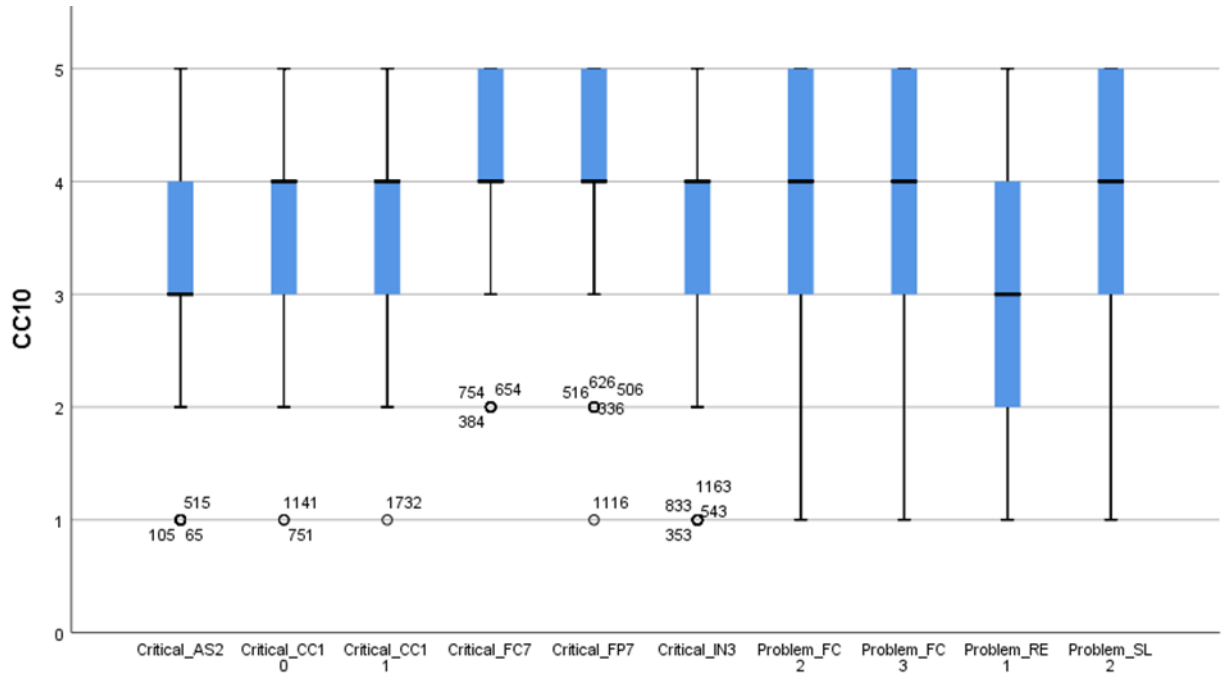
以上の内容に同意します。

氏名：　　サイン：

Appendix P Boxplots



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4
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105
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1141
751
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754
654
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1116
1163
833
543
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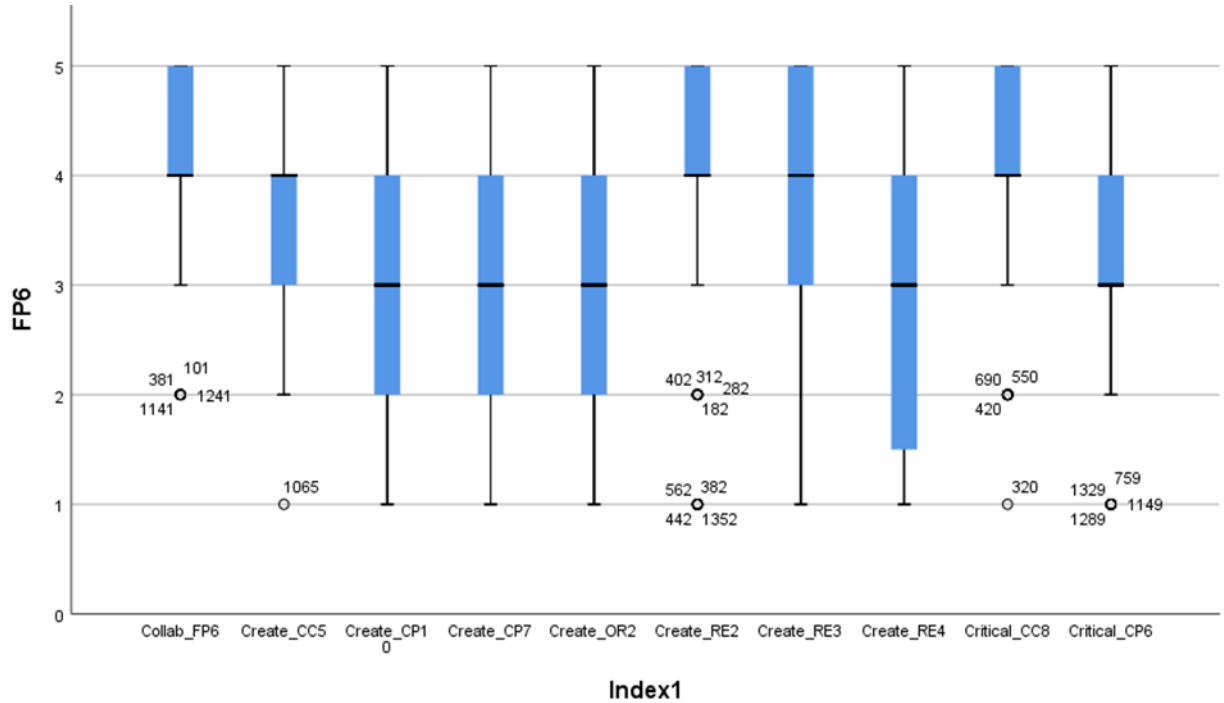
Critical_FC7
Critical_FP7
Critical_IN3
Problem_FC2
Problem_FC3
Problem_RE1
Problem_SL2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442
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690
550
420
320
1329
759
1289
1149
Collab_FP6
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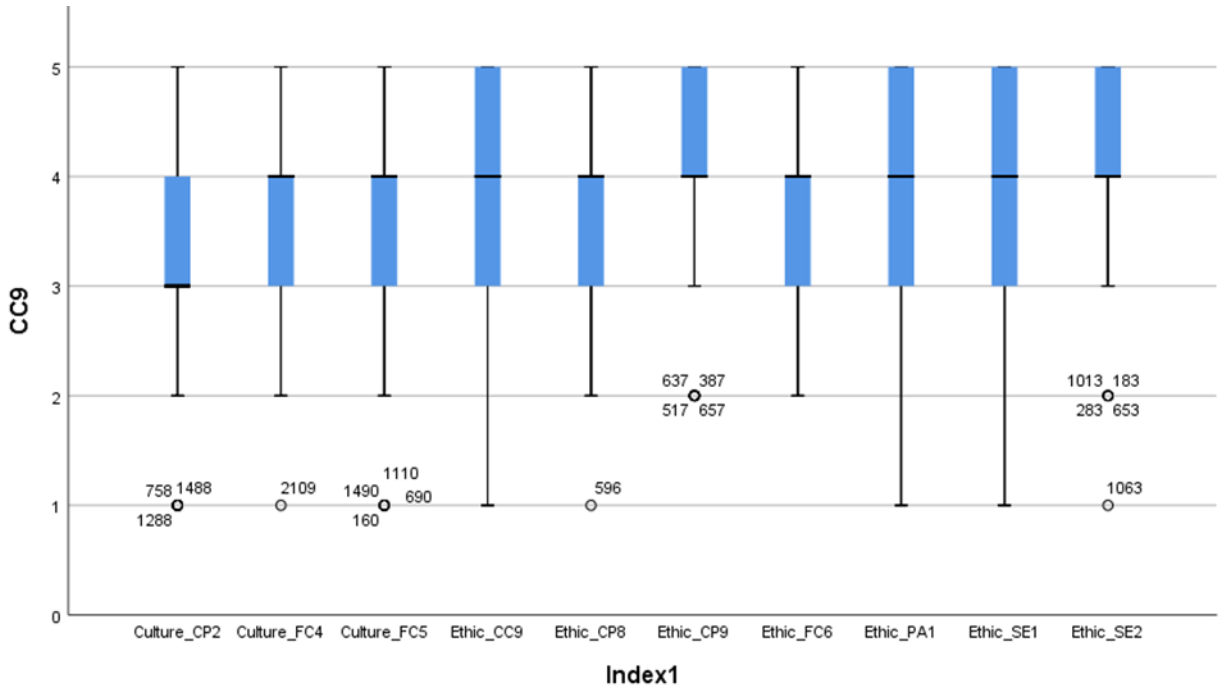
Create_CP10
Create_CP7
Create_OR2
Create_RE2
Create_RE3
Create_RE4
Critical_CC8
Critical_CP6
Index1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1013 183
283 653
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2109
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596
1063
Culture_CP2
Culture_FC4
Culture_FC5
Ethic_CC9
Ethic_CP8
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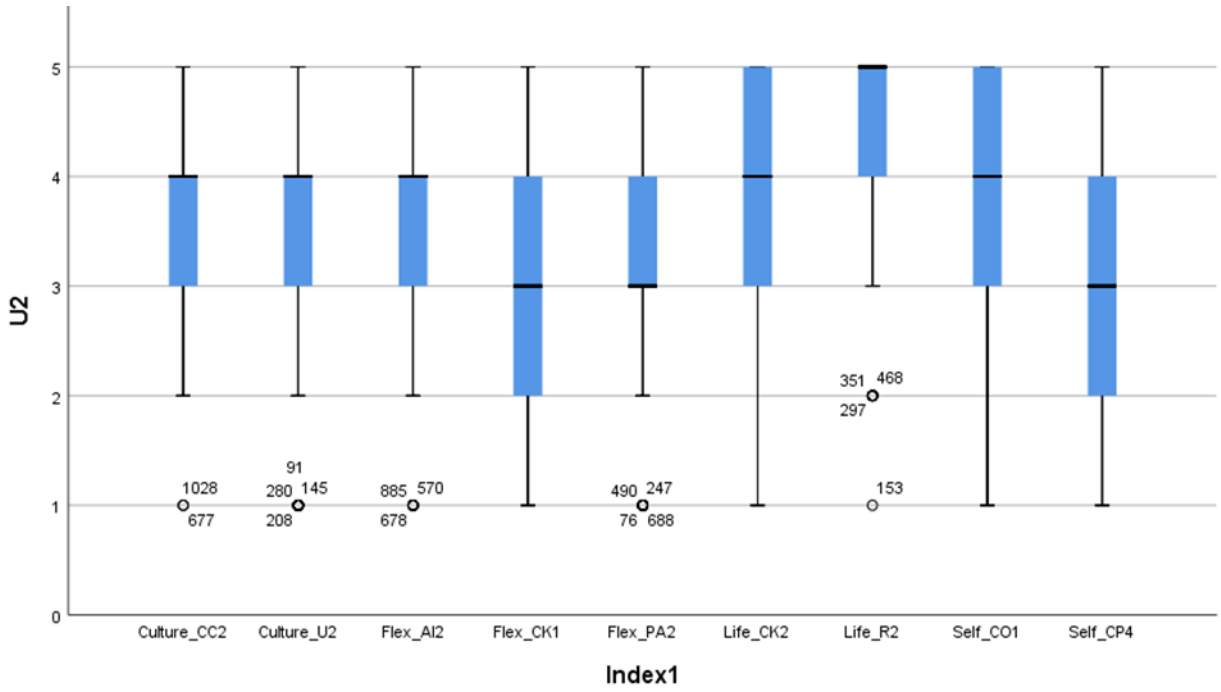
Ethic_FC6
Ethic_PA1
Ethic_SE1
Ethic_SE2
Index1


U2
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1028
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208
885 570
678
490 247
76 688
153
Culture_CC2
Culture_U2
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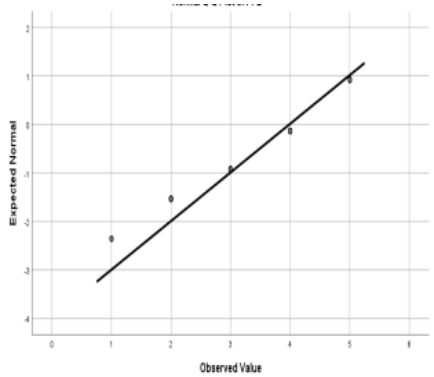
Flex_CK1
Flex_PA2
Life_CK2
Life_R2
Self_CO1
Self_CP4
Index1

Appendix Q. Q-Q plots



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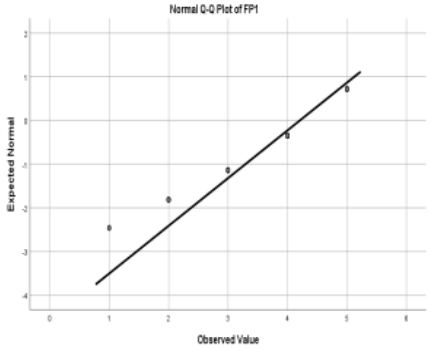

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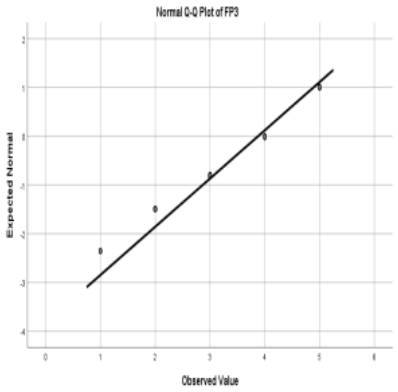

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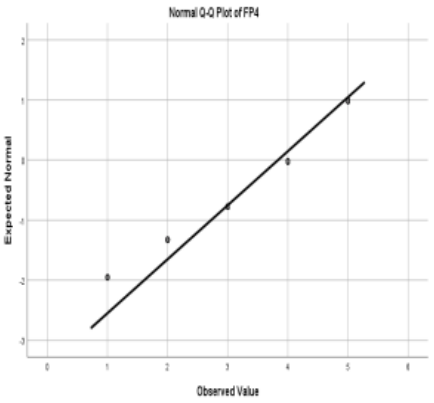

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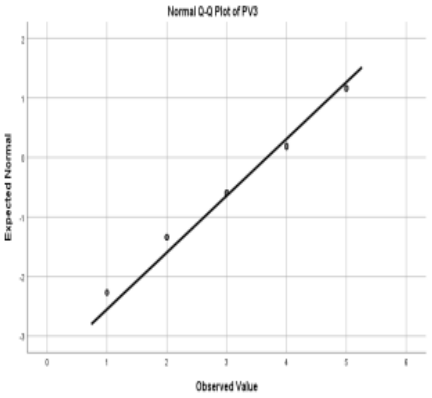

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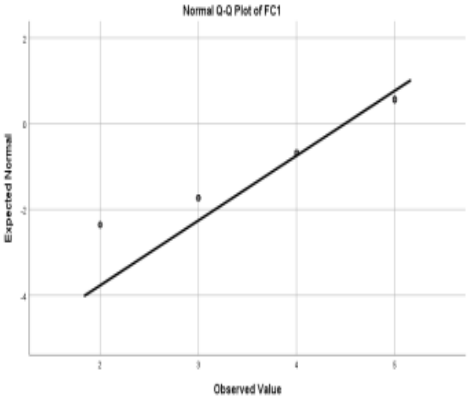
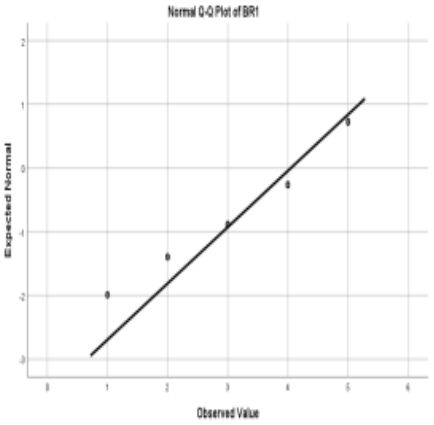
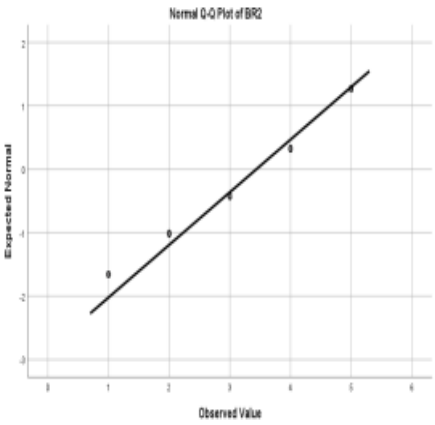


FC1



BR1



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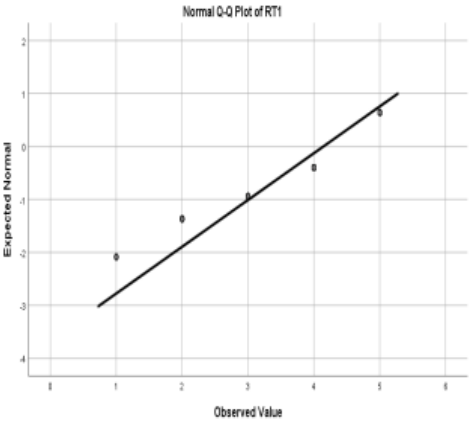

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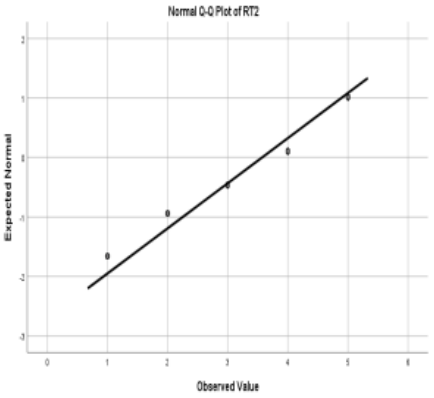
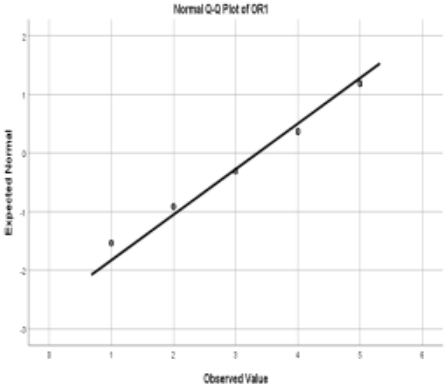


RT2



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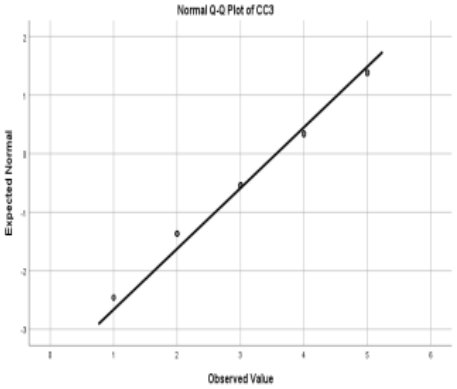

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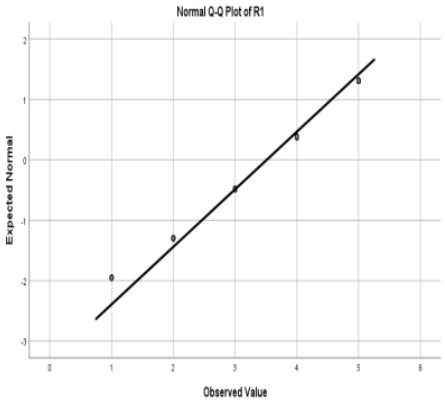

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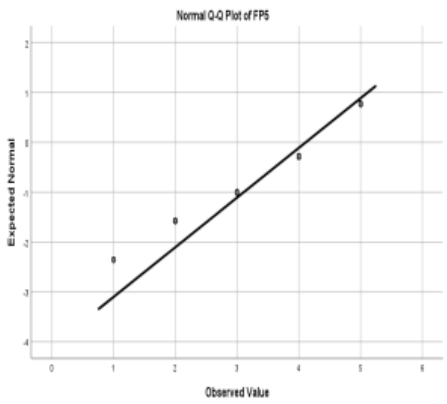

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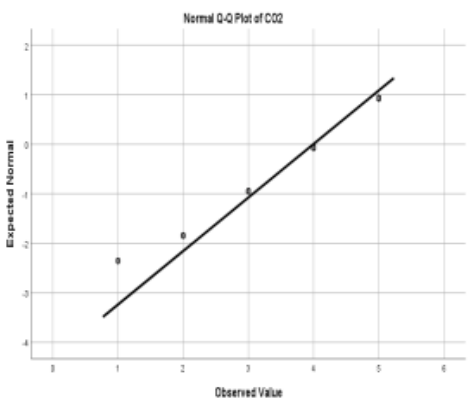

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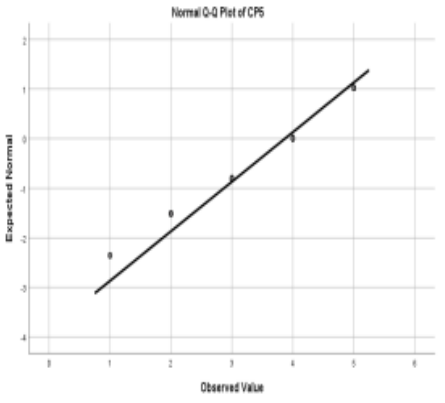

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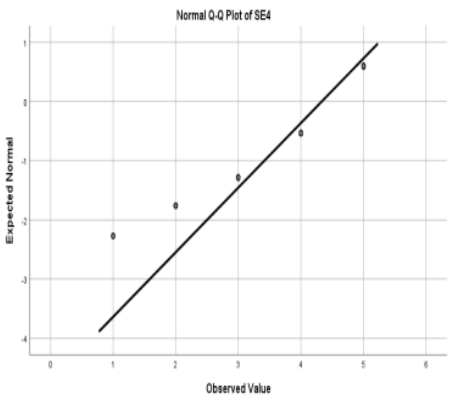

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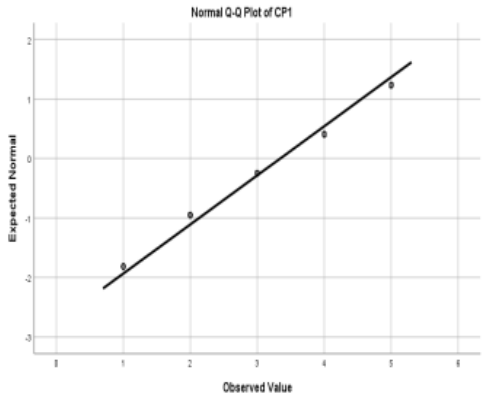

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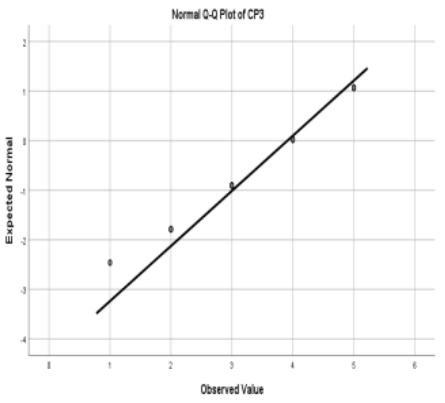

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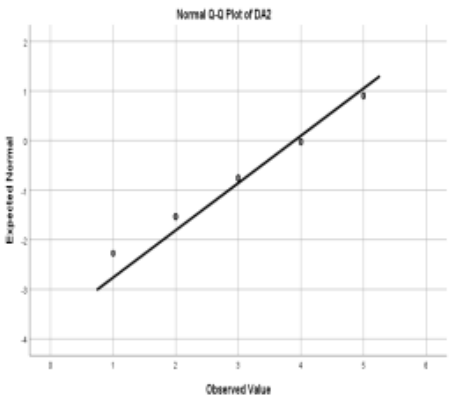

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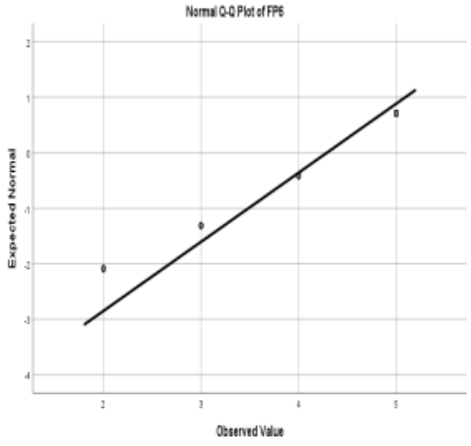

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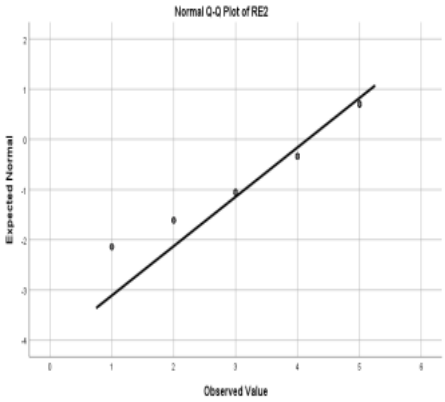

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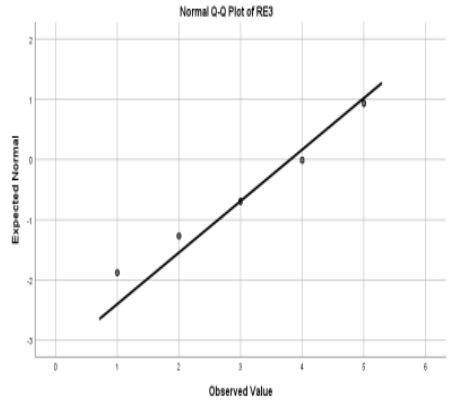

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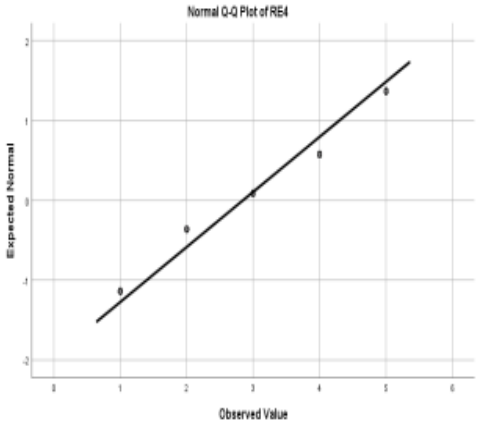

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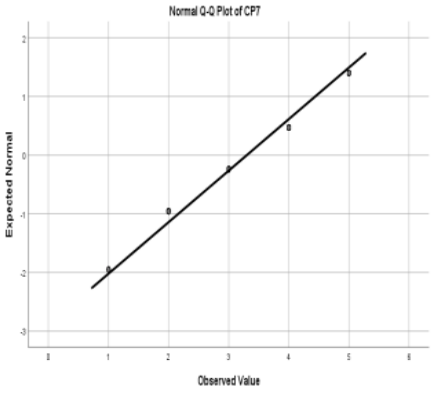

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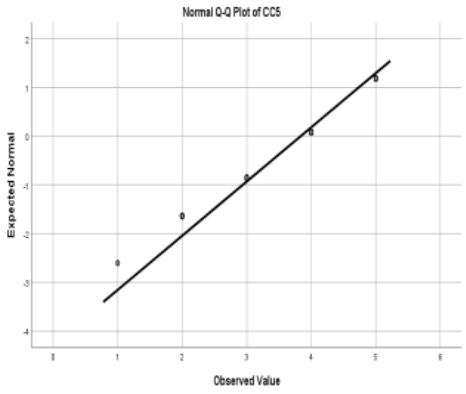

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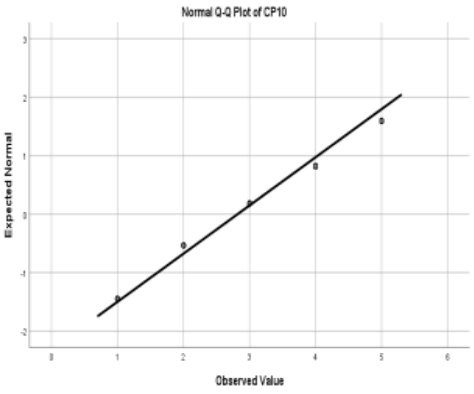

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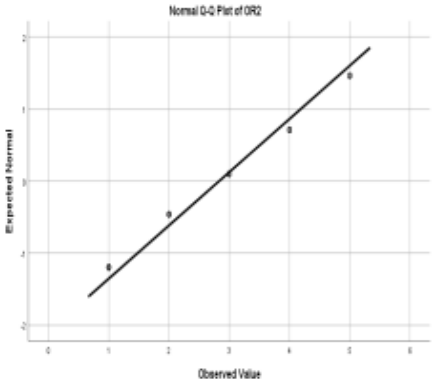

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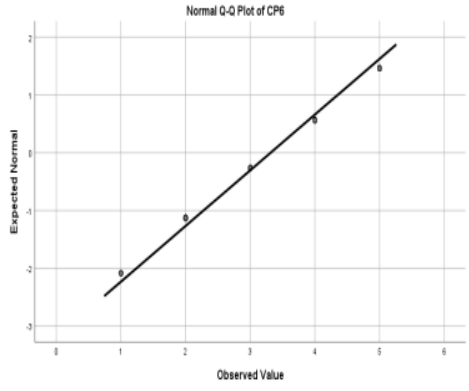
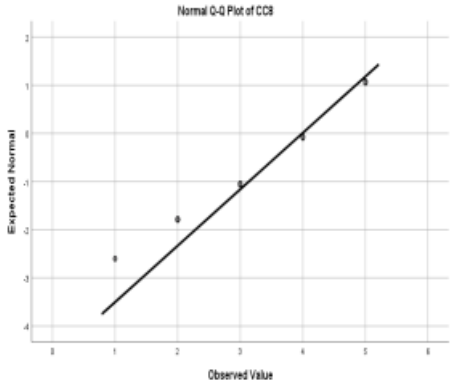


CP6



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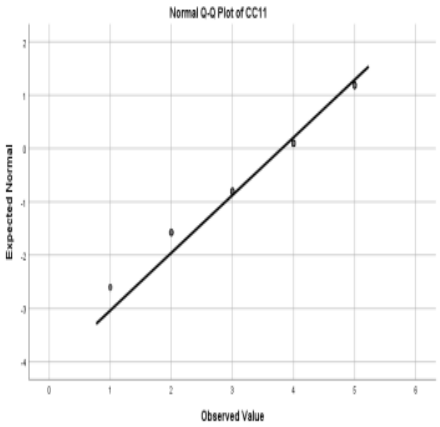

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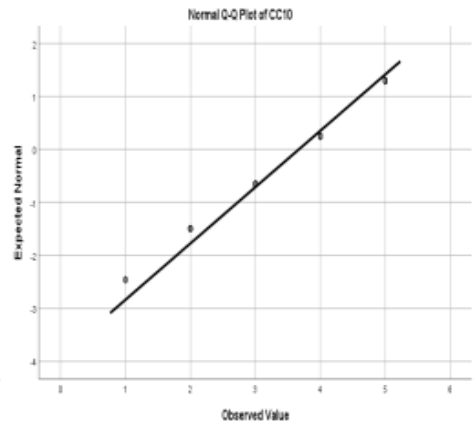

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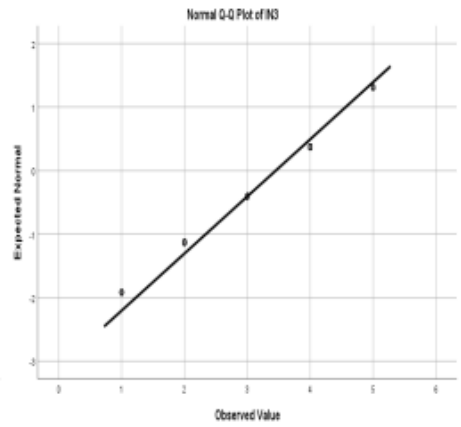
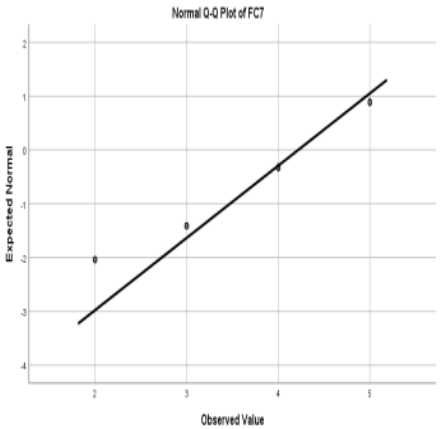


IN3



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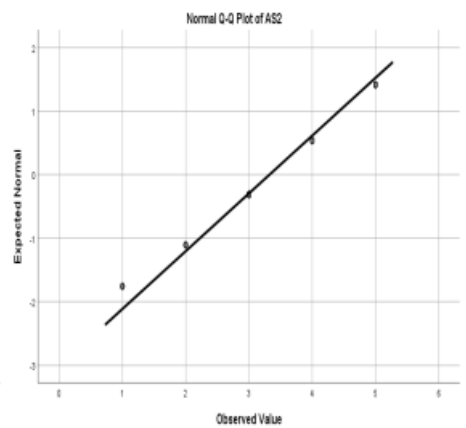

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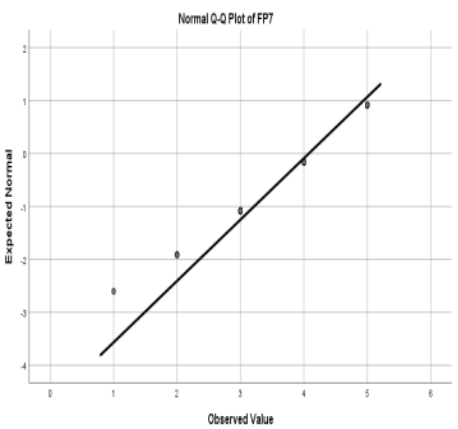
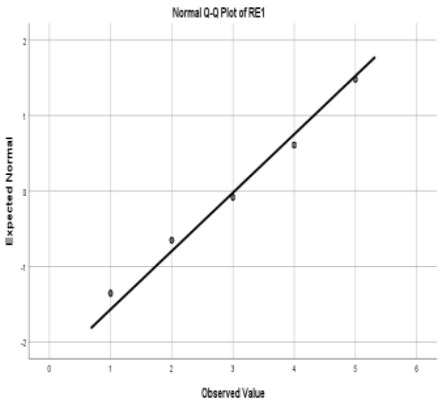


FP7



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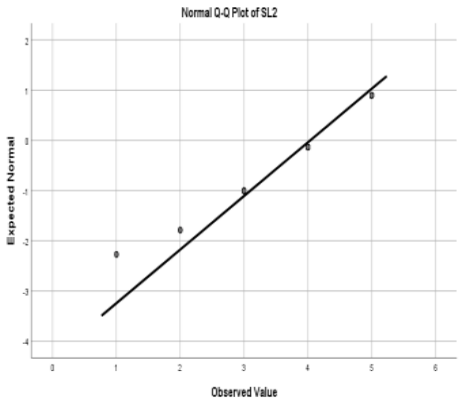

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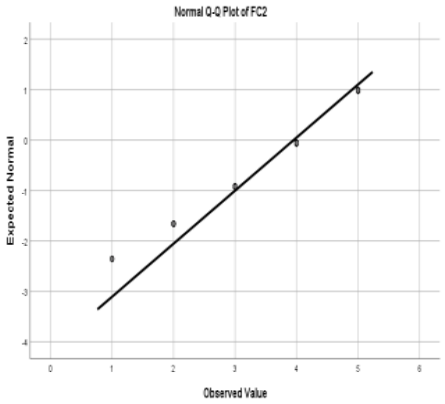

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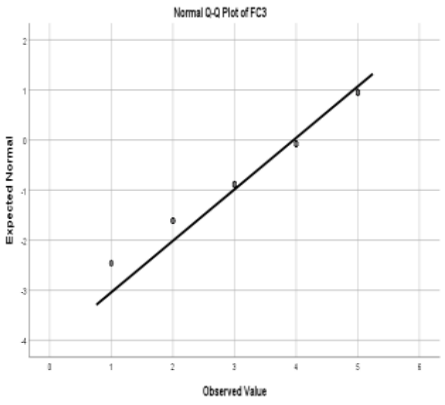

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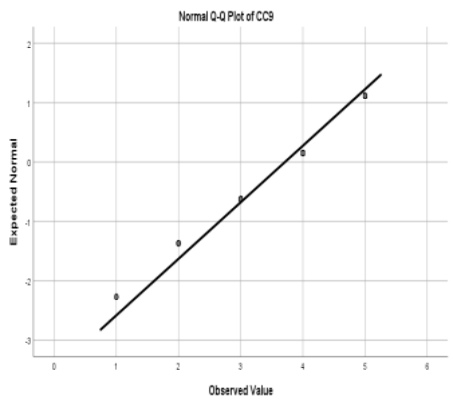
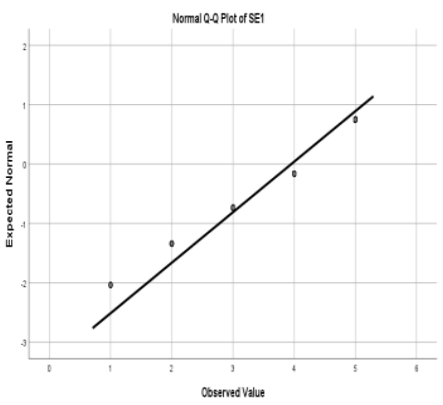


CC 9



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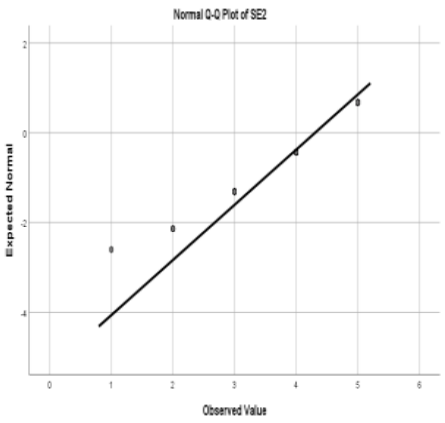

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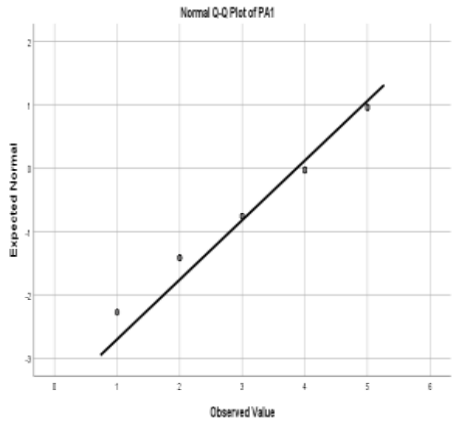

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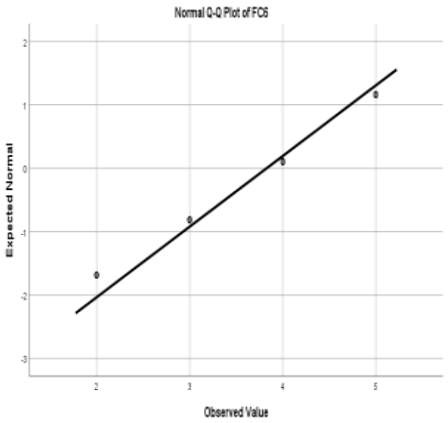

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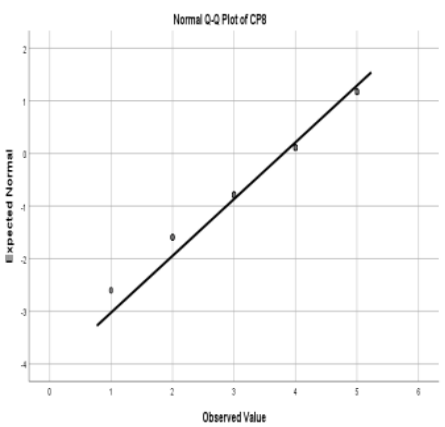

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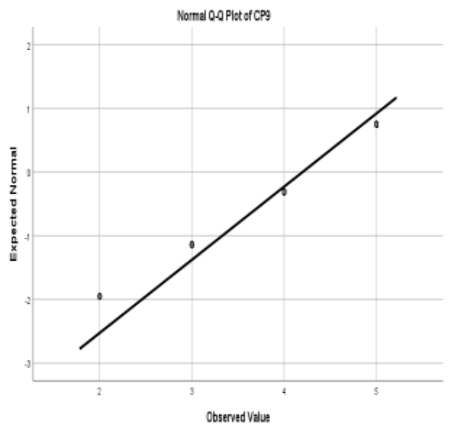

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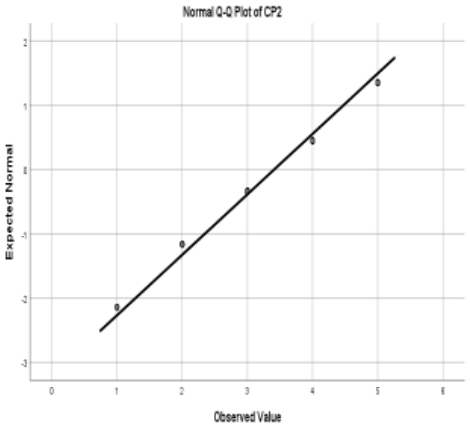
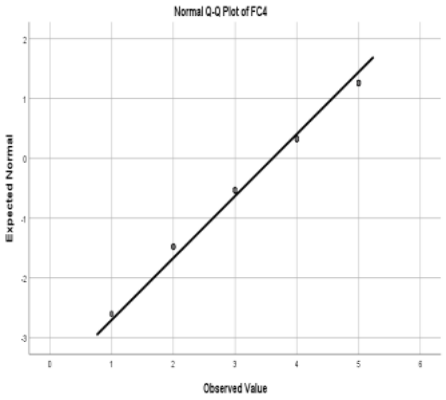


CP2



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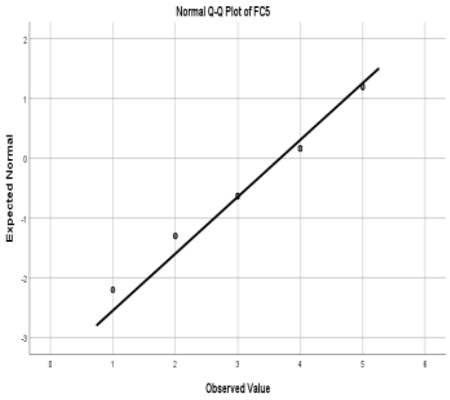

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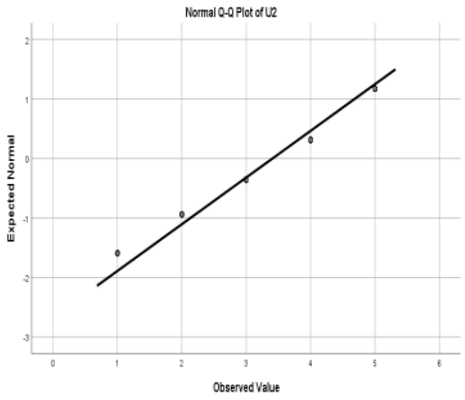

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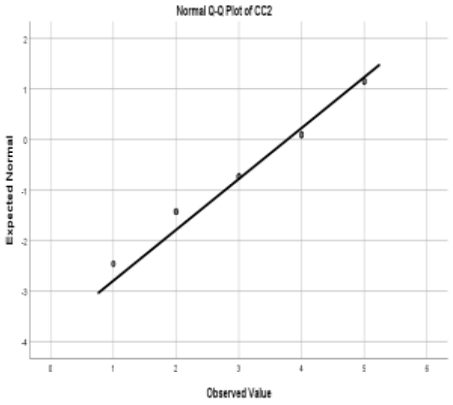

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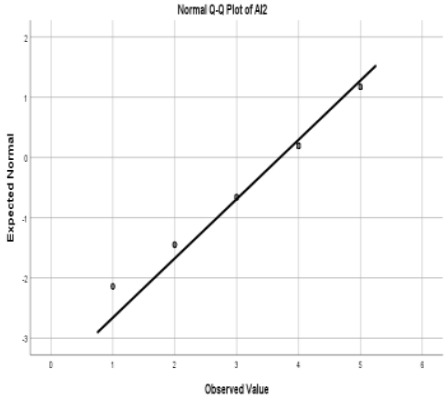

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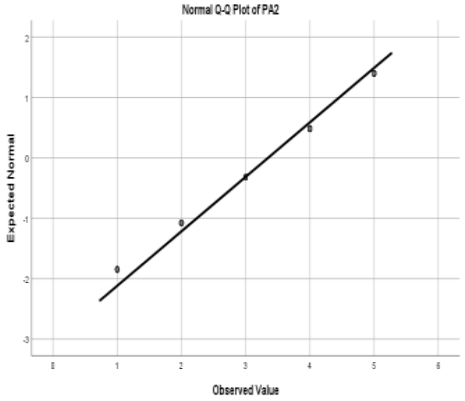

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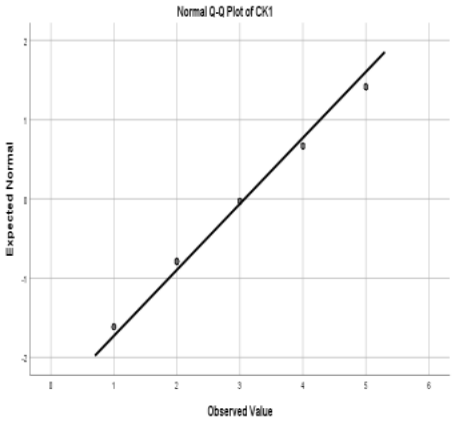

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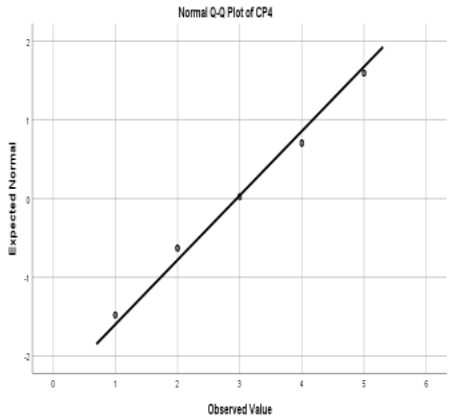

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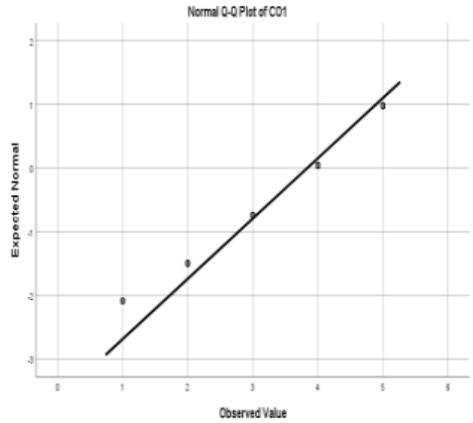
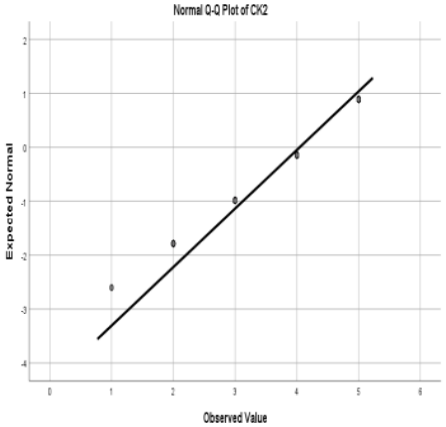
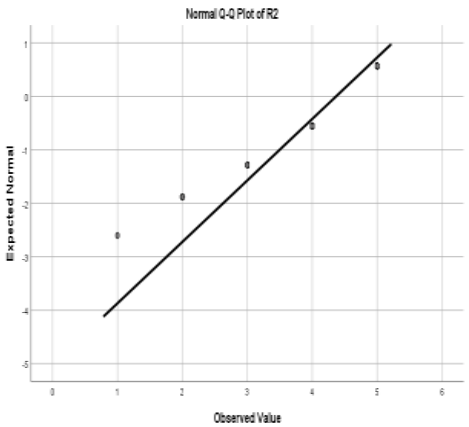


CO1



CK2



R2

Appendix R

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha	N of Items
Tech_FP1	15.38	8.460	0.226	0.075	0.647	0.690	5
Tech_FP2	15.60	6.550	0.580	0.528	0.478		
Tech_FP3	15.71	6.124	0.671	0.604	0.425		
Tech_FP4	15.75	6.329	0.524	0.411	0.500		
Tech_PV3	15.91	9.249	0.025	0.017	0.743		
Info_FC1	25.64	15.326	0.245	0.263	0.447	0.485	8
Info_BR1	26.08	13.344	0.228	0.327	0.414		
Info_BR2	26.69	12.634	0.283	0.345	0.388		
Info_RT1	25.99	13.864	0.262	0.251	0.443		
Info_RT2	26.56	12.612	0.231	0.250	0.413		
Info_OR1	26.78	13.782	0.112	0.187	0.470		
Info_CC3	26.56	14.275	0.280	0.237	0.435		
Info_R1	26.62	13.144	0.298	0.279	0.387		
Com_FP5	12.20	3.525	0.409	0.266	0.474	0.583	4
Com_CO2	12.32	3.703	0.512	0.315	0.402		
Com_CP5	12.44	3.425	0.543	0.394	0.361		
Com_SE4	11.98	4.789	0.063	0.019	0.723		
Collab_CP1	12.17	4.066	0.408	0.326	0.640	0.663	4
Collab_CP3	11.64	4.611	0.612	0.383	0.504		
Collab_DA2	11.72	4.468	0.394	0.386	0.635		
Collab_FP6	11.24	5.318	0.442	0.332	0.609		
Create_RE2	19.18	16.940	0.253	0.246	0.561	0.583	7
Create_RE3	19.64	15.536	0.237	0.227	0.532		
Create_RE4	20.64	16.800	0.116	0.186	0.624		
Create_CC5	19.52	15.950	0.452	0.373	0.505		
Create_CP7	20.07	15.382	0.392	0.448	0.513		
Create_CP10	20.55	15.174	0.384	0.327	0.514		
Create_OR2	20.37	15.349	0.374	0.328	0.557		
Critical_CP6	26.47	15.402	0.538	0.391	0.702	0.748	8
Critical_CC8	25.93	16.202	0.526	0.295	0.708		
Critical_CC10	26.18	15.166	0.580	0.487	0.694		
Critical_CC11	26.05	16.102	0.491	0.341	0.713		
Critical_IN3	26.44	18.720	0.274	0.240	0.793		
Critical_FC7	25.64	16.439	0.517	0.387	0.710		
Critical_AS2	26.48	15.384	0.449	0.335	0.722		
Critical_FP7	25.78	16.591	0.473	0.294	0.717		

Problem_RE1	8.00	2.472	0.067	0.005	0.524	0.312	3
Problem_SL2	6.99	2.733	0.260	0.129	0.084		
Problem_FC3	7.07	2.706	0.238	0.127	0.116		
Ethic_CC9	23.96	10.527	0.359	0.232	0.572	0.618	7
Ethic_SE1	23.76	11.657	0.139	0.223	0.654		
Ethic_SE2	23.44	11.720	0.248	0.241	0.606		
Ethic_PA1	23.79	10.227	0.420	0.229	0.550		
Ethic_FC6	23.94	11.242	0.330	0.277	0.582		
Ethic_CP8	23.94	10.186	0.495	0.389	0.527		
Ethic_CP9	23.49	11.101	0.384	0.332	0.567		
Culture_CP2	18.33	16.373	0.510	0.294	0.798	0.814	6
Culture_FC4	18.05	15.498	0.699	0.494	0.761		
Culture_FC5	17.91	16.255	0.514	0.307	0.797		
Culture_U2	18.30	13.891	0.603	0.371	0.783		
Culture_CC2	17.93	15.353	0.585	0.347	0.782		
Culture_FC2	17.72	16.430	0.586	0.365	0.784		
Flex_AI2	6.42	3.769	0.405	0.379	0.582	0.632	3
Flex_PA2	6.78	3.473	0.411	0.382	0.575		
Flex_CK1	7.05	2.862	0.515	0.266	0.420		

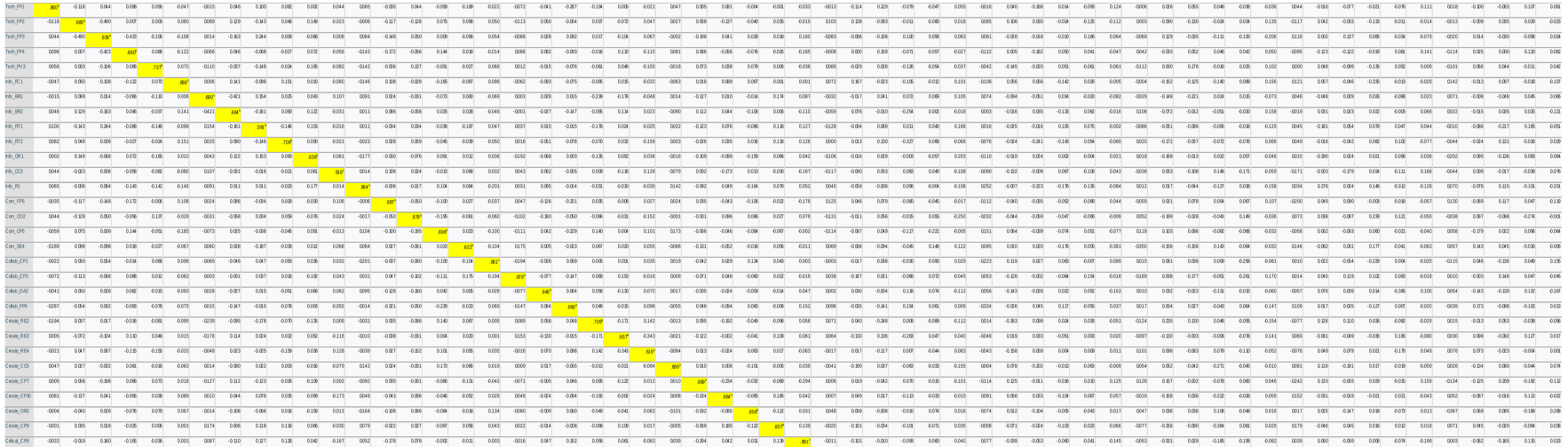
PearsonA Correlation

	Tech_FP1	Tech_FP2	Tech_FP3	Tech_FP4	Tech_PV3	Info_FC1	Info_BR1	Info_BR2	Info_RT1	Info_RT2	Info_OR1	Info_CC3	Info_R1	Com_FP5	Com_CO2	Com_CP5	Com_SE4	Collab_CP1	Collab_CP3	Collab_DA2	Collab_FP6	Create_RE2	Create_RE3	Create_RE4	Create_CC5	Create_CP7	Create_CP10	Create_OR2	Critical_CP6	Critical_CC8	Critical_CC10	Critical_CC11	Critical_IN3	Critical_FC7	Critical_AS2	Critical_FP7	Problem_RE1	Problem_SL2	Problem_FC3	Ethic_CC9	Ethic_SE1	Ethic_SE2	Ethic_PA1	Ethic_FC6	Ethic_CP8	Ethic_CP9	Culture_CP2	Culture_FC4	Culture_FC5	Culture_U2	Culture_CC2	Culture_FC2	Flex_AI2	Flex_PA2	Flex_CK1	Self_CP4	Self_CO1	Life_CK2	Life_R2	*No.* of low correlations
Tech_FP1	1	.269**	.214**	.134*	0.023	.345**	0.021	0.006	-0.016	-0.022	.123*	.241**	.160**	.325**	.183**	.422**	.172**	.318**	.340**	.212**	.527**	.114*	0.081	-0.036	.229**	.208**	.156*	.115*	.264**	.170**	.406**	.240**	0.095	.255**	.131*	.304**	0.015	.285**	.377**	.262**	-0.008	0.089	0.081	.248**	.225**	.170**	.219**	.220**	0.104	.146*	.272**	.281**	.233**	0.066	0.049	.230**	.199**	0.088	.126*	49
Tech_FP2	.269**	1	.707**	.511**	-0.045	.407**	-.190**	-.146*	-0.081	-0.061	.138*	.295**	.297**	.539**	.268**	.298**	0.015	.155*	.379**	.146*	.413**	-0.094	0.062	-0.085	.174**	.407**	.299**	.251**	.299**	0.099	.169**	.255**	0.014	.369**	.225**	.224**	-.134*	.256**	.389**	.273**	0.063	0.069	.210**	.435**	.406**	.202**	.270**	.252**	.252**	.162**	.247**	.293**	.199**	.148*	.231**	.141*	.122*	.179**	.205**	47
Tech_FP3	.214**	.707**	1	.634**	0.051	.390**	-0.052	0.005	-.144*	-0.014	.270**	.291**	.349**	.511**	.254**	.280**	0.049	.206**	.399**	.169**	.365**	0.019	0.091	-0.038	.214**	.495**	.370**	.316**	.317**	.199**	.223**	.270**	0.086	.327**	.237**	.230**	-0.022	.311**	.413**	.147*	0.003	0.091	.133*	.368**	.423**	.192**	.324**	.354**	.297**	.205**	.192**	.373**	.256**	.171**	.315**	.166**	.130*	.232**	.215**	38
Tech_FP4	.134*	.511**	.634**	1	0.042	.331**	-0.067	-0.034	-0.026	0.105	.210**	.309**	.408**	.527**	.231**	.170**	0.008	.163**	.205**	.122*	.335**	-0.001	0.019	0.031	.141*	.352**	.306**	.354**	.340**	0.111	.140*	0.106	0.063	.291**	.288**	.261**	0.006	.432**	.347**	0.096	0.062	0.040	.167**	.271**	.268**	0.106	.199**	.284**	.334**	.271**	.254**	.324**	.279**	.160**	.331**	0.097	0.112	.153*	.212**	42
Tech_PV3	0.023	-0.045	0.051	0.042	1	-0.023	.250**	.257**	.225**	.243**	.162**	0.082	.139*	0.048	-0.016	-0.023	.114*	-0.011	0.019	0.029	0.068	.379**	.220**	.219**	0.087	-0.062	0.060	0.096	0.044	0.012	0.094	0.051	.351**	-0.010	0.068	-0.013	.400**	0.084	0.055	0.037	0.082	.249**	0.008	-0.080	0.016	-0.036	0.036	0.063	0.019	0.037	0.006	0.074	0.071	0.106	.145*	-0.052	0.019	0.021	0.040	55
Info_FC1	.345**	.407**	.390**	.331**	-0.023	1	-0.084	-0.043	-0.008	-0.073	.156*	.292**	.321**	.311**	.302**	.436**	0.104	.230**	.332**	.268**	.487**	-0.002	0.056	-0.013	.269**	.310**	.222**	0.098	.248**	.223**	.218**	.261**	0.084	.378**	.151*	.381**	-0.033	.219**	.569**	.246**	0.060	0.065	.284**	.442**	.478**	.363**	.283**	.318**	.161**	.175**	.339**	.601**	.261**	0.064	0.071	.156*	.229**	.284**	.325**	37
Info_BR1	0.021	-.190**	-0.052	-0.067	.250**	-0.084	1	.562**	.125*	.152*	-0.025	-0.070	-0.030	-.124*	0.072	-0.048	0.100	0.038	-0.041	0.075	-0.063	.455**	.356**	.292**	0.031	-0.081	-0.010	0.003	-0.062	-0.009	0.003	0.045	.278**	-0.074	-0.055	-0.076	.340**	-0.019	-0.028	-0.023	0.083	0.094	0.040	0.068	-0.097	-.171**	0.010	0.065	-0.021	-0.040	-0.081	-0.076	0.082	0.004	-0.037	-0.022	0.030	-0.043	-0.038	54
Info_BR2	0.006	-.146*	0.005	-0.034	.257**	-0.043	.562**	1	.224**	.171**	-0.061	0.003	-0.004	-0.068	.115*	0.020	0.095	0.060	0.031	0.106	0.048	.399**	.185**	.170**	.131*	-0.080	0.003	0.079	0.020	0.086	0.004	0.100	.389**	-0.060	0.037	0.003	.313**	0.006	0.056	-0.040	0.090	0.096	0.026	0.027	0.048	-0.021	0.068	0.047	-0.029	-0.008	-0.051	-0.015	0.107	0.011	0.042	-0.015	0.063	0.036	0.082	54
Info_RT1	-0.016	-0.081	-.144*	-0.026	.225**	-0.008	.125*	.224**	1	.323**	-.134*	-0.011	-0.043	-0.047	0.010	0.000	.354**	-0.064	-.120*	0.036	-0.015	.284**	.151*	0.096	0.005	-0.088	-0.028	-0.045	-0.055	0.045	0.027	-0.045	.285**	-0.065	-0.060	-0.031	.150*	0.004	-0.079	-0.047	.240**	.302**	0.043	-0.008	-0.026	-0.091	-0.030	0.095	0.008	0.085	-0.046	-0.094	-0.023	0.038	-0.018	0.069	0.063	-0.024	0.107	55
Info_RT2	-0.022	-0.061	-0.014	0.105	.243**	-0.073	.152*	.171**	.323**	1	-0.023	0.034	.115*	0.061	0.083	0.053	.243**	.116*	0.039	0.093	0.020	.237**	.234**	.232**	0.095	0.012	0.074	0.098	0.028	0.042	0.025	-0.044	.450**	-0.052	.186**	0.071	.223**	.206**	0.092	-0.056	.225**	.227**	0.087	0.005	-0.015	-.128*	0.112	.121*	0.069	.116*	-0.023	-0.001	0.082	.224**	.173**	0.072	-0.037	-0.007	0.081	56
Info_OR1	.123*	.138*	.270**	.210**	.162**	.156*	-0.025	-0.061	-.134*	-0.023	1	.176**	.408**	.190**	.319**	0.108	-0.037	.179**	.317**	.234**	.235**	.127*	-0.026	-0.043	.159**	.325**	.256**	.447**	.143*	.211**	.174**	.147*	-0.004	.255**	.241**	.223**	.120*	.252**	.250**	.145*	-0.088	-0.001	.276**	.210**	.242**	.157*	.194**	.258**	.157*	.352**	.190**	.208**	.324**	.247**	.487**	0.058	.235**	.313**	.221**	49
Info_CC3	.241**	.295**	.291**	.309**	0.082	.292**	-0.070	0.003	-0.011	0.034	.176**	1	.289**	.176**	.160**	.314**	-0.005	.312**	.274**	.141*	.307**	0.044	0.092	0.012	.425**	.409**	.348**	.267**	.488**	.364**	.465**	.363**	0.026	.393**	.354**	.339**	0.062	.272**	.439**	.352**	-0.022	0.027	.127*	.437**	.318**	.148*	.511**	.441**	.360**	.304**	.533**	.416**	.321**	.129*	.266**	.288**	.155*	.170**	0.101	33
Info_R1	.160**	.297**	.349**	.408**	.139*	.321**	-0.030	-0.004	-0.043	.115*	.408**	.289**	1	.318**	.378**	.215**	0.001	.305**	.266**	.340**	.251**	.119*	-0.015	0.079	.202**	.429**	.227**	.439**	.348**	.209**	.248**	.255**	0.041	.275**	.385**	0.094	0.093	.589**	.428**	.266**	0.008	0.007	.298**	.287**	.315**	.133*	.285**	.411**	.336**	.230**	.267**	.328**	.573**	.324**	.414**	.157*	.286**	.367**	.418**	35
Com_FP5	.325**	.539**	.511**	.527**	0.048	.311**	-.124*	-0.068	-0.047	0.061	.190**	.176**	.318**	1	.288**	.392**	0.010	.203**	.342**	.255**	.551**	-0.032	0.042	-0.072	0.093	.351**	.304**	.262**	.330**	0.056	.158*	0.089	0.093	.236**	.212**	.351**	0.023	.244**	.335**	.199**	0.020	0.089	.176**	.198**	.315**	.151*	.194**	.214**	.362**	.150*	.124*	.294**	.230**	.234**	.171**	.168**	0.097	.136*	.285**	42
Com_CO2	.183**	.268**	.254**	.231**	-0.016	.299**	0.072	.115*	0.010	0.083	.319**	.160**	.378**	.288**	1	.328**	0.101	.210**	.286**	.433**	.398**	.120*	0.090	0.073	.196**	.237**	0.087	.235**	0.109	.260**	.170**	.185**	.116*	.273**	.415**	.258**	.121*	.340**	.259**	.225**	0.086	0.095	.446**	.297**	.299**	.274**	.145*	.276**	.195**	.283**	.233**	.191**	.262**	.225**	.298**	0.049	.468**	.560**	.461**	47
Com_CP5	.422**	.298**	.280**	.170**	-0.023	.436**	-0.048	0.020	0.000	0.053	0.108	.214**	.215**	.392**	.228**	1	0.027	.399**	.490**	.223**	.529**	-0.080	-0.009	-0.110	.236**	.408**	.261**	.153*	.350**	.243**	.416**	.256**	0.112	.421**	.208**	.247**	-0.059	.249**	.460**	.222**	0.035	0.009	.124*	.228**	.231**	.266**	.215**	.278**	.253**	.148*	.237**	.211**	.178**	.155*	.121*	.258**	.134*	.154*	.216**	47
Com_SE4	.172**	0.015	0.049	0.008	.114*	0.104	0.100	0.095	.354**	.243**	-0.037	-0.005	0.001	0.010	0.101	0.027	1	0.068	-0.038	0.084	0.033	.177**	.190**	0.021	0.066	-0.003	0.042	-0.004	0.080	0.058	0.091	0.065	.332**	-0.046	0.012	-0.022	0.000	0.013	0.105	0.086	.535**	.544**	.155*	0.076	-0.071	-0.014	0.094	.149*	-0.033	0.098	0.031	0.002	0.072	0.091	0.007	-0.040	0.047	0.053	0.085	54
Collab_CP1	.318**	.155*	.206**	.163**	-0.011	.230**	0.038	0.060	-0.064	.116*	.179**	.312**	.305**	.203**	.210**	.399**	0.068	1	.448**	.197**	.315**	-0.015	0.076	0.030	.253**	.354**	.192**	.149*	.407**	.279**	.370**	.234**	0.092	.180**	.259**	.376**	-0.060	.236**	.456**	.218**	-0.028	-0.008	0.071	.274**	.268**	0.027	.586**	.407**	.175**	.174**	.277**	.472**	.235**	.241**	.261**	.276**	.237**	.140*	0.105	44
Collab_CP3	.340**	.379**	.399**	.205**	0.019	.332**	-0.041	0.031	-.120*	0.039	.317**	.274**	.266**	.342**	.286**	.490**	-0.038	.448**	1	.267**	.430**	-0.040	-0.021	-0.043	.276**	.432**	.267**	.268**	.345**	.230**	.379**	.243**	0.091	.308**	.279**	.346**	0.050	.192**	.391**	.190**	-0.017	0.075	0.100	.386**	.444**	.207**	.502**	.240**	.182**	.133*	.187**	.323**	.221**	.172**	.283**	.264**	0.039	0.090	.137*	39
Collab_DA2	.212**	.146*	.169**	.122*	0.029	.368**	0.075	0.106	0.036	0.093	.334**	.141*	.340**	.355**	.433**	.323**	0.084	.197**	.267**	1	.212**	0.103	0.098	0.048	.175**	.241**	.147*	.182**	.197**	.124*	.155*	.148*	0.076	.118*	.332**	.138*	.150*	.370**	.347**	0.088	0.091	0.081	.381**	.314**	.311**	.166**	.197**	.205**	.186**	.334**	.175**	.197**	.537**	.159**	.225**	.149*	.343**	.256**	.415**	42
Collab_FP6	.527**	.413**	.365**	.335**	0.068	.487**	-0.063	0.048	-0.015	0.020	.235**	.307**	.251**	.551**	.398**	.529**	0.033	.315**	.430**	.212**	1	0.017	0.019	-0.106	.272**	.282**	.264**	.208**	.198**	.202**	.343**	.288**	0.042	.331**	.247**	.566**	0.024	.278**	.416**	.293**	-0.035	0.014	.252**	.335**	.421**	.318**	.299**	.333**	.149*	.217**	.303**	.470**	.232**	.186**	.191**	.142*	.287**	.298**	.296**	37
Create_RE2	.114*	-0.094	0.019	-0.001	.379**	-0.002	.455**	.399**	.284**	.237**	.127*	0.044	.119*	-0.032	.120*	-0.080	.177**	-0.015	-0.040	0.103	0.017	1	.340**	.172**	0.090	-0.079	.134*	.122*	-0.040	0.056	0.061	.192**	.434**	0.002	.124*	-0.047	.476**	0.052	0.059	0.018	.135*	.306**	-0.011	-0.010	-0.011	-0.011	0.046	.203**	0.040	0.053	-0.052	-0.002	0.110	0.103	0.093	-0.016	0.068	0.067	0.096	51
Create_RE3	0.081	0.062	0.091	0.019	.220**	0.056	.356**	.185**	.151*	.234**	-0.026	0.092	-0.015	0.042	0.090	-0.009	.190**	0.076	-0.021	0.098	0.019	.340**	1	.420**	0.103	0.029	.143*	0.000	0.058	-0.020	0.100	0.044	.400**	-0.022	0.030	0.061	.238**	-0.032	.116*	0.061	.119*	.229**	0.044	0.080	-0.004	-.127*	.138*	0.074	0.034	0.027	0.015	0.084	0.003	.113*	0.003	-0.023	0.081	-0.031	0.023	54
Create_RE4	-0.036	-0.085	-0.038	0.031	.219**	-0.013	.292**	.170**	0.096	.232**	-0.043	0.012	0.079	-0.072	0.073	-0.110	0.021	0.030	-0.043	0.048	-0.106	.172**	.420**	1	0.095	-0.026	-0.029	-0.054	0.067	0.014	0.038	0.100	.225**	0.018	-0.042	0.017	.294**	0.025	0.058	0.063	-0.004	-0.035	-0.019	0.109	-0.050	-.135*	.114*	0.064	0.069	-0.024	-0.011	-0.015	.127*	0.031	-0.063	-0.075	0.038	-0.030	-0.011	57
Create_CC5	.229**	.174**	.214**	.141*	0.087	.269**	0.031	.131*	0.005	0.095	.159**	.425**	.202**	0.093	.196**	.236**	0.066	.253**	.276**	.175**	.272**	0.090	0.103	0.095	1	.304**	.229**	.273**	.321**	.326**	.488**	.395**	.130*	.299**	.298**	.293**	0.048	.284**	.344**	.299**	0.037	0.024	0.100	.387**	.438**	.244**	.387**	.290**	.127*	.201**	.435**	.299**	.258**	.160**	.223**	.299**	0.105	.133*	0.047	47
Create_CP7	.208**	.407**	.495**	.352**	-0.062	.310**	-0.081	-0.080	-0.088	0.012	.325**	.409**	.429**	.351**	.237**	.408**	-0.003	.354**	.432**	.241**	.282**	-0.079	0.029	-0.026	.304**	1	.462**	.358**	.524**	.287**	.333**	.299**	-0.009	.346**	.298**	.313**	-.123*	.314**	.438**	.214**	-0.077	-0.060	.125*	.398**	.486**	.155*	.426**	.380**	.413**	.201**	.337**	.345**	.325**	.138*	.373**	.356**	0.088	.227**	.246**	28
Create_CP10	.156*	.376**	.370**	.306**	0.060	.222**	-0.010	0.003	-0.028	0.074	.256**	.348**	.227**	.304**	0.087	.261**	0.042	.192**	.267**	.147*	.264**	.134*	.143*	-0.029	.229**	.462**	1	.301**	.320**	.143*	.180**	.210**	.126*	.225**	.233**	.192**	-0.003	.166**	.353**	0.109	-0.042	0.061	.144*	.328**	.375**	0.030	.325**	.250**	.192**	.181**	.233**	.292**	.195**	.130*	.256**	.230**	0.028	0.037	.121*	46
Create_OR2	.115*	.251**	.316**	.354**	0.096	0.098	0.003	0.079	-0.045	0.098	.447**	.267**	.439**	.262**	.235**	.153*	-0.004	.149*	.268**	.182**	.208**	.122*	0.000	-0.054	.273**	.358**	.288**	1	.221**	.132*	.165**	.172**	0.084	.199**	.329**	.163**	0.091	.359**	.257**	.127*	-0.005	-0.008	.179**	.222**	.209**	.167**	.223**	.215**	.169**	.248**	.264**	.186**	.402**	.245**	.591**	0.111	.121*	.257**	0.080	49
Create_CP9	.170**	.202**	.192**	0.106	-0.036	.363**	-.171**	-0.021	-0.091	-.128*	.157*	.148*	.133*	.151*	.274**	.266**	-0.014	0.027	.207**	.166**	.318**	-0.011	-.127*	-.135*	.244**	.155*	0.030	.167**	0.033	.222**	.212**	.227**	0.027	.343**	.136*	.240**	0.037	0.100	.252**	.232**	0.032	0.065	.280**	.289**	.489**	1	0.083	.149*	0.030	.157*	.192**	.259**	.168**	0.010	0.102	0.044	.172**	.315**	.168**	53
Critical_CP6	.264**	.302**	.317**	.340**	0.044	.248**	-0.062	0.020	-0.055	0.028	.143*	.488**	.348**	.330**	0.109	.350**	0.080	.407**	.345**	.197**	.198**	-0.040	0.058	0.067	.321**	.524**	.320**	.221**	1	.293**	.423**	.316**	0.106	.249**	.253**	.222**	0.000	.339**	.453**	.316**	0.089	0.056	0.092	.299**	.380**	0.033	.560**	.418**	.367**	.181**	.368**	.403**	.307**	.286**	.255**	.365**	.166**	0.077	.145*	33
Critical_CC8	.170**	0.099	.199**	0.111	0.012	.223**	-0.009	0.086	0.045	0.042	.211**	.364**	.209**	0.056	.260**	.343**	0.058	.279**	.230**	.124*	.202**	0.056	-0.020	0.014	.326**	.287**	.143*	.132*	.293**	1	.380**	.353**	0.098	.334**	.202**	.286**	0.013	.187**	.360**	.320**	0.069	.118*	.117*	.217**	.234**	.222**	.385**	.393**	.210**	.265**	.295**	.339**	.212**	.211**	.160**	.215**	0.097	.262**	.174**	47
Critical_CC10	.406**	.169**	.223**	.140*	0.094	.218**	0.003	0.004	0.027	0.025	.174**	.465**	.248**	.158*	.170**	.416**	0.091	.370**	.379**	.155*	.343**	0.061	0.100	0.038	.488**	.333**	.180**	.165**	.423**	.380**	1	.491**	0.085	.370**	.258**	.291**	0.046	.279**	.368**	.366**	0.016	0.060	0.097	.353**	.306**	.212**	.435**	.449**	.209**	.199**	.450**	.400**	.239**	.165**	.162**	.405**	.138*	0.082	0.058	37
Critical_CC11	.240**	.255**	.270**	0.106	0.051	.261**	0.045	0.100	-0.045	-0.044	.147*	.363**	.255**	0.089	.185**	.256**	0.065	.234**	.243**	.148*	.288**	.192**	0.044	0.100	.395**	.299**	.210**	.172**	.299**	.353**	.491**	1	.147*	.278**	.268**	.206**	0.047	.229**	.334**	.400**	-0.025	-0.046	.117*	.405**	.349**	.227**	.369**	.419**	.220**	.165**	.421**	.299**	.252**	0.111	.122*	.195**	.131*	0.087	0.093	47
Critical_IN3	0.095	0.014	0.086	0.063	.351**	0.084	.278**	.389**	.285**	.450**	-0.004	0.026	0.041	0.093	.116*	0.112	.332**	0.092	0.091	0.076	0.042	.434**	.400**	.225**	.130*	-0.009	.126*	0.084	0.106	0.098	0.085	.147*	1	-0.029	.124*	0.002	.339**	0.042	.160**	0.008	.288**	.440**	-0.021	0.073	0.059	0.027	0.076	.217**	0.096	0.083	-0.069	.117*	0.070	.167**	.132*	0.050	0.051	0.084	0.098	50
Critical_FC7	.255**	.369**	.327**	.291**	-0.010	.378**	-0.074	-0.060	-0.065	-0.052	.255**	.393**	.275**	.236**	.273**	.421**	-0.046	.180**	.308**	.118*	.331**	0.002	-0.022	0.018	.325**	.346**	.225**	.199**	.249**	.334**	.370**	.278**	-0.029	1	.289**	.322**	-0.006	.236**	.451**	.260**	0.012	0.028	.189**	.615**	.380**	.343**	.347**	.399**	.317**	.304**	.451**	.371**	.235**	0.094	.201**	.150*	.158*	.258**	.164**	36
Critical_AS2	.131*	.225**	.237**	.288**	0.068	.151*	-0.055	0.037	-0.060	.186**	.241**	.354**	.385**	.212**	.415**	.208**	0.012	.259**	.279**	.232**	.247**	.124*	0.030	-0.042	.327**	.298**	.233**	.329**	.253**	.202**	.258**	.268**	.124*	.289**	1	.189**	0.026	.451**	.336**	.114*	0.041	.138*	.208**	.303**	.228**	.136*	.293**	.214**	.216**	.501**	.280**	.299**	.421**	.298**	.487**	0.112	.259**	.257**	.289**	47
Critical_FP7	.304**	.224**	.230**	.261**	-0.013	.381**	-0.076	0.003	-0.031	0.071	.223**	.339**	0.094	.351**	.258**	.347**	-0.022	.376**	.346**	.138*	.566**	-0.047	0.061	0.017	.293**	.313**	.192**	.163**	.222**	.286**	.291**	.206**	0.002	.322**	.189**	1	-0.010	0.089	.371**	.231**	-0.033	-0.048	.164**	.361**	.370**	.240**	.367**	.245**	.126*	.217**	.320**	.334**	.171**	.186**	.147*	.225**	0.111	.154*	.160**	42
Problem_RE1	0.015	-.134*	-0.022	0.006	.400**	-0.033	.340**	.313**	.150*	.223**	.120*	0.062	0.093	0.023	.121*	-0.059	0.000	-0.060	0.050	.150*	0.024	.476**	.238**	.294**	0.048	-.123*	-0.003	0.091	0.000	0.013	0.046	0.047	.339**	-0.006	0.026	-0.010	1	0.065	0.045	0.058	-0.021	0.103	0.037	-0.008	0.020	0.037	0.012	0.076	0.034	0.038	-0.046	-0.007	0.102	.150*	0.089	0.007	0.048	0.058	0.037	53
Problem_SL2	.285**	.256**	.311**	.432**	0.084	.219**	-0.019	0.006	0.004	.206**	.252**	.272**	.589**	.344**	.340**	.249**	0.013	.236**	.192**	.370**	.278**	0.052	-0.032	0.025	.284**	.314**	.166**	.359**	.339**	.187**	.279**	.229**	0.042	.236**	.451**	0.089	0.065	1	.356**	.153*	0.023	-0.021	.206**	.185**	.208**	0.100	.215**	.352**	.292**	.351**	.260**	.359**	.532**	.316**	.346**	.157*	.365**	.280**	.413**	39
Problem_FC3	.377**	.389**	.413**	.347**	0.055	.569**	-0.028	0.056	-0.079	0.092	.250**	.439**	.428**	.335**	.259**	.460**	0.105	.456**	.391**	.247**	.416**	0.059	.116*	0.058	.344**	.438**	.353**	.257**	.453**	.360**	.368**	.334**	.160**	.451**	.336**	.371**	0.045	.356**	1	.308**	-0.002	0.069	.189**	.452**	.400**	.252**	.545**	.590**	.334**	.311**	.440**	.771**	.337**	.131*	.243**	.250**	.275**	.268**	.250**	25
Ethic_CC9	.262**	.273**	.147*	0.096	0.037	.246**	-0.023	-0.040	-0.047	-0.056	.145*	.352**	.266**	.199**	.225**	.222**	0.086	.218**	.190**	0.088	.303**	0.018	0.061	0.063	.306**	.214**	0.109	.127*	.316**	.320**	.366**	.400**	0.008	.260**	.114*	.231**	0.058	.153*	.308**	1	0.080	0.033	.154*	.383**	.340**	.232**	.374**	.262**	.237**	.193**	.247**	.306**	.160**	.203**	0.062	.131*	.122*	.164**	0.101	46
Ethic_SE1	-0.008	0.063	0.003	0.062	0.082	0.060	0.083	0.090	.240**	.225**	-0.088	-0.022	0.008	0.020	0.086	0.035	.535**	-0.028	-0.017	0.091	-0.035	.135*	.119*	-0.004	0.037	-0.077	-0.042	-0.005	0.089	0.069	0.016	-0.025	.288**	0.012	0.041	-0.033	-0.021	0.023	-0.002	0.080	1	.469**	0.070	0.041	-0.021	0.032	0.019	0.046	0.045	0.019	0.011	-0.010	-0.031	0.056	0.019	-0.057	-0.036	0.024	0.058	56
Ethic_SE2	0.089	0.069	0.091	0.040	.249**	0.065	0.094	0.096	.302**	.227**	-0.001	0.027	0.007	0.089	0.095	0.009	.544**	-0.008	0.075	0.081	0.014	.306**	.229**	-0.035	0.024	-0.060	0.061	-0.008	0.056	.118*	0.060	-0.046	.440**	0.028	.138*	-0.048	0.103	-0.021	0.069	0.033	.469**	1	0.084	0.002	0.012	0.065	0.016	.118*	0.072	0.094	-0.042	0.019	0.015	0.098	0.053	-0.009	0.031	0.093	0.104	53
Ethic_PA1	0.081	.210**	.133*	.167**	0.008	.284**	0.040	0.026	0.043	0.087	.276**	.127*	.298**	.176**	.446**	.124*	.155*	0.071	0.100	.281**	.252**	-0.011	0.044	-0.019	0.100	.125*	.144*	.179**	0.092	.117*	0.097	.117*	-0.021	.189**	.208**	.164**	0.037	.206**	.189**	.154*	0.070	0.084	1	.196**	.206**	.280**	.122*	.246**	.242**	.198**	.220**	.197**	.344**	.312**	.249**	0.071	.301**	.388**	.350**	52
Ethic_FC6	.248**	.435**	.368**	.271**	-0.080	.442**	0.068	0.027	-0.008	0.005	.210**	.437**	.287**	.198**	.297**	.328**	0.076	.274**	.386**	.214**	.335**	-0.010	0.080	0.109	.387**	.398**	.228**	.222**	.299**	.217**	.353**	.405**	0.073	.615**	.303**	.361**	-0.008	.185**	.452**	.383**	0.041	0.002	.196**	1	.420**	.289**	.377**	.429**	.327**	.274**	.423**	.406**	.307**	.117*	.259**	.248**	.197**	.196**	.117*	35
Ethic_CP8	.225**	.406**	.423**	.268**	0.016	.478**	-0.097	0.048	-0.026	-0.015	.242**	.318**	.315**	.315**	.299**	.431**	-0.071	.268**	.444**	.311**	.421**	-0.011	-0.004	-0.050	.438**	.486**	.375**	.209**	.380**	.334**	.306**	.349**	0.059	.380**	.228**	.370**	0.020	.208**	.400**	.340**	-0.021	0.012	.206**	.420**	1	.489**	.399**	.296**	.252**	.214**	.287**	.393**	.265**	0.099	.240**	.235**	.149*	.224**	.252**	33
Culture_CP2	.319**	.270**	.324**	.199**	0.036	.283**	0.010	0.068	-0.030	0.112	.194**	.511**	.285**	.194**	.145*	.415**	0.094	.586**	.502**	.197**	.299**	0.046	.138*	.114*	.387**	.426**	.325**	.223**	.560**	.385**	.435**	.369**	0.076	.347**	.293**	.367**	0.012	.215**	.545**	.374**	0.019	0.016	.122*	.377**	.399**	0.083	1	.475**	.252**	.286**	.370**	.481**	.282**	.255**	.258**	.328**	.159**	.138*	.145*	35
Culture_FC4	.320**	.252**	.354**	.284**	0.063	.318**	0.065	0.047	0.095	.121*	.258**	.441**	.411**	.214**	.276**	.378**	.149*	.407**	.240**	.205**	.333**	.203**	0.074	0.064	.330**	.380**	.250**	.215**	.418**	.393**	.449**	.419**	.217**	.399**	.314**	.245**	0.076	.352**	.590**	.262**	0.046	.118*	.246**	.429**	.296**	.149*	.475**	1	.461**	.328**	.411**	.540**	.257**	.237**	.251**	.377**	.263**	.289**	.228**	33
Culture_FC5	0.104	.352**	.297**	.334**	0.019	.161**	-0.021	-0.029	0.008	0.069	.157*	.360**	.336**	.362**	.195**	.253**	-0.033	.175**	.182**	.186**	.149*	0.040	0.034	0.069	.127*	.413**	.192**	.169**	.367**	.210**	.209**	.220**	0.096	.317**	.216**	.126*	0.034	.302**	.334**	.237**	0.045	0.072	.242**	.327**	.252**	0.030	.252**	.461**	1	.213**	.271**	.265**	.225**	.221**	.163**	.228**	0.104	.179**	.216**	46
Culture_U2	.146*	.162**	.205**	.271**	0.037	.175**	-0.040	-0.008	0.085	.116*	.352**	.304**	.230**	.150*	.283**	.148*	0.098	.174**	.133*	.234**	.217**	0.053	0.027	-0.024	.201**	.201**	.181**	.248**	.181**	.265**	.199**	.165**	0.083	.204**	.501**	.217**	0.038	.351**	.211**	.193**	0.019	0.094	.198**	.274**	.214**	.157*	.286**	.328**	.213**	1	.320**	.332**	.433**	.295**	.361**	0.111	.271**	.362**	.365**	47
Culture_CC2	.272**	.247**	.192**	.254**	0.006	.339**	-0.081	-0.051	-0.046	-0.023	.190**	.533**	.267**	.124*	.233**	.337**	0.031	.277**	.187**	.175**	.303**	-0.052	0.015	-0.011	.435**	.337**	.233**	.264**	.368**	.295**	.450**	.421**	-0.069	.451**	.280**	.320**	-0.046	.260**	.440**	.247**	0.011	-0.042	.220**	.423**	.287**	.192**	.370**	.411**	.271**	.320**	1	.414**	.304**	0.101	.210**	.261**	.219**	.211**	.176**	40
Culture_FC2	.381**	.393**	.373**	.324**	0.074	.601**	-0.076	-0.015	-0.094	-0.001	.208**	.416**	.328**	.294**	.191**	.411**	0.002	.472**	.323**	.197**	.470**	-0.002	0.084	-0.015	.335**	.345**	.292**	.186**	.403**	.339**	.400**	.319**	.117*	.371**	.327**	.334**	-0.007	.359**	.771**	.286**	-0.010	0.019	.197**	.406**	.393**	.259**	.481**	.540**	.265**	.332**	.414**	1	.256**	.162**	.244**	.251**	.355**	.333**	.258**	28
Flex_AI2	.233**	.199**	.256**	.279**	0.071	.261**	0.082	0.107	-0.023	0.082	.324**	.321**	.573**	.230**	.362**	.178**	0.072	.235**	.221**	.537**	.232**	0.110	0.003	.127*	.258**	.325**	.195**	.402**	.307**	.212**	.239**	.252**	0.070	.235**	.421**	.171**	0.102	.532**	.337**	.160**	-0.031	0.015	.344**	.307**	.265**	.168**	.282**	.257**	.225**	.433**	.304**	.256**	1	.267**	.409**	0.072	.346**	.354**	.383**	39
Flex_PA2	0.066	.148*	.171**	.160**	0.106	0.064	0.004	0.011	0.038	.224**	.347**	.129*	.324**	.234**	.325**	.155*	0.091	.241**	.172**	.159**	.186**	0.103	.113*	0.031	.160**	.138*	.130*	.245**	.386**	.211**	.165**	0.111	.167**	0.094	.328**	.186**	.150*	.316**	.131*	.203**	0.056	0.098	.312**	.117*	0.099	0.010	.255**	.237**	.321**	.305**	0.101	.162**	.367**	1	.412**	.219**	.276**	.372**	.254**	46
Flex_CK1	0.049	.231**	.315**	.331**	.145*	0.071	-0.037	0.042	-0.018	.173**	.487**	.266**	.414**	.171**	.328**	.121*	0.007	.261**	.283**	.225**	.191**	0.093	0.003	-0.063	.223**	.373**	.256**	.591**	.255**	.160**	.162**	.122*	.132*	.201**	.487**	.147*	0.089	.346**	.243**	0.062	0.019	0.053	.249**	.259**	.240**	0.102	.258**	.251**	.163**	.261**	.210**	.244**	.409**	.412**	1	.139*	.274**	.247**	.255**	47
Self_CP4	.230**	.141*	.166**	0.097	-0.052	.156*	-0.022	-0.015	0.069	0.072	0.058	.288**	.157*	.168**	0.049	.358**	-0.040	.276**	.264**	.149*	.142*	-0.016	-0.023	-0.075	.299**	.356**	.230**	0.111	.365**	.215**	.405**	.195**	0.050	.150*	0.112	.225**	0.007	.157*	.250**	.131*	-0.057	-0.009	0.071	.248**	.235**	0.044	.328**	.377**	.228**	0.111	.261**	.251**	0.072	.219**	.139*	1	0.048	0.060	0.007	52
Self_CO1	.199**	.122*	.130*	0.112	0.019	.229**	0.030	0.063	0.063	-0.037	.235**	.155*	.286**	0.097	.468**	.134*	0.047	.237**	0.039	.343**	.287**	0.068	0.081	0.038	0.105	0.088	0.028	.121*	.166**	0.097	.138*	.131*	0.051	.158*	.259**	0.111	0.048	.365**	.275**	.122*	-0.036	0.031	.301**	.197**	.149*	.172**	.159**	.263**	0.104	.271**	.219**	.355**	.346**	.276**	.274**	0.048	1	.660**	.477**	50
Life_CK2	0.088	.179**	.232**	.153*	0.021	.284**	-0.043	0.036	-0.024	-0.007	.313**	.170**	.367**	.136*	.560**	.154*	0.053	.140*	0.090	.256**	.298**	0.067	-0.031	-0.030	.133*	.227**	0.037	.257**	0.077	.262**	0.082	0.087	0.084	.258**	.257**	.154*	0.058	.280**	.268**	.164**	0.024	0.093	.388**	.196**	.224**	.315**	.138*	.289**	.179**	.362**	.211**	.333**	.354**	.272**	.347**	0.060	.660**	1	.538**	47
Life_R2	.126*	.205**	.215**	.212**	0.040	.325**	-0.038	0.082	0.107	0.081	.221**	0.101	.418**	.285**	.461**	.216**	0.085	0.105	.137*	.415**	.296**	0.096	0.023	-0.011	0.047	.246**	.121*	0.080	.145*	.174**	0.058	0.093	0.098	.164**	.289**	.160**	0.037	.413**	.250**	0.101	0.058	0.104	.350**	.117*	.252**	.168**	.145*	.228**	.216**	.365**	.176**	.258**	.383**	.254**	.255**	0.007	.477**	.538**	1	48

**. Correlation is significant at the 0.01 level (1-tailed).

*. Correlation is significant at the 0.05 level (1-tailed).

Appendix T Anti-image Matrices



a. Measures of Sampling Adequacy(MSA)

Appendix U

質問項目の日本語版

ここでの「メディア」とはインターネットメディアを指します。
（Twitter, Instagram, Facebook などのソーシャルメディア、テレビ番組や新聞、雑誌など）

批判的・倫理的思考力

#1　様々なメディア環境を活用して、情報に到達することができる。
#2　メディアから最新のニュースや情報を入手することができる。
#3　メディアメッセージには、曖昧さのないもとと暗黙的なものがあることに気づくことができる。
#4　メディアメッセージを制作者、種類、目的などによって分類することができる。
#5　メディア情報を信頼性、信ぴょう性、客観性、最新性の観点から評価することができる。
#6　メディアメッセージの内容にコマーシャルメッセージが含まれているかどうかを判断することができる。
#7　法的で、倫理的なルール（著作権、人権など）の観点からメディアを評価することができる。

メディアコンテンツとツール管理スキル

#8　様々なメディアや情報提供者を通して、必要な情報やメディアコンテンツにアクセスすることができる。
#9　適切な技術やツールを用いて、検索した情報やメディアコンテンツを選択し、整理し、保管することができる。
#10 必要に応じ、検索する方法を改善することができる
#11 様々な人、グループ、組織、または様々な地位や階級にいる人に連絡し、相談したり、連携したり、質問を考案したりすることができる。
#12 様々な手段やツールを使って、社会的、公的な活動に参加することができる。

技術およびコミュニケーションスキル

#13 メディアにおける基本的な操作ツール（ボタン、ハイパーリンク、ファイル転送など）を使うことができる。
#14 メディアコンテンツ（テキスト、画像、動画など）作成に必要なソフトウェアを使うことができる。
#15 インターネット上でデジタルメディアコンテンツやメッセージを共有することができる。